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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release from	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes

1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2			
2002	PSF	yes		
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2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
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1.4 idna 2.10

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Found in path(s):

```
* /opt/cola/permits/1110905341_1606871385.15/0/kjd-idna-v2-10-0-ge5c11db-1-tar-gz/kjd-idna-b8defb9/LICENSE.rst
```

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A library to support the Internationalised Domain Names in Applications (IDNA) protocol as specified in RFC 5890 et.al. This new methodology, known as IDNA 2008, can generate materially different results to the previous standard. The library can act as a drop-in replacement for the "encodings.idna" module.

```
import io, sys
from setuptools import setup
```

```
def main():
```



```

python_version = sys.version_info[:2]
if python_version < (2,7):
    raise SystemExit("Sorry, Python 2.7 or newer required")

package_data = {}
exec(open('idna/package_data.py').read(), package_data)

arguments = {
    'name': 'idna',
    'packages': ['idna'],
    'version': package_data['__version__'],
    'description': 'Internationalized Domain Names in Applications (IDNA)',
    'long_description': io.open("README.rst", encoding="UTF-8").read(),
    'author': 'Kim Davies',
    'author_email': 'kim@cynosure.com.au',
    'license': 'BSD-like',
    'url': 'https://github.com/kjd/idna',
    'classifiers': [
        'Development Status :: 5 - Production/Stable',
        'Intended Audience :: Developers',
        'Intended Audience :: System Administrators',
        'License :: OSI Approved :: BSD License',
        'Operating System :: OS Independent',
        'Programming Language :: Python',
        'Programming Language :: Python :: 2',
        'Programming Language :: Python :: 2.7',
        'Programming Language :: Python :: 3',
        'Programming Language :: Python :: 3.4',
        'Programming Language :: Python :: 3.5',
        'Programming Language :: Python :: 3.6',
        'Programming Language :: Python :: 3.7',
        'Programming Language :: Python :: 3.8',
        'Programming Language :: Python :: Implementation :: CPython',
        'Programming Language :: Python :: Implementation :: PyPy',
        'Topic :: Internet :: Name Service (DNS)',
        'Topic :: Software Development :: Libraries :: Python Modules',
        'Topic :: Utilities',
    ],
    'python_requires': '>=2.7, !=3.0.*, !=3.1.*, !=3.2.*, !=3.3.*',
}

setup(**arguments)

if __name__ == '__main__':
    main()

```

Found in path(s):

* /opt/cola/permits/1110905341_1606871385.15/0/kjd-idna-v2-10-0-ge5c11db-1-tar-gz/kjd-idna-b8defb9/setup.py

1.5 dmidecode 3.5

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1.7 tenacity 7.0.0

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1.8 msgpack 1.0.2

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1.9 urllib3 1.26.5

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Contributions to the urllib3 project

Creator & Maintainer

* Andrey Petrov <andrey.petrov@shazow.net>

Contributors

In chronological order:

- * victor.vde <<http://code.google.com/u/victor.vde/>>
 - * HTTPS patch (which inspired HTTPSConnectionPool)
- * erikcederstrand <<http://code.google.com/u/erikcederstrand/>>
 - * NTLM-authenticated HTTPSConnectionPool
 - * Basic-authenticated HTTPSConnectionPool (merged into make_headers)
- * niphlod <niphlod@gmail.com>
 - * Client-verified SSL certificates for HTTPSConnectionPool
 - * Response gzip and deflate encoding support
 - * Better unicode support for filepost using StringIO buffers
- * btoconnor <brian@btoconnor.net>
 - * Non-multipart encoding for POST requests
- * p.dobrogost <<http://code.google.com/u/@WBRSRIBZDhBFXQB6/>>
 - * Code review, PEP8 compliance, benchmark fix
- * kennethreitz <me@kennethreitz.com>
 - * Bugfixes, suggestions, Requests integration
- * georgemarshall <<https://github.com/georgemarshall>>
 - * Bugfixes, Improvements and Test coverage
- * Thomas Kluyver <thomas@kluyver.me.uk>
 - * Python 3 support
- * brandon-rhodes <<http://rhodesmill.org/brandon>>
 - * Design review, bugfixes, test coverage.
- * studer <theo.studer@gmail.com>
 - * IPv6 url support and test coverage
- * Shivaram Lingamneni <slingamn@cs.stanford.edu>
 - * Support for explicitly closing pooled connections
- * hartator <hartator@gmail.com>
 - * Corrected multipart behavior for params
- * Thomas Weischuh <thomas@t-8ch.de>
 - * Support for TLS SNI
 - * API unification of ssl_version/cert_reqs

- * SSL fingerprint and alternative hostname verification
- * Bugfixes in testsuite

- * Sune Kirkeby <mig@ibofobi.dk>
- * Optional SNI-support for Python 2 via PyOpenSSL.

- * Marc Schlaich <marc.schlaich@gmail.com>
- * Various bugfixes and test improvements.

- * Bryce Boe <bbzbryce@gmail.com>
- * Correct six.moves conflict
- * Fixed pickle support of some exceptions

- * Boris Figovsky <boris.figovsky@ravellosystems.com>
- * Allowed to skip SSL hostname verification

- * Cory Benfield
- <<https://lukasa.co.uk/about/>>
- * Stream method for Response objects.
- * Return native strings in header values.
- * Generate 'Host' header when using proxies.

- * Jason Robinson <jaywink@basshero.org>
- * Add missing WrappedSocket.fileno method in PyOpenSSL

- * Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
- * Fixed a race condition

- * Stanislav Vitkovskiy <stas.vitkovsky@gmail.com>
- * Added HTTPS (CONNECT) proxy support

- * Stephen Holsapple <sholsapp@gmail.com>
- * Added abstraction for granular control of request fields

- * Martin von Gagern <Martin.vGagern@gmx.net>
- * Support for non-ASCII header parameters

- * Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
- * Support for separate connect and request timeouts

- * Peter Waller <p@pwaller.net>
- * HTTPResponse.tell() for determining amount received over the wire

- * Nipunn Koorapati <nipunn1313@gmail.com>
- * Ignore default ports when comparing hosts for equality

- * Danilo @dbrgn <<https://dbrgn.ch/>>

- * Disabled TLS compression by default on Python 3.2+
- * Disabled TLS compression in pyopenssl contrib module
- * Configurable cipher suites in pyopenssl contrib module

- * Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
- * Account retries on proxy errors

- * Nicolas Delaby <nicolas.delaby@ezeep.com>
- * Use the platform-specific CA certificate locations

- * Josh Schneier <https://github.com/jschneier>
- * HTTPHeaderDict and associated tests and docs
- * Bugfixes, docs, test coverage

- * Tahia Khan <http://tahia.tk/>
- * Added Timeout examples in docs

- * Arthur Grunseid <https://grunseid.com>
- * source_address support and tests (with https://github.com/bui)

- * Ian Cordasco <graffatcolmingov@gmail.com>
- * PEP8 Compliance and Linting
- * Add ability to pass socket options to an HTTP Connection

- * Erik Tollerud <erik.tollerud@gmail.com>
- * Support for standard library io module.

- * Krishna Prasad <kprasad.iitd@gmail.com>
- * Google App Engine documentation

- * Aaron Meurer
<asmeurer@gmail.com>
- * Added Url.url, which unparses a Url

- * Evgeny Kapun <abacabadabacaba@gmail.com>
- * Bugfixes

- * Benjamin Meyer <bm_witness@yahoo.com>
- * Security Warning Documentation update for proper capture

- * Shivan Sornarajah <github@sornars.com>
- * Support for using ConnectionPool and PoolManager as context managers.

- * Alex Gaynor <alex.gaynor@gmail.com>
- * Updates to the default SSL configuration

- * Tomas Tomecek <ttomecek@redhat.com>
- * Implemented generator for getting chunks from chunked responses.

- * tlynn <<https://github.com/tlynn>>
- * Respect the warning preferences at import.

- * David D. Riddle <ddriddle@illinois.edu>
- * IPv6 bugfixes in testsuite

- * Thea Flowers <magicalgirl@google.com>
- * App Engine environment tests.
- * Documentation re-write.

- * John Krauss <<https://github.com/talos>>
- * Clues to debugging problems with `cryptography` dependency in docs

- * Disassem <<https://github.com/Disassem>>
- * Fix pool-default headers not applying for url-encoded requests like GET.

- * James Atherfold <jlatherfold@hotmail.com>
- * Bugfixes relating to cleanup of connections during errors.

- * Christian Pedersen <<https://github.com/chripede>>
- * IPv6 HTTPS proxy bugfix

- * Jordan Moldow <<https://github.com/jmoldow>>
- * Fix low-level exceptions leaking from ``HTTPResponse.stream()``.
- * Bugfix for ``ConnectionPool.urlopen(release_conn=False)``.
- * Creation of ``HTTPConnectionPool.ResponseCls``.

- * Predrag Gruevski <<https://github.com/obi1kenobi>>
- * Made cert digest comparison use a constant-time algorithm.

- * Adam Talsma <<https://github.com/a-tal>>
- * Bugfix to ca_cert file paths.

- * Evan Meagher <<https://evanmeagher.net>>
- * Bugfix related to `memoryview` usage in PyOpenSSL adapter

- * John Vandenberg <jayvdb@gmail.com>
- * Python 2.6 fixes; pyflakes and pep8 compliance

- * Andy Caldwell <andy.m.caldwell@gmail.com>
- * Bugfix related to reusing connections in indeterminate states.

- * Ville Skytt <ville.skytta@iki.fi>
- * Logging efficiency improvements, spelling fixes, Travis config.

- * Shige Takeda <smtakeda@gmail.com>
- * Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response

- * Jess Shapiro <jesse@jesseshapiro.net>
- * Various character-encoding fixes/tweaks
- * Disabling IPv6 DNS when IPv6 connections not supported

- * David Foster <http://dafoster.net/>
- * Ensure order of request and response headers are preserved.

- * Jeremy Cline <jeremy@jcline.org>
- * Added connection pool keys by scheme

- * Aviv Palivoda <palaviv@gmail.com>
- * History list to Retry object.
- * HTTPResponse contains the last Retry object.

- * Nate Prewitt <nate.prewitt@gmail.com>
- * Ensure timeouts are not booleans and greater than zero.
- * Fixed infinite loop in ``stream`` when amt=None.
- * Added length_remaining to determine remaining data to be read.
- * Added enforce_content_length to raise exception when incorrect content-length received.

- * Seth Michael Larson <sethmichaellarson@protonmail.com>
- * Created selectors backport that supports PEP 475.

- * Alexandre Dias <alex.dias@smarkets.com>
- * Don't retry on timeout if method not in whitelist

- * Moinuddin Quadri <moin18@gmail.com>
- * Lazily load idna package

- * Tom White <s6yg1ez3@mail2tor.com>
- * Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.

- * Tim Burke <tim.burke@gmail.com>
- * Stop buffering entire deflate-encoded responses.

- * Tuukka Mustonen <tuukka.mustonen@gmail.com>
- * Add counter for status_forcelist retries.

- * Erik Rose <erik@mozilla.com>
- * Bugfix to pyopenssl vendoring

- * Wolfgang Richter <wolfgang.richter@gmail.com>
- * Bugfix related to loading full certificate chains with PyOpenSSL backend.

- * Mike Miller <github@mikeage.net>

- * Logging improvements to include the HTTP(S) port when opening a new connection

- * Ioannis Tziakos <mail@itziakos.gr>
- * Fix ``util.selectors._fileobj_to_fd`` to accept ``long``.
- * Update appveyor tox setup to use the 64bit python.

- * Akamai
(through Jess Shapiro) <jshapiro@akamai.com>
- * Ongoing maintenance; 2017-2018

- * Dominique Leuenberger <dimstar@opensuse.org>
- * Minor fixes in the test suite

- * Will Bond <will@wbond.net>
- * Add Python 2.6 support to ``contrib.securetransport``

- * Aleksei Alekseev <alekseev.yeskela@gmail.com>
- * using auth info for socks proxy

- * Chris Wilcox <git@crwilcox.com>
- * Improve contribution guide
- * Add ``HTTPResponse.geturl`` method to provide ``urllib2.urlopen().geturl()`` behavior

- * Bruce Merry <https://www.brucemerry.org.za>
- * Fix leaking exceptions when system calls are interrupted with zero timeout

- * Hugo van Kemenade <https://github.com/hugovk>
- * Drop support for EOL Python 2.6

- * Tim Bell <https://github.com/timb07>
- * Bugfix for responses with Content-Type: message/* logging warnings

- * Justin Bramley <https://github.com/jbramleycl>
- * Add ability to handle multiple Content-Encodings

- * Katsuhiko YOSHIDA <https://github.com/kyoshidajp>
- * Remove Authorization header
regardless of case when redirecting to cross-site

- * James Meickle <https://permadeath.com/>
- * Improve handling of Retry-After header

- * Chris Jerdonek <chris.jerdonek@gmail.com>
- * Remove a spurious TypeError from the exception chain inside
HTTPConnectionPool._make_request(), also for BaseExceptions.

- * Jorge Lopez Silva <https://github.com/jalopezsilva>
- * Added support for forwarding requests through HTTPS proxies.

- * Benno Rice <benno@jeamland.net>
- * Allow cadata parameter to be passed to underlying ``SSLContext.load_verify_locations()``.

- * Keiichi Kobayashi <abok.1k@gmail.com>
- * Rename VerifiedHTTPSConnection to HTTPSConnection

- * Himanshu Garg <garg_himanshu@outlook.com>
- * DOC & LICENSE Update

- * Hod Bin Noon <bin.noon.hod@gmail.com>
- * Test improvements

- * Chris Olufson <tycarac@gmail.com>
- * Fix for connection not being released on HTTP redirect and response not preloaded

- * [Bastiaan Bakker] <https://github.com/bastiaanb>
- * Support for logging session keys
via environment variable ``SSLKEYLOGFILE`` (Python 3.8+)

- * [Ezzeri Esa] <https://github.com/savarin>
- * Ports and extends on types from typeshed

- * [Your name or handle] <[email or website]>
- * [Brief summary of your changes]

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1.10 python-requests 2.26.0

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1.11 bridgeutils 1.5

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1.13 distlib 0.3.3

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes

2.1.3				
2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
3.1.1	3.1	2009	PSF	yes
3.1.2	3.1	2010	PSF	yes
3.2	3.1	2010	PSF	yes

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's

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=====
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=====

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distlib has started off using some of the code from distutil2.

If you're making a patch, please add your name below in alphabetical order,
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1.17 modern-go-concurrent 0.0.0-20180306012644-bacd9c7ef1dd

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1.18 josharian-intern 1.0.0

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1.19 goautoneg 0.0.0-20191010083416-a7dc8b61c822

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1.20 spf13-pflag 1.0.5

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1.21 errors 0.9.1

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1.22 libcomps 0.1.18

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1.25 alpine-keys 2.4-r1

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1.26 pygobject 3.40.1

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1.27 fdisk 2.37.4

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1	32	7679	7648	3.7M		8f8378c0-01
2	7680	16383	8704	4.3M		8f8378c0-02
5	7936	12799	4864	2.4M		
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1.29 t-tomalak-logrus-easy-formatter 0.0.0-20190827215021-c074f06c5816

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1.30 six 1.15.0

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The primary author and maintainer of six is Benjamin Peterson. He would like to acknowledge the following people who submitted bug reports, pull requests, and otherwise worked to improve six:

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1.31 groupcache 0.0.0-20210331224755-41bb18bfe9da

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1.32 python-certifi 2021.05.30

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ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#

This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:

<http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#>

It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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@(#) \$RCSfile: certdata.txt,v \$

\$Revision: 1.80 \$ \$Date: 2011/11/03 15:11:58 \$

1.33 chardet 4.0.0

1.33.1 Available under license :

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1.34 html5lib 1.1

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1.36 psocks 1.7.1

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1.37 go-openapi-swag 0.22.3

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1.38 x-time-rate 0.3.0

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1.39 go-openapi-jsonpointer 0.19.6

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1.40 go-openapi-jsonreference 0.20.2

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1.41 gogo-protobuf 1.3.2

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1.42 python3-decorator 4.4.2-6.el9

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1.43 langpacks-core-en 3.0-16.el9

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1.44 python3-object-base-noarch 3.40.1-6.el9

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* /opt/cola/permits/1584951174_1692872448.0366485/0/langpacks-3.0-16.el9.src.rpm-cosi-expand-archive-4zImGCnN/langpacks.spec

1.48 python-chardet 4.0.0-5.el9

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A "covered work" means either the unmodified Program or a work based on the Program.

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To "convey" a work means any kind of propagation that enables other

parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

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1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

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```
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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License.

Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

- a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application

to use the modified definitions.)

- b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.
- c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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Version 2, June 1991

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However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while

preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If

identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition,

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This option is useful when you wish to copy part of the code of the

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to

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5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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Appendix: How to Apply These Terms to Your New Libraries

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<one line to give the library's name and a brief idea of what it does.>

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Here is a sample; alter the names:

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<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

That's all there is to it!

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Version 3, 29 June 2007

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extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The

"System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

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it, and giving a relevant date.

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7. This requirement modifies the requirement in section
4 to
"keep intact all notices".

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in or on a volume of a storage or distribution
medium, is called an
"aggregate" if the compilation and its resulting copyright are not
used to limit the access or legal rights of the compilation's users
beyond what the individual works permit. Inclusion of a covered work
in an aggregate does not cause this License to apply to the other
parts of the aggregate.

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```
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```

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1.52 dbus-broker 28-7.el9

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1.53 python3-object-base 3.40.1-6.el9

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Any

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```

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```
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```

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1.57 libutempter 1.2.1-6.el9

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Version 2.1, February 1999

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2)

will operate properly
with a modified version of the library, if
the user installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

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Upstream-Name: liblz4

Upstream-Contact: Yann Collet <Cyan4973@github.com>

Source: <https://github.com/lz4/lz4>

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1.64 libreport-filessystem 2.15.2-6.el9

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1.66 python3-pysocks 1.7.1-12.el9

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1.67 libidn 2.3.0-7.el9

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```

```
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```

```
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```
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```

it

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<signature of Ty Coon>, 1 April 1989

Ty Coon, President of Vice

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1.68 python-six 1.15.0-9.el9

1.68.1 Available under license :

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1.69 python3-gpg 1.15.1-6.el9

1.69.1 Available under license :

```
(21:protected-private-key(3:elg(1:p129:|B36I(s7)+ZJ/pvE;"tg7N ca"Gxvnyu&bB#h'7=89&oG
R<hO)(1:g1:)(1:y128:Ji]WU_UP}AQ\YMhAl|2e{ _tcMNDg]{ QnWsK 4pY{ $bDCs)(9:protected25:openpgp-s2k3-
sha1-aes-cbc((4:sha18:JcE7:6452224)16: i[Q*vK)192:FJA!O!ZAF
biJ&Tsb!t
&9@R\~V+x>?sedDz-W(yqf?u^e?s1saV8<T0:tC5%ZMh?$|,y_e[1D)(12:protected-at15:20130812T105135)))
(21:protected-private-key(3:elg(1:p129:W#} }l; ;m>
;4YV$Qg
LoLy~*Tru*+ID8"-9,:17^g*({ #7)(1:g1:)(1:y128:2o62,Tj/
rRi3sSS iCAYNYbVtAHKi7(UPp)?Od{ 'R^f)(9:protected25:openpgp-s2k3-sha1-aes-
cbc((4:sha18:fw^E7:5242880)16:aqR)192:5f1a-`{^EV699WoB\,:Rs1*W6Lu iZ
:=ZqURM47;pA3#DL
so8O)Th^P@IP0&.DR;"rkN7)(12:protected-at15:20101008T070216)))
#+TITLE: GPGME Python Bindings HOWTO Examples
#+LATEX_COMPILER: xelatex
```

```
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

* Examples

```
:PROPERTIES:
:CUSTOM_ID: gpgme-python3-examples
:END:
```

The contents of this directory are the examples included in the /GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO/ file. Each script is explicitly for Python 3 and specifically for Python 3.4 or later.

Some of these scripts may work with Python 2.7, but there are no guarantees. They will include the relevant imports from the `__future__` module to facilitate that if possible.

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```
:PROPERTIES:
:CUSTOM_ID: copyright-and-license
:END:
```

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```
:PROPERTIES:
:CUSTOM_ID: copyright
:END:
```

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** License GPL compatible

```
:PROPERTIES:
:CUSTOM_ID: license
:END:
```

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cython

;;; gpgme-package.lisp

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;;; Conventions:

;;;

;;; gpg-error is used for error handling.

;;;

;;; Standard I/O streams are used for input and output.

```
(defpackage #:gpgme
  (:use #:common-lisp #:cffi #:gpg-error)
  (:import-from #:trivial-garbage
    #:finalize)
  (:export #:check-version
    #:*version*
    #:context
    #:protocol
    #:armorp
    #:textmodep
    #:+include-certs-default+
    #:include-certs
```

#:keylist-mode
#:signers
#:sig-notations
#:with-context
#:key-data
#:get-key
#:op-encrypt
#:op-decrypt
#:op-sign
#:op-verify
#:op-import
#:op-export))

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-05-12 Marcus Brinkmann <marcus@g10code.com>

* gpgme.texi (I/O Callback Example): Fix example code.

* gpgme.texi (Generating Keys): Fix OpenPGP parameters and reference GPG and GPGSM manual.

2010-01-05 Werner Koch <wk@g10code.com>

* gpgme.texi (Changing Passphrases): New.

2009-07-21 Werner Koch <wk@g10code.com>

* uiserver.texi (UI Server Encrypt): Add --expect-sign option to PREP_ENCRYPT.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Result Management): New section.

2009-06-16 Werner Koch <wk@g10code.com>

* gpgme.texi (Exporting Keys): Document gpgme_op_export_keys.
(Importing Keys): Document gpgme_op_import_keys.
(Data Buffer Meta-Data): Document URL encodings.

2009-05-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Document selftest error.
(Creating Contexts): Likewise.

2009-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_ENCRYPT_NO_ENCRYPT_TO.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Replace path by file_name.

2008-11-28 Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Change description of the return
value to match the code. Spotted by Colin Leroy.

2008-10-15 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Add option
--protocol to the SENDER command.

2008-07-17 Werner Koch <wk@g10code.com>

* module-overview.sk: New.

2008-07-04 Werner Koch <wk@g10code.com>

* gpgme.texi (Algorithms): Add a hint on symmetric only encryption.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancellation): Document gpgme_cancel_async.

2008-06-25

Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Updated example to the current API.
Noted by Nico Schottelius.

2008-06-05 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Describe
START_CONFDialog.

2008-06-04 Werner Koch <wk@g10code.com>

* gpgme.texi: Use @copying command. Change license to

GPLv3. Include protocol specs from GpgOL and GPGEx. Minor cleanups.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (File Based Data Buffers): Document the need for blocking operations.
(Callback Based Data Buffers): Likewise.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Rename snippet function to `init_gpgme`.
(I/O Callback Example): Call it here.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Document that data encoding affects some output data objects now.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Protocols and Engines):
Document `GPGME_PROTOCOL_UNKNOWN`.

2007-09-11 Werner Koch <wk@g10code.com>

* gpgme.texi (I/O Callback Example): Typo fix.

2007-08-07 Werner Koch <wk@g10code.com>

* gpgme.texi (Verify): Describe `chain_model`.

2007-07-12 Werner Koch <wk@g10code.com>

* gpgme.texi (Library Version Check): Add remark that the socket layer will get initialized.

2007-06-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Advanced Key Editing): New section.

2007-05-21 Werner Koch <wk@g10code.com>

* `Makefile.am` (online): New target.

2007-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Fix documentation of
gpgme_strerror_r.

2006-11-01 Moritz Schulte <moritz@g10code.com>

* gpgme.texi (Data Buffer I/O Operations): Fixed entry for
gpgme_data_seek: OFFSET is not a pointer; some s/whence/offset/.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Clarify that
gpgme_data_release_and_get_mem destroys DH unconditionally.

2005-03-24

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Make example code compatible
to W32 systems.

2006-06-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix inverted condition in
description.

2005-12-20 Werner Koch <wk@g10code.com>

* gpgme.texi (Verify): Document pka_trust.

2005-12-06 Werner Koch <wk@g10code.com>

* gpgme.texi (Key Management): Updated to match the fixes for
subkey fingerprints and the secret flag.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Document gpgme_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add the new member notations of
gpgme_sig_key_t.
(Key Listing Mode): Document GPGME_KEYLIST_MODE_SIG_NOTATIONS.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Enclose all return parameters of dectypes in
curly brackets.

* gpgme.texi (Signature Notation Data): New section.

(Verify): Added more about the notation data structure.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Data Buffer I/O Operations, Data Buffer Meta-Data): New subsections.

* gpgme.texi: Replace plaintext_filename with file_name.

* gpgme.texi (Key Management): Document is_qualified.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Decrypt): Add plaintext_filename to gpgme_decrypt_result_t.

(Verify): Likewise for gpgme_verify_result_t.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Add information about new fields in gpgme_signature_t.

* gpgme.texi (Decrypt): Add gpgme_recipient_t.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Fix return type of gpgme_set_keylist_mode.

Reported by "Sergio" <ml_sergico@virgilio.it>.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Included Certificates): Document GPGME_INCLUDE_CERTS_DEFAULT.

2005-01-12 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Configuration): New section. (Crypto Engine): New subsection.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* lesser.texi (Library Copying): Change from @appendixsec to @appendix.

* gpgme.texi (Features): Change reference to GPL to one to LGPL.

* Makefile.am: Change license to LGPL.
(gpgme_TEXINFOS): Replace gpl.texi with lesser.texi.

* gpgme.texi: Change license to LGPL (also for documentation of GPGME's license).
* lesser.texi: New file.
* gpl.texi: File removed.

* gpgme.texi (Creating Contexts): Fix cut&paste error. Reported by Noel Torres <envite@rolamasao.org>.

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgme_TEXINFOS): Remove fdl.texi.
* gpgme.texi: Do not include fdl.texi. Change license to GPL.
* fdl.texi: File removed.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Change type of keylist_mode in gpgme_key_t to gpgme_keylist_mode_t.

2004-09-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix last change.

2004-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document GPG_ERR_NOT_IMPLEMENTED.

* gpgme.texi: Update copyright year for tex version.

2004-07-29 Moritz Schulte <moritz@g10code.com>

* gpgme.texi (Verify): Fix gpgme_get_key example (ancient force_update argument was still there).

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Elaborate on the length restrictions on search patterns.

* gpgme.texi (Decrypt and Verify): Document the NO_DATA error code.

(Verify): Document the relationship between gpgme_op_verify_result

and the decrypt and verify operations.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.text (Verify): Document GPG_ERR_CERT_REVOKED status.

* gpgme.text (Decrypt): Add note about new field wrong_key_usage of gpgme_decrypt_result_t.

* gpgme.text (Key Management): Add note about new field keylist_mode of gpgme_key_t.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.text (Verify): Correct type of member wrong_key_usage.

2004-03-29 Moritz Schulte <moritz@duesseldorf.ccc.de>

* gpgme.text (Verify): Fix type of gpgme_op_verify_result.

* gpgme.text (Key Listing Mode): Typo fix.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.text (Library Version Check): Fix the instruction when to set the locale.

2004-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.text (I/O Callback Example Qt): New section by Marc Mutz.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.text (cancellation): New section.

2004-02-17 Werner Koch <wk@gnupg.org>

* gpgme.text (Key Listing Mode): Doc KEYLIST_MODE_VALIDATE.

2004-02-06 Moritz Schulte <mo@g10code.com>

* gpgme.text: A couple of small fixes regarding the Largfile Support section.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

* gpgme.text (Largefile Support): New

section.

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Fix exportable field.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Rename member class in
gpgme_key_sig_t to sig_class.

(Creating a Signature): Likewise for gpgme_signature_t.

2003-12-23 Moritz Schulte <mo@g10code.com>

* gpgme.texi (Listing Keys): Minor clarification for
gpgme_get_key.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Signal Handling): New section.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Correct documentation on memory
synchronization requirement.

* gpgme.texi (Locale): New section.

(Multi Threading): Set locale in example.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Add gpgme_strerror_r.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Update documentation.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

*

gpgme.texi (Header): We don't use the assuan namespace anymore.
Document new thread options.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Change type of member class
to unsigned int.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Get error code from SIG->status in the code for gpgme_get_sig_status.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add can_authenticate flag.

* gpgme.texi (Listing Keys): Document GPG_ERR_AMBIGUOUS_NAME for gpgme_get_key.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (EXTRA_DIST): Remove variable.

* gpgme.texi (Encrypting a Plaintext): Bad passphrase is only possible with symmetric encryption, change the wording to reflect that.

* gpgme.texi (Creating a Signature): Document GPG_ERR_UNUSABLE_SECKEY.

* gpgme.texi (Encrypting a Plaintext): Mention encrypt and sign operations in result function.
(Creating a Signature): Likewise.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Remove word duplication.
(Listing Keys): Remove mentioning of force argument.
(Verify): Don't mention r_stat. Fix some typos.
(Decrypt and Verify): Correct info how to get the result. Don't mention r_stat.
(Manipulating Data Buffers): Fix documentation of return value.
(Listing Keys): Update examples.
(Decrypt): Result might also be available when operation failed.
(Verify): Result might also be available when operation failed.
All spotted by Stphane Corthisy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Sources): Fix cut and paste error.

2003-07-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Clarify difference between can_sign

and can_certify.

(Information About Keys): Likewise for GPGME_ATTR_CAN_SIGN and GPGME_ATTR_CAN_CERTIFY.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Progress Meter Callback): Change return type of gpgme_progress_cb_t to void.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add 2003 to copyright notice.

* gpgme.texi (Header): Fix name space documentation on libgpg-error.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove reference to gpgme_recipients_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Crypto Operations): Rename gpgme_invalid_user_id_t to gpgme_invalid_key_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Change error codes to GPG_ERR_* variants. (Error Handling): Rewritten.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Exporting Keys): Change and document prototypes. Add new gpgme_op_export_ext and gpgme_op_export_ext_start variants.

(Selecting Recipients): Section removed.

(Encrypting a Plaintext): Change prototypes and document the changes.

2003-05-28 Marcus Brinkmann <marcus@g10code.de>

*

gpgme.texi (Exporting Keys): Change argument type from gpgme_recipient_t to gpgme_user_id_t.

(Encrypting a Plaintext): Likewise.

(Selecting Recipients): Rewritten.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Protocol Selection): Do not use @acronym in @node because that breaks texi2dvi.

* gpgme.texi (Passphrase Callback): Document new prototype.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Header): Remove Gpgme as namespace prefix. Add _GPGME to namespace prefix.

* gpgme.texi (Multi Threading): Add note about link order.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document what happens if key is not found.

* gpgme.texi (Importing Keys): Fix cut and paste error.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Remove reference to gpgme_get_op_info.

(Detailed Results): Subsection removed.

* gpgme.texi (Key Listing Mode): Add GPGME_KEYLIST_MODE_SIGS.

(Manipulating

Keys): Add obsolescence note.

(Key Signatures): Likewise.

(Information About Keys): Likewise.

(Key Management): Add new data types GpgmeSubkey, GpgmeKeySig, GpgmeUserID, and all the information about GpgmeKey.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Remove force_update argument from gpgme_get_key.

* gpgme.texi (Trust Item Management): Add data members of GpgmeTrustItem type.

(Information About Trust Items): Add note about obsolescence.

(Manipulating Trust Items): Add gpgme_trust_item_ref and gpgme_trust_item_unref.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Rewritten to take into account new and deprecated functions and data types.

* gpgme.texi (Decrypt): Descript gpgme_op_decrypt_result and GpgmeDecryptResult.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Add info about GpgmeEncryptResult and gpgme_op_encrypt_result.

* gpgme.texi
(Creating a Signature): Add info about GpgmeNewSignature, GpgmeSignResult and gpgme_op_sign_result.
(Crypto Operations): Add GpgmeInvalidUserID.
(Algorithms): New chapter.

* gpgme.texi (Deleting Keys): Document GPGME_Ambiguous_Specification.
(Error Values): Remove GPGME_Invalid_Type and GPGME_Invalid_Mode.
Add GPGME_Unknown_Reason, GPGME_Not_Found, GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage, GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known, GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key, GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long, GPGME_Unsupported_Algorithm, GPGME_Sig_Expired, GPGME_Bad_Signature, GPGME_No_Public_Key.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Change GPGME_IMPORT_PRIVATE to GPGME_IMPORT_SECRET.

* gpgme.texi (Importing Keys): Remove note about gpgme_get_op_info.
(Detailed Results): Remove note about import.

* gpgme.texi (Importing Keys): Add documentation for GpgmeImportStatus, GpgmeImportResult and gpgme_op_import_result.

* gpgme.texi (Generating Keys): Fix documentation of public and secret arguments.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document changed gpgme_op_genkey and new gpgme_op_genkey_result function. Document GpgmeGenKeyResult data type.

* gpgme.texi (Error Values): Rename GPGME_No_Passphrase to GPGME_Bad_Passphrase.

* gpgme.texi (Decrypt): Likewise.

(Decrypt and Verify): Likewise.

(Creating a Signature): Likewise.

(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Rename GPGME_No_Recipients to GPGME_No_UserID and GPGME_Invalid_Recipient to GPGME_Invalid_UserID.

(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Remove GPGME_Busy and GPGME_No_Request.

(Listing Keys): Likewise.

(Listing Trust Items): Likewise.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancelling an Operation): Removed.

(Passphrase

Callback): Document new type for GpgmePassphraseCb.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Rename member part to file_name.

* gpgme.texi (Protocols and Engines): Document gpgme_get_protocol_name.

* gpgme.texi (Engine Information): Rewritten.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (I/O Callback Interface): Document new even

GPGME_EVENT_START.

(Waiting For Completion): Document new possible return values.

(I/O Callback Interface): Document return type of GpgmeIOCb.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Hooking Up Into Idle Time): Section removed.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Drop R_STAT argument in gpgme_op_verify.

* gpgme.texi (Decrypt and Verify): Likewise for

gpgme_op_decrypt_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document that GPGME_ATTR_IS_SECRET is not representable as a string anymore.

2002-12-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Signatures): New section.
(Listing Keys): Add gpgme_get_key.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Memory Based Data Buffers): New subsection.
(File Based Data Buffers): Likewise.
(Callback Based Data Buffers): Likewise.
(Manipulating Data Buffers): Update interfaces. Add gpgme_data_seek.
* gpgme.texi (Engine Version Check): Remove gpgme_check_engine.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document the new interface.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document new argument to gpgme_op_genkey.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Fix prototype of gpgme_get_sig_key.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Selecting Signers): Fix reference count.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Header): Document name space.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Document gpgme_op_import_ext.

* gpgme.texi (Importing Keys): Undocument EOF.

2002-08-14 Werner Koch <wk@gnupg.org>

* gpgme.texi (Information About Keys): Changed GPGME_ATTR_TYPE.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Say that secret keys might not be deleted.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document (badly) the new key attributes.

* gpgme.texi (Manipulating Data Buffers): Mention that backend tries to detect encoding automatically.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Run Control): Update this section.
(Waiting For Completion): Likewise for this subsection.
(Cancelling an Operation): Likewise for this subsection.
(Using External Event Loops): New subsection with several subsubsections.

2002-06-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove item about the need to synchronize anything against gpgme_wait (except gpgme_wait itself).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Fix documentation for IDX.
(Information About Trust Items): Likewise.

2002-06-26 Werner Koch <wk@gnupg.org>

* gpgme.texi (Importing Keys): Document the return value -1 of gpgme_op_import.

2002-06-20 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Explain the new whatidx variable.

2002-06-10 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Document attribute GPGME_ATTR_ERRTOK.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Document new autodetection.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (DISTCLEANFILES): New variable.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some typographical corrections throughout.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Using Automake): New section.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Escape { and }.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Overview): Replace note about thread-safeness.
(Multi Threading): New section.

2002-05-03 Werner Koch <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): Changed some data types to void*.

(Protocol Selection): Added gpgme_get_protocol.

(Verify): Updated to include the new attribute functions and status codes.

2002-04-27 Werner Koch <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): New type GpgmeDataEncoding.

2002-04-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document that either return argument can be NULL.

(Progress Meter Callback): Likewise.

2002-04-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix small typo. Document the new function gpgme_get_passphrase_cb. (Progress Meter Callback): Document the new function gpgme_get_progress_cb.

2002-04-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Fix function name. Reported by Wichert Ackerman <wichert@debian.org>.

2002-03-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (direntry): End index entry with a full stop. Patch submitted by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Fix syntax error in last change.

2002-03-08 Werner Koch <wk@gnupg.org>

* gpgme.texi (Detailed Results): Import does also return info.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document symmetric encryption.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Add example.
* gpgme.texi (Listing Keys): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

*
gpgme.texi (Information About Keys): Document GPGME_ATTR_EXPIRE.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document verification of normal and cleartext signatures.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document gpgme_op_keylist_ext_start.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_Invalid_Recipients.
(Error Values): Likewise.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
gpgme_op_encrypt_sign and gpgme_op_encrypt_sign_start.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Add a note about
certificates to include.
(Included Certificates): New section.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Remove literal tags.
(Generating Keys): Update documentation.

* gpgme.texi (Generating Keys):
Fix syntax error.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Waiting For Completion): Adjust doc to changes in
the code.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Update documentation.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document error at creation
failure.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Document new error values.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Add reference to gpgme_get_op_info.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some spell checking.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add all the gpgme_op_*_start functions.
Fill the concept index with many, many entries.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Run Control): New section.
(Verify): Document gpgme_get_notation.
(More Information):
New section describing gpgme_get_op_info.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase callback): Change GpgmePassphraseCb's
R_HD type from void* to void**.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating data buffers): Change
gpgme_data_new_from_filepart's LENGTH type from off_t to size_t.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating keys): New subsection.
(Exporting keys): Likewise.
(Importing keys): Likewise.
(Deleting keys): Likewise.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: g10Code -> g10 Code

* gpgme.texi (Top): Complete detailmenu.

* gpgme.texi: Convert embarrassing cruft to the real thing.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* ChangeLog: New file.

* gpgme.texi: Likewise.

* gpl.texi: Likewise.

* fdl.texi: Likewise.
* Makefile.am (info_TEXINFOS): New variable.
(gpgme_TEXINFOS): Likewise.

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(private-key

(oid.1.2.840.113549.1.1.1

(n

#00e0ce96f90b6c9e02f3922beada93fe50a875eac6bcc18bb9a9cf2e84965caa2d1ff95a7f542465c6c0c19d276e4526ce
048868a7a914fd343cc3a87dd74291ffc565506d5bbb25cbac6a0e2dd1f8bcaab0d4a29c2f37c950f363484bf269f78914
40464baf79827e03a36e70b814938eebdc63e964247be75dc58b014b7ea251#)

(e #010001#)

(d

#046129F2489D71579BE0A75FE029BD6CDB574EBF57EA8A5B0FDA942CAB943B117D7BB95E5D28875E0F
9FC5FCC06A72F6D502464DABDED78EF6B716177B83D5BDC543DC5D3FED932E59F5897E92E6F58A0F334
24106A3B6FA2CBF877510E4AC21C3EE47851E97D12996222AC3566D4CCB0B83D164074ABF7DE655FC244
6DA1781#)

(p

#00e861b700e17e8afe6837e7512e35b6ca11d0ae47d8b85161c67baf64377213fe52d772f2035b3ca830af41d8a4120e
1c1c70d12cc22f00d28d31dd48a8d424f1#)

(q

#00f7a7ca5367c661f8e62df34f0d05c10c88e5492348dd7bdbc942c9a8f369f935a07785d2db805215ed786e4285df16
58eed3ce84f469b81b50d358407b4ad361#)

(u

#304559a9ead56d2309d203811a641bb1a09626bc8eb36fffa23c968ec5bd891eebbafc73ae666e01ba7c8990bae06cc2
bbe10b75e69fcacb353a6473079d8e9b#)

)

)

This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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File: gpgme.info, Node: Top, Next: Introduction, Up: (dir)

Main Menu

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35 of the GPGME library.

* Menu:

- * Introduction:: How to use this manual.
- * Preparation:: What you should do before using the library.
- * Protocols and Engines:: Supported crypto protocols.
- * Algorithms:: Supported algorithms.
- * Error Handling:: Error numbers and their meanings.
- * Exchanging Data:: Passing data to and from GPGME.
- * Contexts:: Handling GPGME contexts.

Appendices

- * UI Server Protocol:: The GnuPG UI Server Protocol.
- * Debugging:: How to solve problems.
- * Deprecated Functions:: Documentation of deprecated functions.

- * Library Copying:: The GNU Lesser General Public License says how you can copy and share GnuPG Made Easy.
- * Copying:: The GNU General Public License says how you can copy and share this manual.

Indices

- * Concept Index:: Index of concepts and programs.
- * Function and Data Index:: Index of functions, variables and data types.

The Detailed Node Listing

Introduction

- * Getting Started:: Purpose of the manual, and how to use it.
- * Features:: Reasons to install and use GPGME.
- * Overview:: Basic architecture of the GPGME library.

Preparation

- * Header:: What header file you need to include.
- * Building the Source:: Compiler options to be used.
- * Largefile Support (LFS):: How to use GPGME with LFS.
- * Using Automake:: Compiler options to be used the easy way.
- * Using Libtool:: Avoiding compiler options entirely.
- * Library Version Check:: Getting and verifying the library version.
- * Signal Handling:: How GPGME affects signal handling.
- * Multi-Threading:: How GPGME can be used in an MT environment.

Protocols and Engines

- * Engine Version Check:: Verifying the engine version.
- * Engine Information:: Obtaining more information about the engines.
- * Engine Configuration:: Changing the engine configuration.
- * OpenPGP:: Support for the OpenPGP protocol.
- * Cryptographic Message Syntax:: Support for the CMS.

Algorithms

- * Public Key Algorithms:: A list of all public key algorithms.

* Hash Algorithms:: A list of all hash algorithms.

Error Handling

* Error Values:: The error value and what it means.

* Error Codes:: A list of important error codes.

* Error Sources:: A list of important error sources.

* Error Strings:: How to get a descriptive string from a value.

Exchanging Data

* Creating Data Buffers:: Creating new data buffers.

* Destroying Data Buffers:: Releasing data buffers.

* Manipulating Data Buffers:: Operations on data buffers.

Creating Data Buffers

* Memory Based Data Buffers:: Creating memory based data buffers.

* File Based Data Buffers:: Creating file based data buffers.

* Callback Based Data Buffers:: Creating callback based data buffers.

Manipulating Data Buffers

* Data Buffer I/O Operations:: I/O operations on data buffers.

* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.

* Data Buffer Convenience:: Convenience function for data buffers.

Contexts

* Creating Contexts:: Creating new GPGME contexts.

* Destroying Contexts:: Releasing GPGME contexts.

* Result Management:: Managing the result of crypto operations.

* Context Attributes:: Setting properties of a context.

* Key Management:: Managing keys with GPGME.

* Crypto Operations:: Using a context for cryptography.

* Miscellaneous:: Miscellaneous operations.

* Run Control:: Controlling how operations are run.

Context Attributes

* Protocol Selection:: Selecting the protocol used by a context.

* Crypto Engine:: Configuring the crypto engine.

* Setting the Sender:: How to tell the engine the sender.

* ASCII Armor:: Requesting ASCII armored output.

* Text Mode:: Choosing canonical text mode.

* Offline Mode:: Choosing offline mode.

- * Included Certificates:: Including a number of certificates.
- * Key Listing Mode:: Selecting key listing mode.
- * Passphrase Callback:: Getting the passphrase from the user.
- * Progress Meter Callback:: Being informed about the progress.
- * Status Message Callback:: Status messages received from gpg.
- * Locale:: Setting the locale of a context.

Key Management

- * Key objects:: Description of the key structures.
- * Listing Keys:: Browsing the list of available keys.
- * Information About Keys:: Requesting detailed information about keys.
- * Manipulating Keys:: Operations on keys.
- * Generating Keys::
Creating new key pairs.
- * Signing Keys:: Adding key signatures to public keys.
- * Exporting Keys:: Retrieving key data from the key ring.
- * Importing Keys:: Adding keys to the key ring.
- * Deleting Keys:: Removing keys from the key ring.
- * Changing Passphrases:: Change the passphrase of a key.
- * Changing TOFU Data:: Changing data pertaining to TOFU.
- * Advanced Key Editing:: Advanced key edit operation.

Crypto Operations

- * Decrypt:: Decrypting a ciphertext.
- * Verify:: Verifying a signature.
- * Decrypt and Verify:: Decrypting a signed ciphertext.
- * Sign:: Creating a signature.
- * Encrypt:: Encrypting a plaintext.

Sign

- * Selecting Signers:: How to choose the keys to sign with.
- * Creating a Signature:: How to create a signature.
- * Signature Notation Data::
How to add notation data to a signature.

Encrypt

- * Encrypting a Plaintext:: How to encrypt a plaintext.

Miscellaneous

- * Running other Programs:: Running other Programs.
- * Using the Assuan protocol:: Using the Assuan protocol.
- * Checking for updates:: How to check for software updates.

Run Control

- * **Waiting For Completion::** Waiting until an operation is completed.
- * **Using External Event Loops::** Advanced control over what happens when.
- * **Cancellation::** How to end pending operations prematurely.

Using External Event Loops

- * **I/O Callback Interface::** How I/O callbacks are registered.
- * **Registering I/O Callbacks::** How to use I/O callbacks for a context.
- * **I/O Callback Example::** An example how to use I/O callbacks.
- * **I/O Callback Example GTK+::** How to integrate GPGME in GTK+.
- * **I/O Callback Example GDK::** How to integrate GPGME in GDK.
- * **I/O Callback Example Qt::** How to integrate GPGME in Qt.

File:

gpgme.info, Node: Introduction, Next: Preparation, Prev: Top, Up: Top

1 Introduction

GnuPG Made Easy (GPGME) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. GPGME provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

GPGME uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

* Menu:

- * **Getting Started::** Purpose of the manual, and how to use it.
- * **Features::** Reasons to install and use GPGME.
- * **Overview::** Basic architecture of the GPGME library.

File: gpgme.info, Node: Getting Started, Next: Features, Up: Introduction

1.1 Getting Started

=====

This manual documents the GPGME library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to GPGME or its users.

This manual can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those languages bindings follow the general programming model of GPGME but may provide some extra high level abstraction on top of the GPGME style API. For now please see the README files in the lang/ directory of the source distribution.

File: gpgme.info, Node: Features, Next: Overview, Prev: Getting Started, Up: Introduction

1.2 Features

=====

GPGME has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

its free software

Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (*note Library Copying:).

its flexible

GPGME provides transparent support for several cryptographic protocols by different engines. Currently, GPGME supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

its easy

GPGME hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for

GPGME has been added to a program, it is easy to add support for other crypto protocols once GPGME backends provide them.

its language friendly

GPGME comes with languages bindings for several common programming languages: Common Lisp, C++, Python 2, and Python 3.

File: [gpgme.info](#), Node: [Overview](#), [Prev: Features](#), [Up: Introduction](#)

1.3 Overview

=====

GPGME provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all

operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, GPGME has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, GPGME can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

File: [gpgme.info](#), Node: [Preparation](#), [Next: Protocols and Engines](#), [Prev: Introduction](#), [Up: Top](#)

2 Preparation

To use GPGME, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

- * Menu:
- * Header:: What header file you need to include.
- * Building the Source:: Compiler options to be used.
- * Largefile Support (LFS):: How to use GPGME with LFS.
- * Using Automake:: Compiler options to be used the easy way.
- * Using Libtool:: Avoiding compiler options entirely.
- * Library Version Check:: Getting and verifying the library version.
- * Signal Handling:: How GPGME affects signal handling.
- * Multi-Threading:: How GPGME can be used in an MT environment.

File: gpgme.info, Node: Header, Next: Building the Source, Up: Preparation

2.1 Header

=====

All interfaces (data types and functions) of the library are defined in the header file `gpgme.h`. You must include this in all programs using the library, either directly or through some other header file, like this:

```
#include <gpgme.h>
```

The name space of GPGME is `gpgme_*` for function names and data types and `GPGME_*` for other symbols. Symbols internal to GPGME take the form `_gpgme_*` and `_GPGME_*`.

Because GPGME makes use of the GPG Error library, using GPGME will also use the `GPG_ERR_*` name space directly, and the `gpg_err*`, `gpg_str*`, and `gpgrt_*` name space indirectly.

File: gpgme.info, Node: Building the Source, Next: Largefile Support (LFS), Prev: Header, Up: Preparation

2.2 Building the Source

=====

If you want to compile a source file including the `gpgme.h` header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the `-I` option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, `gpgme` ships with a small helper program `gpgme-config` that knows about the path to

the include

file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the `--cflags` option to `gpgme-config`. The following example shows how it can be used at the command line:

```
gcc -c foo.c `gpgme-config --cflags`
```

Adding the output of `gpgme-config --cflags` to the compiler command line will ensure that the compiler can find the GPGME header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the `-L` option). For this, the option `--libs` to `gpgme-config` can be used. For convenience, this option also outputs all other options that are required to link the program with GPGME (in particular, the `-lgpgme` option). The example shows how to link `foo.o` with the GPGME library to a program `foo`.

```
gcc -o foo foo.o `gpgme-config --libs`
```

Of

course you can also combine both examples to a single command by specifying both options to `gpgme-config`:

```
gcc -o foo foo.c `gpgme-config --cflags --libs`
```

If you need to detect the installed language bindings you can use list them using:

```
gpgme-config --print-lang
```

or test for the availability using

```
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
```

File: `gpgme.info`, Node: Largefile Support (LFS), Next: Using Automake, Prev: Building the Source, Up: Preparation

2.3 Largefile Support (LFS)

=====

GPGME is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems,

nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type `off_t` is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type `off64_t` is provided, which is 64 bit wide. Or you can replace the existing `off_t` data type with its 64 bit wide counterpart. All occurrences of `off_t` are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for GPGME, because some data types it uses in its interfaces are affected by that. For example, the `off_t` data type is used in the `gpgme_data_seek` function, to match its POSIX counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms GPGME is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the `gpgme.h` header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms `off_t` is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (`CreateFile` et al.) for large files. Released binary versions of GPGME (`libpggme-11.dll`) have always been build with a 32 bit `off_t`. To avoid an ABI break we stick to this convention for 32 bit Windows by using `long` there. GPGME versions for 64 bit Windows have never been released and thus we are able to use `int64_t` instead of `off_t` there. For easier migration the typedef `gpgme_off_t` has been defined. The reason we cannot use `off_t` directly is that some toolchains (e.g. `mingw64`) introduce a POSIX compatible hack for `off_t`. Some widely used toolkits make use of this hack and in turn GPGME would need to use it also. However, this would introduce an ABI break and existing software making use of `libpggme` might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using `off_t` to use `gpgme_off_t` which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in GPGME is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro `AC_SYS_LARGEFILE`. If you do this, then you dont need to worry about anything else: It will just work. In this case you might also want to use `AC_FUNC_FSEEKO` to take advantage of some new interfaces, and `AC_TYPE_OFF_T` (just in case).

If you do not use Autoconf, you can define the preprocessor symbol `_FILE_OFFSET_BITS` to 64 `_before_` including any header files, for example by specifying the option `-D_FILE_OFFSET_BITS=64` on the compiler command line. You will also want to define the preprocessor symbol `LARGEFILE_SOURCE` to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the GPGME header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (`_LARGEFILE64_SOURCE`).

File: `gpgme.info`, Node: Using Automake, Next: Using Libtool, Prev: Largefile Support (LFS), Up: Preparation

2.4 Using Automake

=====

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the gpgme-config script at all. GPGME provides an extension to Automake that does all the work for you.

- Macro: AM_PATH_GPGME ([MINIMUM-VERSION], [ACTION-IF-FOUND], [ACTION-IF-NOT-FOUND])
- Macro: AM_PATH_GPGME_PTH ([MINIMUM-VERSION], [ACTION-IF-FOUND], [ACTION-IF-NOT-FOUND])
- Macro: AM_PATH_GPGME_PTHREAD ([MINIMUM-VERSION], [ACTION-IF-FOUND], [ACTION-IF-NOT-FOUND])

Check whether GPGME (at least version MINIMUM-VERSION, if given) exists on the host system. If it is found, execute ACTION-IF-FOUND, otherwise do ACTION-IF-NOT-FOUND, if given.

Additionally, the function defines GPGME_CFLAGS to the flags needed for compilation of the program to find the gpgme.h header file, and GPGME_LIBS to the linker flags needed to link the program to the GPGME library. If the used helper script does not match the target type you are building for a warning is printed and the string libgcrypt is appended to the variable gpg_config_script_warn.

AM_PATH_GPGME_PTH

checks for the version of GPGME that can be used with GNU Pth, and defines GPGME_PTH_CFLAGS and GPGME_PTH_LIBS.

AM_PATH_GPGME_PTHREAD checks for the version of GPGME that can be used with the native pthread implementation, and defines GPGME_PTHREAD_CFLAGS and GPGME_PTHREAD_LIBS. Since version 1.8.0 this is no longer required to GPGME_PTHREAD as GPGME itself is thread safe.

This macro searches for gpgme-config along the PATH. If you are cross-compiling, it is useful to set the environment variable SYSROOT to the top directory of your target. The macro will then first look for the helper program in the bin directory below that top directory. An absolute directory name must be used for SYSROOT. Finally, if the configure command line option --with-gpgme-prefix is used, only its value is used for the top directory below which the helper script is expected.

You can use the defined Autoconf variables like this in your Makefile.am:

```
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
```

File: gpgme.info, Node: Using Libtool, Next: Library Version Check, Prev: Using Automake, Up: Preparation

2.5 Using Libtool

=====

The easiest way is to just use GNU Libtool. If you use libtool, and link to libgpgme.la, libgpgme-pth.la or libgpgme-pthread.la respectively, everything will be done automatically by Libtool.

File: gpgme.info, Node: Library Version Check, Next: Signal Handling, Prev: Using Libtool, Up: Preparation

2.6 Library Version Check

=====

-- Function: `const char * gpgme_check_version`
(`const char *REQUIRED_VERSION`)

The function `gpgme_check_version` has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems, and for this reason alone it must be invoked early in your program, before you make use of the other functions in GPGME. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If `REQUIRED_VERSION` is `NULL`, the function returns a pointer to a statically allocated string containing the version number of the library.

If `REQUIRED_VERSION` is not `NULL`, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If `REQUIRED_VERSION` is not a valid version number, or if the version requirement is not met, the function returns `NULL`.

If you use a version of a library that is backwards compatible with older releases, but contains

additional interfaces which your

program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking `gpgme_new` or `gpgme_data_new`, so that a detailed error code can be returned (historically, `gpgme_check_version` does not return a detailed error code).

-- Function: `int gpgme_set_global_flag (const char *NAME, const char *VALUE)`

SINCE: 1.4.0

On some systems it is not easy to set environment variables and thus hard to use GPGMEs internal trace facility for debugging. This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses GPGME functions between a call to this function and after the return from the call to `gpgme_check_version`.

All currently supported features require that this function is called as early as possible even before `gpgme_check_version`. The features are identified by the following values for NAME:

`debug`

To enable debugging use the string `debug` for NAME and VALUE identical to the value used with the environment variable `GPGME_DEBUG`.

`disable-gpgconf`

Using this feature with any VALUE disables the detection of the `gpgconf` program and thus forces GPGME to fallback into the simple OpenPGP only mode. It may be used to force the use of GnuPG-1 on systems which have both GPG versions installed. Note that in general the use of `gpgme_set_engine_info` is a better way to select a specific engine version.

`gpgconf-name`

`gpg-name`

Set the name of the `gpgconf` respective `gpg` binary. The defaults are `GNU/GnuPG/gpgconf` and `GNU/GnuPG/gpg`. Under

Under Unix the leading directory part is ignored. Under Windows the leading directory part is used as the default installation directory; the .exe suffix is added by GPGME. Use forward slashes even under Windows.

require-gnupg

Set the minimum version of the required GnuPG engine. If that version is not met, GPGME fails early instead of trying to use the existent version. The given version must be a string with major, minor, and micro number. Example: "2.1.0".

w32-inst-dir

On Windows GPGME needs to know its installation directory to find its spawn helper. This is in general no problem because a DLL has this information. Some applications however link statically to GPGME and thus GPGME can only figure out the installation directory of this application which may be wrong in certain cases. By supplying an installation directory as

value to this flag, GPGME will assume that that directory is the installation directory. This flag has no effect on non-Windows platforms.

This function returns 0 on success. In contrast to other functions the non-zero return value on failure does not convey any error code. For setting debug the only possible error cause is an out of memory condition; which would exhibit itself later anyway. Thus the return value may be ignored.

After initializing GPGME, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

```
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
{
    /* Initialize the locale environment. */
    setlocale (LC_ALL, "");
    gpgme_check_version (NULL);
    gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
#ifdef LC_MESSAGES
    gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
}
```


Note that you are highly recommended to initialize the locale settings like this. GPGME can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for portability to W32 systems.

File: gpgme.info, Node: Signal Handling, Next: Multi-Threading, Prev: Library Version Check, Up: Preparation

2.7 Signal Handling

=====

The GPGME library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a SIGPIPE signal will be delivered to the application. The default action is to abort the program. To protect against this, `gpgme_check_version` sets the SIGPIPE signal action to SIG_IGN, which means that the signal will be ignored.

GPGME will only do that if the signal action for SIGPIPE is SIG_DEF at the time `gpgme_check_version` is called. If it is something different, GPGME will take no action.

This means that if your application does not install any signal handler for SIGPIPE, you don't need to take any precautions. If you do install a signal handler for SIGPIPE, you must be prepared to handle any SIGPIPE events that occur due to GPGME writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for SIGPIPE, you must make sure you do this either before `gpgme_check_version` is called or afterwards.

File: gpgme.info, Node: Multi-Threading, Prev: Signal Handling, Up: Preparation

2.8 Multi-Threading

=====

The GPGME library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

The function `gpgme_check_version` must be called before any other function in the library, because it initializes the thread support subsystem in GPGME. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use GPGME. For this, it is sufficient to call

gpgme_check_version before creating the other threads using GPGME(1).

Any gpgme_data_t and gpgme_ctx_t object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

Only one thread at any time is allowed to call gpgme_wait. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

The function gpgme_strerror is not thread safe. You have to use gpgme_strerror_r instead.

----- Footnotes -----

(1) At least this is true for POSIX threads, as pthread_create is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term Memory Synchronization. For other thread packages other, more relaxed or more strict rules may apply.

File: gpgme.info, Node: Protocols and Engines, Next: Algorithms, Prev: Preparation, Up: Top

3 Protocols and Engines

GPGME supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. GPGME uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by GPGME. Where an exchange of information between the application and the backend is necessary, GPGME provides the necessary callback function hooks and further interfaces.

-- Data type: enum gpgme_protocol_t

The gpgme_protocol_t type specifies the set of possible protocol values that are supported by GPGME. The following protocols are supported:

GPGME_PROTOCOL_OpenPGP

GPGME_PROTOCOL_OPENPGP

This specifies the OpenPGP protocol.

GPGME_PROTOCOL_CMS

This specifies the Cryptographic Message Syntax.

GPGME_PROTOCOL_GPGCONF

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_ASSUAN

SINCE: 1.2.0

This specifies the raw Assuan protocol.

GPGME_PROTOCOL_G13

SINCE: 1.3.0

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_UISERVER

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_SPAWN

SINCE: 1.5.0

Special protocol for use with
gpgme_op_spawn.

GPGME_PROTOCOL_UNKNOWN

Reserved for future extension. You may use this to indicate that the used protocol is not known to the application.

Currently, GPGME does not accept this value in any operation, though, except for gpgme_get_protocol_name.

-- Function: const char * gpgme_get_protocol_name
(gpgme_protocol_t PROTOCOL)

The function gpgme_get_protocol_name returns a statically allocated string describing the protocol PROTOCOL, or NULL if the protocol number is not valid.

* Menu:

* Engine Version Check:: Verifying the engine version.

* Engine Information:: Obtaining more information about the engines.

- * Engine Configuration:: Changing the engine configuration.
- * OpenPGP:: Support for the OpenPGP protocol.
- * Cryptographic Message Syntax:: Support for the CMS.
- * Assuan:: Support for the raw Assuan protocol.

File: gpgme.info,

Node: Engine Version Check, Next: Engine Information, Up: Protocols and Engines

3.1 Engine Version Check

=====

-- Function: const char * gpgme_get_dirinfo (const char *WHAT)
 SINCE: 1.5.0

The function gpgme_get_dirinfo returns a statically allocated string with the value associated to WHAT. The returned values are the defaults and won't change even after gpgme_set_engine_info has been used to configure a different engine. NULL is returned if no value is available. Commonly supported values for WHAT are:

homedir

Return the default home directory.

sysconfdir

Return the name of the system configuration directory

bindir

Return the name of the directory with GnuPG program files.

libdir

Return the name of the directory with GnuPG related library files.

libexecdir

Return the name of the directory with GnuPG helper program files.

datadir

Return the name of the directory with GnuPG shared data.

localedir

Return the name of the directory with GnuPG locale data.

agent-socket

Return the name of the socket to connect to the gpg-agent.

agent-ssh-socket

Return the name of the socket to connect to the ssh-agent component of gpg-agent.

dirmngr-socket

Return the name of the socket to connect to the dirmngr.

uiserver-socket

Return the name of the socket to connect to the user interface server.

gpgconf-name

Return the file name of the engine configuration tool.

gpg-name

Return the file name of the OpenPGP engine.

gpgsm-name

Return the file name of the CMS engine.

g13-name

Return the name of the file container encryption engine.

gpg-wks-client-name

Return the name of the Web Key Service tool.

-- Function: gpgme_error_t gpgme_engine_check_version
(gpgme_protocol_t PROTOCOL)

The function gpgme_engine_check_version verifies that the engine implementing the protocol PROTOCOL is installed in the expected path and meets the version requirement of GPGME.

This function returns the error code GPG_ERR_NO_ERROR if the engine is available and GPG_ERR_INV_ENGINE if it is not.

File: gpgme.info, Node: Engine Information, Next: Engine Configuration, Prev: Engine Version Check, Up: Protocols and Engines

3.2 Engine Information

=====

-- Data type: gpgme_engine_info_t

The gpgme_engine_info_t type specifies a pointer to a structure describing a crypto engine. The structure contains the following elements:

gpgme_engine_info_t next

This is a pointer to the next engine info structure in the linked list, or NULL if this is the last element.

`gpgme_protocol_t protocol`

This is the protocol for which the crypto engine is used.

You

can convert this to a string with `gpgme_get_protocol_name` for printing.

`const char *file_name`

This is a string holding the file name of the executable of the crypto engine. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

`const char *home_dir`

This is a string holding the directory name of the crypto engines configuration directory. If it is NULL, then the default directory is used. See `gpgme_get_dirinfo` on how to get the default directory.

`const char *version`

This is a string containing the version number of the crypto engine. It might be NULL if the version number can not be determined, for example because the executable doesn't exist or is invalid.

`const char *req_version`

This is a string containing the minimum required version number

of the crypto engine for GPGME to work correctly. This is the version number that `gpgme_engine_check_version` verifies against. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

-- Function: `gpgme_error_t gpgme_get_engine_info`
(`gpgme_engine_info_t *INFO`)

The function `gpgme_get_engine_info` returns a linked list of engine info structures in `INFO`. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, and a system error if the memory could not be allocated.

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

```
gpgme_ctx_t ctx;
gpgme_error_t
err;

[...]

if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
{
gpgme_engine_info_t info;
err = gpgme_get_engine_info (&info);
if (!err)
{
while (info && info->protocol != gpgme_get_protocol (ctx))
info = info->next;
if (!info)
fprintf (stderr, "GPGME compiled without support for protocol %s",
gpgme_get_protocol_name (info->protocol));
else if (info->file_name && !info->version)
fprintf (stderr, "Engine %s not installed properly",
info->file_name);
else if (info->file_name && info->version && info->req_version)
fprintf (stderr, "Engine %s version %s installed, "
"but at least version %s required", info->file_name,
info->version, info->req_version);
else
fprintf (stderr, "Unknown problem with engine
for protocol %s",
gpgme_get_protocol_name (info->protocol));
}
}
```

File: gpgme.info, Node: Engine Configuration, Next: OpenPGP, Prev: Engine Information, Up: Protocols and Engines

3.3 Engine Configuration

=====

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

-- Function: `gpgme_error_t gpgme_set_engine_info`
(`gpgme_protocol_t PROTO`, `const char *FILE_NAME`,
`const char *HOME_DIR`)
SINCE: 1.1.0

The function `gpgme_set_engine_info` changes the default configuration of the crypto engine implementing the protocol `PROTO`.

`FILE_NAME` is the file name of the executable program implementing this protocol, and `HOME_DIR` is the directory name of the configuration directory for this crypto engine. If `HOME_DIR` is

`NULL`, the engines default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

The functions `gpgme_ctx_get_engine_info` and `gpgme_ctx_set_engine_info` can be used to change the engine configuration per context. *Note Crypto Engine::.

File: `gpgme.info`, Node: OpenPGP, Next: Cryptographic Message Syntax, Prev: Engine Configuration, Up: Protocols and Engines

3.4 OpenPGP

=====

OpenPGP is implemented by GnuPG, the GNU Privacy Guard. This is the first protocol that was supported by GPGME.

The OpenPGP protocol is specified by `GPGME_PROTOCOL_OpenPGP`.

File: `gpgme.info`, Node: Cryptographic Message Syntax, Next: Assuan, Prev: OpenPGP, Up: Protocols and Engines

3.5 Cryptographic Message Syntax

=====

CMS is implemented by GpgSM, the S/MIME implementation for GnuPG.

The CMS protocol is specified by `GPGME_PROTOCOL_CMS`.

3.6 Assuan

=====

Assuan is the RPC library used by the various GnuPG components. The Assuan protocol allows one to talk to arbitrary Assuan servers using GPGME. *Note Using the Assuan protocol::

The ASSUAN protocol is specified by GPGME_PROTOCOL_ASSUAN.

4 Algorithms

The crypto backends support a variety of algorithms used in public key cryptography.(1) The following sections list the identifiers used to denote such an algorithm.

* Menu:

* Public Key Algorithms:: A list of all public key algorithms.

* Hash Algorithms:: A list of all hash algorithms.

----- Footnotes -----

(1) Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.

File:

gpgme.info, Node: Public Key Algorithms, Next: Hash Algorithms, Up: Algorithms

4.1 Public Key Algorithms

=====

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

-- Data type: enum gpgme_pubkey_algo_t

The gpgme_pubkey_algo_t type specifies the set of all public key algorithms that are supported by GPGME. Possible values are:

GPGME_PK_RSA

This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

GPGME_PK_RSA_E

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

GPGME_PK_RSA_S

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

GPGME_PK_DSA

This value indicates DSA, the Digital Signature Algorithm.

GPGME_PK_ELG

This value indicates ElGamal.

GPGME_PK_ELG_E

This value also indicates ElGamal and is used specifically in GnuPG.

GPGME_PK_ECC

SINCE: 1.5.0

This value is a generic indicator for elliptic curve algorithms.

GPGME_PK_ECDSA

SINCE: 1.3.0

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

GPGME_PK_ECDH

SINCE: 1.3.0

This value indicates ECDH, the Elliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

GPGME_PK_EDDSA

SINCE: 1.7.0

This value indicates the EdDSA algorithm.

-- Function: const char * gpgme_pubkey_algo_name
(gpgme_pubkey_algo_t ALGO)

The function gpgme_pubkey_algo_name returns a pointer to a statically allocated string containing a description of the public key algorithm ALGO. This string can be used to output the name of

the public key algorithm to the user.

If ALGO is not a valid public key algorithm, NULL is returned.

-- Function: char * gpgme_pubkey_algo_string (gpgme_subkey_t KEY)
SINCE: 1.7.0

The function gpgme_pubkey_algo_string is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. rsa2048 or ed25519). The caller must free the result using gpgme_free. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets ERRNO.

File: gpgme.info, Node: Hash Algorithms, Prev: Public Key Algorithms, Up: Algorithms

4.2 Hash Algorithms

=====

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

-- Data type: enum gpgme_hash_algo_t

The gpgme_hash_algo_t type specifies the set of all hash algorithms that are supported by GPGME. Possible values are:

GPGME_MD_MD5
GPGME_MD_SHA1
GPGME_MD_RMD160
GPGME_MD_MD2
GPGME_MD_TIGER
GPGME_MD_HAVAL
GPGME_MD_SHA256
GPGME_MD_SHA384
GPGME_MD_SHA512
GPGME_MD_SHA224

SINCE: 1.5.0

GPGME_MD_MD4
GPGME_MD_CRC32
GPGME_MD_CRC32_RFC1510
GPGME_MD_CRC24_RFC2440

-- Function: const char * gpgme_hash_algo_name (gpgme_hash_algo_t ALGO)

The function gpgme_hash_algo_name returns a pointer to a statically allocated string containing a description of the hash algorithm ALGO. This string can be used to output the name of the hash algorithm to the user.

If ALGO is not a valid hash algorithm, NULL is returned.

File: gpgme.info, Node: Error Handling, Next: Exchanging Data, Prev: Algorithms, Up: Top

5 Error Handling

Many functions in GPGME can return an error if they fail. For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

GPGME uses the libgpg-error library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no information is lost. As a consequence, GPGME does not use its own identifiers for error codes, but uses those provided by libgpg-error. They usually start with GPG_ERR_.

However, GPGME does provide aliases for the functions defined in libgpg-error, which might be preferred for name space consistency.

* Menu:

- * Error Values:: The error value and what it means.
- * Error Sources:: A list of important error sources.
- * Error Codes:: A list of important error codes.
- * Error Strings:: How to get a descriptive string from a value.

File: gpgme.info, Node: Error Values, Next: Error Sources, Up: Error Handling

5.1 Error Values

=====

-- Data type: `gpgme_err_code_t`

The `gpgme_err_code_t` type is an alias for the `libgpg-error` type `gpg_err_code_t`. The error code indicates the type of an error, or the reason why an operation failed.

A list of important error codes can be found in the next section.

-- Data type: `gpgme_err_source_t`

The `gpgme_err_source_t` type is an alias for the `libgpg-error` type `gpg_err_source_t`. The error source has not a precisely defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.

-- Data type: `gpgme_error_t`

The `gpgme_error_t` type is an alias for the `libgpg-error` type `gpg_error_t`. An error value like this has always two components, an error code and an error source. Both together form the error value.

Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used. However, it is guaranteed that only 0 is used to indicate success (`GPG_ERR_NO_ERROR`), and that in this case all other parts of the error value are set to 0, too.

Note

that in `GPGME`, the error source is used purely for diagnostical purposes. Only the error code should be checked to test for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

-- Function: `static inline gpgme_err_code_t gpgme_err_code(gpgme_error_t ERR)`

The static inline function `gpgme_err_code` returns the `gpgme_err_code_t` component of the error value `ERR`. This function must be used to extract the error code from an error value in order to compare it with the `GPG_ERR_*` error code macros.

-- Function: `static inline gpgme_err_source_t gpgme_err_source`

(gpgme_error_t ERR)

The static inline function `gpgme_err_source` returns the `gpgme_err_source_t` component of the error value `ERR`. This function must be used to extract the error source from an error value in order to compare it with the `GPG_ERR_SOURCE_*` error source macros.

-- Function: static inline `gpgme_error_t gpgme_err_make`

(`gpgme_err_source_t SOURCE`, `gpgme_err_code_t CODE`)

The static inline function `gpgme_err_make` returns the error value consisting of the error source `SOURCE` and the error code `CODE`.

This function can be used in callback functions to construct an error value to return it to the library.

-- Function: static inline `gpgme_error_t gpgme_error`

(`gpgme_err_code_t CODE`)

The static inline function `gpgme_error` returns the error value consisting of the default error source and the error code `CODE`.

For GPGME applications, the default error source is

`GPG_ERR_SOURCE_USER_1`. You can define `GPGME_ERR_SOURCE_DEFAULT` before including `gpgme.h` to change this default.

This function can be used in callback functions to construct an error value to return it to the library.

The `libgpg-error` library provides error codes for all system error numbers

it knows about. If `ERR` is an unknown error number, the error code `GPG_ERR_UNKNOWN_ERRNO` is used. The following functions can be used to construct error values from system error numbers.

-- Function: `gpgme_error_t gpgme_err_make_from_errno`

(`gpgme_err_source_t SOURCE`, `int ERR`)

The function `gpgme_err_make_from_errno` is like `gpgme_err_make`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

-- Function: `gpgme_error_t gpgme_error_from_errno (int ERR)`

The function `gpgme_error_from_errno` is like `gpgme_error`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

- Function: `gpgme_err_code_t gpgme_err_code_from_errno (int ERR)`
The function `gpgme_err_code_from_errno` returns the error code for the system error `ERR`. If `ERR` is not a known system error, the function returns `GPG_ERR_UNKNOWN_ERRNO`.
- Function: `int gpgme_err_code_to_errno (gpgme_err_code_t ERR)`
The function `gpgme_err_code_to_errno` returns the system error for the error code `ERR`. If `ERR` is not an error code representing a system error, or if this system error is not defined on this system, the function returns 0.

File: `gpgme.info`, Node: Error Sources, Next: Error Codes, Prev: Error Values, Up: Error Handling

5.2 Error Sources

=====

The library `libgpg-error` defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is 0, the whole error value will be 0. In this case the error source part is of course `GPG_ERR_SOURCE_UNKNOWN`.

The list of error sources that might occur in applications using GPGME is:

`GPG_ERR_SOURCE_UNKNOWN`

The error source is not known. The value of this error source is 0.

`GPG_ERR_SOURCE_GPGME`

The error source is GPGME itself. This is the default for errors that occur in the GPGME library.

`GPG_ERR_SOURCE_GPG`

The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

`GPG_ERR_SOURCE_GPGSM`

The error source is GPGSM, which is the crypto engine used for the CMS protocol.

GPG_ERR_SOURCE_GCRYPT

The error source is libgcrypt, which is used by crypto engines to perform cryptographic operations.

GPG_ERR_SOURCE_GPGAGENT

The error source is gpg-agent, which is used by crypto engines to perform operations with the secret key.

GPG_ERR_SOURCE_PINENTRY

The error source is pinentry, which is used by gpg-agent to query the passphrase to unlock a secret key.

GPG_ERR_SOURCE_SCD

The error source is the SmartCard Daemon, which is used by gpg-agent to delegate operations with the secret key to a SmartCard.

GPG_ERR_SOURCE_KEYBOX

The error source is libkbx, a library used by the crypto engines to manage local keyrings.

GPG_ERR_SOURCE_USER_1

GPG_ERR_SOURCE_USER_2

GPG_ERR_SOURCE_USER_3

GPG_ERR_SOURCE_USER_4

These error sources are not used by any GnuPG component and can be used by other software. For example, applications using GPGME can use them to mark error values coming from callback handlers. Thus GPG_ERR_SOURCE_USER_1 is the default for errors created with gpgme_error and gpgme_error_from_errno, unless you define GPGME_ERR_SOURCE_DEFAULT before including gpgme.h.

File: gpgme.info, Node: Error Codes, Next: Error Strings, Prev: Error Sources, Up: Error Handling

5.3 Error Codes

=====

The library libpgp-error defines many error values. Most of them are not used by GPGME directly, but might be returned by GPGME because it received them

from the crypto engine. The below list only includes such error codes that have a specific meaning in GPGME, or which are so common that you should know about them.

GPG_ERR_EOF

This value indicates the end of a list, buffer or file.

GPG_ERR_NO_ERROR

This value indicates success. The value of this error code is 0. Also, it is guaranteed that an error value made from the error code 0 will be 0 itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

GPG_ERR_GENERAL

This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

GPG_ERR_ENOMEM

This value means that an out-of-memory condition occurred.

GPG_ERR_E...

System errors are mapped to GPG_ERR_FOO where FOO is the symbol for the system error.

GPG_ERR_INV_VALUE

This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty `gpgme_data_t` object was expected, but one containing data was provided, this error value is returned.

GPG_ERR_UNUSABLE_PUBKEY

This value means that some recipients for a message were invalid.

GPG_ERR_UNUSABLE_SECKEY

This value means that some signers were invalid.

GPG_ERR_NO_DATA

This value means that a `gpgme_data_t` object which was expected to have content was found empty.

GPG_ERR_CONFLICT

This value means that a conflict of some sort occurred.

GPG_ERR_NOT_IMPLEMENTED

This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some

later time.

GPG_ERR_DECRYPT_FAILED

This value indicates that a decryption operation was unsuccessful.

GPG_ERR_BAD_PASSPHRASE

This value means that the user did not provide a correct passphrase when requested.

GPG_ERR_CANCELED

This value means that the operation was canceled.

GPG_ERR_INV_ENGINE

This value means that the engine that implements the desired protocol is currently not available. This can either be because the sources were configured to exclude support for this engine, or because the engine is not installed properly.

GPG_ERR_AMBIGUOUS_NAME

This value indicates that a user ID or other specifier did not specify a unique key.

GPG_ERR_WRONG_KEY_USAGE

This value indicates that a key is not used appropriately.

GPG_ERR_CERT_REVOKED

This value indicates that a key signature was revoked.

GPG_ERR_CERT_EXPIRED

This value indicates that a key signature expired.

GPG_ERR_NO_CRL_KNOWN

This value indicates that no certificate revocation list is known for the certificate.

GPG_ERR_NO_POLICY_MATCH

This value indicates that a policy issue occurred.

GPG_ERR_NO_SECKEY

This value indicates that no secret key for the user ID is available.

GPG_ERR_MISSING_CERT

This value indicates that a key could not be imported because the issuer certificate is missing.

GPG_ERR_BAD_CERT_CHAIN

This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

GPG_ERR_UNSUPPORTED_ALGORITHM

This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

GPG_ERR_BAD_SIGNATURE

This value means a verification failed because the signature is bad.

GPG_ERR_NO_PUBKEY

This value means a verification failed because the public key is not available.

GPG_ERR_USER_1

GPG_ERR_USER_2

...

GPG_ERR_USER_16

These error codes are not used by any GnuPG component and can be freely used by other software. Applications using GPGME might use them to mark specific errors returned by callback handlers if no suitable error codes (including the system errors) for these errors exist already.

File: gpgme.info, Node: Error Strings, Prev: Error Codes, Up: Error Handling

5.4 Error Strings

=====

-- Function: `const char * gpgme_strerror (gpgme_error_t ERR)`

The function `gpgme_strerror` returns a pointer to a statically allocated string containing a description of the error code contained in the error value `ERR`. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use `gpgme_strerror_r` in multi-threaded programs.

-- Function: `int gpgme_strerror_r (gpgme_error_t ERR, char *BUF, size_t BUFLen)`

The function `gpgme_strerror_r` returns the error string for `ERR` in the user-supplied buffer `BUF` of size `BUFLen`.

This function is, in

contrast to `gpgme_strerror`, thread-safe if a thread-safe `strerror_r` function is provided by the system. If the function

succeeds, 0 is returned and BUF contains the string describing the error. If the buffer was not large enough, ERANGE is returned and BUF contains as much of the beginning of the error string as fits into the buffer.

-- Function: `const char * gpgme_strerror (gpgme_error_t ERR)`

The function `gpgme_strerror` returns a pointer to a statically allocated string containing a description of the error source contained in the error value `ERR`. This string can be used to output a diagnostic message to the user.

The following example illustrates the use of `gpgme_strerror`:

```
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
{
    fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
            argv[0], gpgme_strerror (err), gpgme_strerror (err));
    exit (1);
}
```

File: `gpgme.info`, Node: `Exchanging Data`, Next: `Contexts`, Prev: `Error Handling`, Up: `Top`

6 Exchanging Data

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by GPGME. The user provides and receives the data via `gpgme_data_t` objects, regardless of the communication protocol between GPGME and the crypto engine in use.

-- Data type: `gpgme_data_t`

The `gpgme_data_t` type is a handle for a container for generic data, which is used by GPGME to exchange data with the user.

`gpgme_data_t` objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

-- Data type: `gpgme_off_t`

SINCE: 1.4.1

On POSIX platforms the `gpgme_off_t` type is an alias for `off_t`; it may be used interchangeably. On Windows platforms `gpgme_off_t` is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64 bit signed integer for 64 bit Windows.

-- Data type: `gpgme_ssize_t`

The `gpgme_ssize_t` type is an alias for `ssize_t`. It has only been introduced to overcome portability problems pertaining to the declaration of `ssize_t` by different toolchains.

* Menu:

- * Creating Data Buffers:: Creating new data buffers.
- * Destroying Data Buffers:: Releasing data buffers.
- * Manipulating Data Buffers:: Operations on data buffers.

File: `gpgme.info`, Node: Creating Data Buffers, Next: Destroying Data Buffers, Up: Exchanging Data

6.1 Creating Data Buffers

=====

Data

objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

* Menu:

- * Memory Based Data Buffers:: Creating memory based data buffers.
- * File Based Data Buffers:: Creating file based data buffers.
- * Callback Based Data Buffers:: Creating callback based data buffers.

File: `gpgme.info`, Node: Memory Based Data Buffers, Next: File Based Data Buffers, Up: Creating Data Buffers

6.1.1 Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source and to its destination, which can often be avoided by using one of the other data object

-- Function: `gpgme_error_t gpgme_data_new (gpgme_data_t *DH)`

The function `gpgme_data_new` creates a new `gpgme_data_t` object

and returns a handle for it in DH. The data object is memory based and initially empty.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_mem (gpgme_data_t *DH, const char *BUFFER, size_t SIZE, int COPY)`

The function `gpgme_data_new_from_mem` creates a new `gpgme_data_t` object and fills it with SIZE bytes starting from BUFFER.

If COPY is not zero, a private copy of the data is made. If COPY is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains valid for the whole life span of the data object.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or BUFFER is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_file (gpgme_data_t *DH, const char *FILENAME, int COPY)`

The function `gpgme_data_new_from_file` creates a new `gpgme_data_t` object and fills it with the content of the file FILENAME.

If COPY is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for COPY might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or FILENAME is not a valid pointer, GPG_ERR_NOT_IMPLEMENTED if CODE is zero, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_filepart (gpgme_data_t *DH, const char *FILENAME, FILE *FP, off_t OFFSET, size_t LENGTH)`

The function `gpgme_data_new_from_filepart` creates a new `gpgme_data_t` object and fills it with a part of the file

specified by FILENAME or FP.

Exactly one of FILENAME and FP must be non-zero, the other must be zero. The argument that is not zero specifies the file from which LENGTH bytes are read into the data object, starting from OFFSET.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH and exactly one of FILENAME and FP is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info, Node: File Based Data Buffers, Next: Callback Based Data Buffers, Prev: Memory Based Data Buffers, Up: Creating Data Buffers

6.1.2 File Based Data Buffers

File based data objects operate directly on file descriptors or streams. Only a small amount of data is stored in core at any time, so the size of the data objects is not limited by GPGME.

-- Function: gpgme_error_t gpgme_data_new_from_fd (gpgme_data_t *DH, int FD)

The function gpgme_data_new_from_fd creates a new gpgme_data_t object and uses the file descriptor FD to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_stream (gpgme_data_t *DH, FILE *STREAM)

The function gpgme_data_new_from_stream creates a new gpgme_data_t object and uses the I/O stream STREAM to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

```
-- Function: gpgme_error_t gpgme_data_new_from_estream
           (gpgme_data_t *DH, gpgmt_stream_t STREAM)
```

The function `gpgme_data_new_from_estream` creates a new `gpgme_data_t` object and uses the `gpgmt` stream `STREAM` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

File: `gpgme.info`, Node: `Callback Based Data Buffers`, Prev: `File Based Data Buffers`, Up: `Creating Data Buffers`

6.1.3 Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your application, you can implement the functions a data object provides yourself and create a data object from these callback functions.

```
-- Data type: ssize_t (*gpgme_data_read_cb_t) (void *HANDLE,
           void *BUFFER, size_t SIZE)
```


The `gpgme_data_read_cb_t` type is the type of functions which GPGME calls if it wants to read data from a user-implemented data object. The function should read up to `SIZE` bytes from the current read position into the space starting at `BUFFER`. The `HANDLE` is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, `ERRNO` should be set to describe the type of the error.

-- Data type: `ssize_t (*gpgme_data_write_cb_t) (void *HANDLE, const void *BUFFER, size_t SIZE)`

The `gpgme_data_write_cb_t` type is the type of functions which GPGME calls if it wants to write data to a user-implemented data object. The function should write up to `SIZE` bytes to the current write position from the space starting at `BUFFER`. The `HANDLE` is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, `ERRNO` should be set to describe the type of the error.

-- Data type: `off_t (*gpgme_data_seek_cb_t) (void *HANDLE, off_t OFFSET, int WHENCE)`

The `gpgme_data_seek_cb_t` type is the type of functions which GPGME calls if it wants to change the current read/write position in a user-implemented data object, just like the `lseek` function.

The function should return the new read/write position, and -1 on error. If an error occurs, `ERRNO` should be set to describe the type of the error.

-- Data type: `void (*gpgme_data_release_cb_t) (void *HANDLE)`

The `gpgme_data_release_cb_t` type is the type of functions which GPGME calls if it wants to destroy a user-implemented data object. The `HANDLE` is provided by the user at data object creation time.

-- Data type: `struct gpgme_data_cbs`

This structure is used to store the data callback interface

functions described above. It has the following members:

`gpgme_data_read_cb_t` read

This is the function called by GPGME to read data from the data object. It is only required for input data object.

`gpgme_data_write_cb_t` write

This is the function called by GPGME to write data to the data object. It is only required for output data object.

`gpgme_data_seek_cb_t` seek

This is the function called by GPGME to change the current read/write pointer in the data object (if available). It is optional.

`gpgme_data_release_cb_t` release

This is the function called by GPGME to release a data object. It is optional.

-- Function: `gpgme_error_t gpgme_data_new_from_cbs (gpgme_data_t *DH, gpgme_data_cbs_t CBS, void *HANDLE)`

The function `gpgme_data_new_from_cbs` creates a new `gpgme_data_t` object and uses the user-provided callback functions to operate on the data object.

The handle `HANDLE` is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

File: `gpgme.info`, Node: Destroying Data Buffers, Next: Manipulating Data Buffers, Prev: Creating Data Buffers, Up: Exchanging Data

6.2 Destroying Data Buffers

=====

-- Function: `void gpgme_data_release (gpgme_data_t DH)`

The function `gpgme_data_release` destroys the data object with the handle `DH`. It releases all associated resources that were not provided by the user in the first place.

-- Function: `char * gpgme_data_release_and_get_mem (gpgme_data_t DH, size_t *LENGTH)`

The function `gpgme_data_release_and_get_mem` is like

gpgme_data_release, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with gpgme_free. In case the user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return NULL. In any case, the data object DH is destroyed.

-- Function: void gpgme_free (void *BUFFER)
SINCE: 1.1.1

The function gpgme_free releases the memory returned by gpgme_data_release_and_get_mem and gpgme_pubkey_algo_string. It should be used instead of the system libraries free function in case different allocators are used by a program. This is often the case if gpgme is used under Windows as a DLL.

File: gpgme.info, Node: Manipulating Data Buffers, Prev: Destroying Data Buffers, Up: Exchanging Data

6.3 Manipulating Data Buffers

=====

Data buffers contain data and meta-data. The following operations can be used to manipulate both.

* Menu:

- * Data Buffer I/O Operations:: I/O operations on data buffers.
- * Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- * Data Buffer Convenience:: Convenience function for data buffers.

File: gpgme.info, Node: Data Buffer I/O Operations, Next: Data Buffer Meta-Data, Up: Manipulating Data Buffers

6.3.1 Data Buffer I/O Operations

-- Function: ssize_t gpgme_data_read
(gpgme_data_t DH, void *BUFFER,
size_t LENGTH)

The function gpgme_data_read reads up to LENGTH bytes from the data object with the handle DH into the space starting at BUFFER.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets ERRNO.

-- Function: `ssize_t gpgme_data_write (gpgme_data_t DH, const void *BUFFER, size_t SIZE)`
The function `gpgme_data_write` writes up to `SIZE` bytes starting from `BUFFER` into the data object with the handle `DH` at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, `ERRNO` is set.

-- Function: `off_t gpgme_data_seek (gpgme_data_t DH, off_t OFFSET, int WHENCE)`
The function `gpgme_data_seek` changes the current read/write position.

The `WHENCE` argument specifies how the `OFFSET` should be interpreted.

It must be one of the following symbolic constants:

`SEEK_SET`

Specifies that `OFFSET` is a count of characters from the beginning of the data object.

`SEEK_CUR`

Specifies that `OFFSET` is a count of characters from the current file position. This count may be positive or negative.

`SEEK_END`

Specifies that `OFFSET` is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with `SEEK_CUR` to read the current read/write position.

If the function fails, -1 is returned and `ERRNO` is set.

6.3.2 Data Buffer Meta-Data

-- Function: char * gpgme_data_get_file_name (gpgme_data_t DH)
SINCE: 1.1.0

The function `gpgme_data_get_file_name` returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, `NULL` will be returned.

-- Function: gpgme_error_t gpgme_data_set_file_name (gpgme_data_t DH,
const char *FILE_NAME)
SINCE: 1.1.0

The function `gpgme_data_set_file_name` sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code `GPG_ERR_INV_VALUE` if `DH` is not a valid pointer and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Data type: enum gpgme_data_encoding_t

The `gpgme_data_encoding_t` type specifies the encoding of a `gpgme_data_t` object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

`GPGME_DATA_ENCODING_NONE`

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

GPGME_DATA_ENCODING_BINARY

This specifies that the data is encoding in binary form; i.e. there is no special encoding.

GPGME_DATA_ENCODING_BASE64

This specifies that the data is encoded using the Base-64 encoding scheme as used by MIME and other protocols.

GPGME_DATA_ENCODING_ARMOR

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

GPGME_DATA_ENCODING_MIME

SINCE: 1.7.0

This specifies that the data is encoded as a MIME part.

GPGME_DATA_ENCODING_URL

SINCE: 1.2.0

The data is a list of linefeed delimited URLs. This is only useful with `gpgme_op_import`.

GPGME_DATA_ENCODING_URL0

SINCE: 1.2.0

The data is a list of binary zero delimited URLs. This is only useful with `gpgme_op_import`.

GPGME_DATA_ENCODING URLESC

SINCE: 1.2.0

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is not yet implemented.

-- Function: `gpgme_data_encoding_t gpgme_data_get_encoding(gpgme_data_t DH)`

The function `gpgme_data_get_encoding` returns the encoding of the data object with the handle `DH`. If `DH` is not a valid pointer (e.g. `NULL`) `GPGME_DATA_ENCODING_NONE` is returned.

-- Function: `gpgme_error_t gpgme_data_set_encoding(gpgme_data_t DH, gpgme_data_encoding_t ENC)`

The function `gpgme_data_set_encoding` changes the encoding of the data object with the handle `DH` to `ENC`.

-- Function: `gpgme_error_t gpgme_data_set_flag (gpgme_data_t DH, const char *NAME, const char *VALUE)`

SINCE: 1.7.0

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for NAME:

`size-hint`

The value is a decimal number with the length gpgme shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the applications knows the total size of the data. If this is set the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

This function returns 0 on success.

File: `gpgme.info`, Node: Data Buffer Convenience, Prev: Data Buffer Meta-Data, Up: Manipulating Data Buffers

6.3.3 Data Buffer Convenience Functions

-- Data type: `enum gpgme_data_type_t`
SINCE: 1.4.3

The `gpgme_data_type_t` type is used to return the detected type of the content of a data buffer.

`GPGME_DATA_TYPE_INVALID`

This is returned by `gpgme_data_identify` if it was not possible to identify the data. Reasons for this might be a non-seekable stream

or a memory problem. The value is 0.

`GPGME_DATA_TYPE_UNKNOWN`

The type of the data is not known.

`GPGME_DATA_TYPE_PGP_SIGNED`

The data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.

`GPGME_DATA_TYPE_PGP_ENCRYPTED`

SINCE: 1.7.0

The data is an OpenPGP encrypted message.

`GPGME_DATA_TYPE_PGP_SIGNATURE`

SINCE: 1.7.0

The data is an OpenPGP detached signature.

GPGME_DATA_TYPE_PGP_OTHER

This is a generic OpenPGP message. In most cases this will be encrypted data.

GPGME_DATA_TYPE_PGP_KEY

This is an OpenPGP key (private or public).

GPGME_DATA_TYPE_CMS_SIGNED

This is a CMS signed message.

GPGME_DATA_TYPE_CMS_ENCRYPTED

This is a CMS encrypted (enveloped data) message.

GPGME_DATA_TYPE_CMS_OTHER

This is used for other CMS message types.

GPGME_DATA_TYPE_X509_CERT

The data is a X.509 certificate

GPGME_DATA_TYPE_PKCS12

The data is a PKCS#12 message. This is commonly used to exchange private keys for X.509.

-- Function: `gpgme_data_type_t gpgme_data_identify (gpgme_data_t DH)`

SINCE: 1.4.3

The function `gpgme_data_identify` returns the type of the data with the handle `DH`. If it is not possible to perform the identification, the function returns zero (`GPGME_DATA_TYPE_INVALID`). Note that depending on how the data object has been created the identification may not be possible or the data object may change its internal state (file pointer moved). For file or memory based data object, the state should not change.

File: `gpgme.info`, Node: Contexts, Next: UI Server Protocol, Prev: Exchanging Data, Up: Top

7 Contexts

All cryptographic operations in GPGME are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

-- Data type: `gpgme_ctx_t`

The `gpgme_ctx_t` type is a handle for a GPGME context, which is used to hold the configuration, status and result of cryptographic operations.

- * Menu:
- * Creating Contexts:: Creating new GPGME contexts.
- * Destroying Contexts:: Releasing GPGME contexts.
- * Result Management:: Managing the result of crypto operations.
- * Context Attributes:: Setting properties of a context.
- * Key Management:: Managing keys with GPGME.
- * Crypto Operations:: Using a context for cryptography.
- * Miscellaneous:: Miscellaneous operations
- * Run Control:: Controlling how operations are run.

File: gpgme.info, Node: Creating Contexts, Next: Destroying Contexts, Up: Contexts

7.1 Creating Contexts

=====

-- Function: gpgme_error_t gpgme_new (gpgme_ctx_t *CTX)
 The function gpgme_new creates a new gpgme_ctx_t object and returns a handle for it in CTX.

The function returns the error code GPG_ERR_NO_ERROR if the context was successfully created, GPG_ERR_INV_VALUE if CTX is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available. Also, it returns GPG_ERR_NOT_OPERATIONAL if gpgme_check_version was not called to initialize GPGME, and GPG_ERR_SELFTEST_FAILED if a selftest failed. Currently, the only selftest is for Windows MingW32 targets to see if -mms-bitfields was used (as required).

File: gpgme.info, Node: Destroying Contexts, Next: Result Management, Prev: Creating Contexts, Up: Contexts

7.2 Destroying Contexts

=====

-- Function: void gpgme_release (gpgme_ctx_t CTX)
 The function gpgme_release destroys the context with the handle CTX and releases all associated resources.

File: gpgme.info, Node: Result Management, Next: Context Attributes, Prev: Destroying Contexts, Up: Contexts

7.3 Result Management

=====

The

detailed result of an operation is returned in operation-specific structures such as `gpgme_decrypt_result_t`. The corresponding retrieval functions such as `gpgme_op_decrypt_result` provide static access to the results after an operation completes. Those structures shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context and give it a lifetime beyond that of the current operation or context.

-- Function: `void gpgme_result_ref (void *RESULT)`
SINCE: 1.2.0

The function `gpgme_result_ref` acquires an additional reference for the result `RESULT`, which may be of any type `gpgme_*_result_t`. As long as the user holds a reference, the result structure is guaranteed to be valid and unmodified.

-- Function: `void gpgme_result_unref (void *RESULT)`
SINCE: 1.2.0

The function `gpgme_result_unref` releases a reference for the result `RESULT`. If this was the last reference, the result structure will be destroyed and all resources associated to it will be released.

Note that a context may hold its own references to result structures, typically until the context is destroyed or the next operation is started. In fact, these references are accessed through the `gpgme_op_*_result` functions.

File: `gpgme.info`, Node: Context Attributes, Next: Key Management, Prev: Result Management, Up: Contexts

7.4 Context Attributes

=====

* Menu:

- * Protocol Selection:: Selecting the protocol used by a context.
- * Crypto Engine:: Configuring the crypto engine.
- * Setting the Sender:: How to tell the engine the sender.
- * ASCII Armor:: Requesting ASCII armored output.
- * Text Mode:: Choosing canonical text mode.
- * Offline Mode:: Choosing offline mode.
- * Pinentry Mode:: Choosing the pinentry mode.
- * Included Certificates:: Including a number of certificates.

- * Key Listing Mode:: Selecting key listing mode.
- * Passphrase Callback:: Getting the passphrase from the user.
- * Progress Meter Callback:: Being informed about the progress.
- * Status Message Callback:: Status messages received from gpg.
- * Context Flags:: Additional flags for a context.
- * Locale:: Setting the locale of a context.
- * Additional Logs:: Additional logs of a context.

File: gpgme.info, Node: Protocol Selection, Next: Crypto Engine, Up: Context Attributes

7.4.1 Protocol Selection

-- Function: `gpgme_error_t gpgme_set_protocol (gpgme_ctx_t CTX, gpgme_protocol_t PROTO)`

The function `gpgme_set_protocol` sets the protocol used within the context `CTX` to `PROTO`. All crypto operations will be performed by the crypto engine configured for that protocol. *Note

Protocols
and Engines::.

Setting the protocol with `gpgme_set_protocol` does intentionally not check if the crypto engine for that protocol is available and installed correctly. *Note Engine Version Check::.

The function returns the error code `GPG_ERR_NO_ERROR` if the protocol could be set successfully, and `GPG_ERR_INV_VALUE` if `PROTOCOL` is not a valid protocol.

-- Function: `gpgme_protocol_t gpgme_get_protocol (gpgme_ctx_t CTX)`

The function `gpgme_get_protocol` retrieves the protocol currently use with the context `CTX`.

File: gpgme.info, Node: Crypto Engine, Next: Setting the Sender, Prev: Protocol Selection, Up: Context Attributes

7.4.2 Crypto Engine

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context. *Note Engine Information::. The default can also be changed globally. *Note Engine Configuration::.

-- Function: `gpgme_engine_info_t gpgme_ctx_get_engine_info`
(`gpgme_ctx_t CTX`)
SINCE: 1.1.0

The function `gpgme_ctx_get_engine_info` returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context `CTX`.

The result is valid until the next invocation of `gpgme_ctx_set_engine_info` for this particular context.

This function can not fail.

-- Function: `gpgme_error_t gpgme_ctx_set_engine_info` (`gpgme_ctx_t CTX`,
`gpgme_protocol_t PROTO`, `const char *FILE_NAME`,
`const char *HOME_DIR`)
SINCE: 1.1.0

The function `gpgme_ctx_set_engine_info` changes the configuration of the crypto engine implementing the protocol `PROTO` for the context `CTX`.

`FILE_NAME` is the file name of the executable program implementing this protocol, and `HOME_DIR` is the directory name of the configuration directory for this crypto engine. If `HOME_DIR` is `NULL`, the engines default will be used.

Currently this function must be used before starting the first crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context `CTX`.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

File: `gpgme.info`, Node: Setting the Sender, Next: ASCII Armor, Prev: Crypto Engine, Up: Context Attributes

7.4.3 How to tell the engine the sender.

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. GPGME provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not

supported.

-- Function: `gpgme_error_t`
`gpgme_set_sender` (`gpgme_ctx_t` CTX,
int ADDRESS)

SINCE: 1.8.0

The function `gpgme_set_sender` specifies the sender address for use in sign and verify operations. ADDRESS is expected to be the addr-spec part of an address but may also be a complete mailbox address, in which case this function extracts the addr-spec from it. Using NULL for ADDRESS clears the sender address.

The function returns 0 on success or an error code on failure. The most likely failure is that no valid addr-spec was found in ADDRESS.

-- Function: `const char *` `gpgme_get_sender` (`gpgme_ctx_t` CTX)

SINCE: 1.8.0

The function `gpgme_get_sender` returns the current sender address from the context, or NULL if none was set. The returned value is valid as long as the CTX is valid and `gpgme_set_sender` has not been called again.

File: `gpgme.info`, Node: ASCII Armor, Next: Text Mode, Prev: Setting the Sender, Up: Context Attributes

7.4.4

ASCII Armor

-- Function: `void` `gpgme_set_armor` (`gpgme_ctx_t` CTX, int YES)

The function `gpgme_set_armor` specifies if the output should be ASCII armored. By default, output is not ASCII armored.

ASCII armored output is disabled if YES is zero, and enabled otherwise.

-- Function: `int` `gpgme_get_armor` (`gpgme_ctx_t` CTX)

The function `gpgme_get_armor` returns 1 if the output is ASCII armored, and 0 if it is not, or if CTX is not a valid pointer.

File: `gpgme.info`, Node: Text Mode, Next: Offline Mode, Prev: ASCII Armor, Up: Context Attributes

7.4.5 Text Mode

-- Function: void gpgme_set_textmode (gpgme_ctx_t CTX, int YES)
The function gpgme_set_textmode specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme_get_textmode (gpgme_ctx_t CTX)
The function gpgme_get_textmode returns 1 if canonical text mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Offline Mode, Next: Pinentry Mode, Prev: Text Mode, Up: Context Attributes

7.4.6 Offline Mode

-- Function: void gpgme_set_offline (gpgme_ctx_t CTX, int YES)
SINCE: 1.6.0

The function gpgme_set_offline specifies if offline mode should be used. Offline mode is disabled if YES is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode `GPGME_KEYLIST_MODE_VALIDATE`.

For the OpenPGP protocol offline mode entirely disables the use of

the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

-- Function: int gpgme_get_offline (gpgme_ctx_t CTX)
SINCE: 1.6.0

The function gpgme_get_offline returns 1 if offline mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Pinentry Mode, Next: Included Certificates, Prev: Offline Mode, Up: Context Attributes

7.4.7

Pinentry Mode

-- Function: gpgme_error_t gpgme_set_pinentry_mode (gpgme_ctx_t CTX,
gpgme_pinentry_mode_t MODE)

SINCE: 1.4.0

The function gpgme_set_pinentry_mode specifies the pinentry mode to be used.

For GnuPG \geq 2.1 this option is required to be set to GPGME_PINENTRY_MODE_LOOPBACK to enable the passphrase callback mechanism in GPGME through gpgme_set_passphrase_cb.

-- Function: gpgme_pinentry_mode_t gpgme_get_pinentry_mode
(gpgme_ctx_t CTX)

SINCE: 1.4.0

The function gpgme_get_pinentry_mode returns the mode set for the context.

-- Data type: enum gpgme_pinentry_mode_t
SINCE: 1.4.0

The gpgme_minentry_mode_t type specifies the set of possible pinentry modes that are supported by GPGME if GnuPG \geq 2.1 is used. The following modes are supported:

GPGME_PINENTRY_MODE_DEFAULT

SINCE: 1.4.0

Use the default of the agent, which is ask.

GPGME_PINENTRY_MODE_ASK

SINCE: 1.4.0

Force the use of the Pinentry.

GPGME_PINENTRY_MODE_CANCEL

SINCE: 1.4.0

Emulate use of Pinentrys cancel button.

GPGME_PINENTRY_MODE_ERROR

SINCE: 1.4.0

Return a Pinentry error No Pinentry.

GPGME_PINENTRY_MODE_LOOPBACK

SINCE: 1.4.0

Redirect Pinentry queries to the caller. This enables the use of `gpgme_set_passphrase_cb` because pinentry queries are redirected to `gpgme`.

Note: For 2.1.0 - 2.1.12 this mode requires `allow-loopback-pinentry` to be enabled in the `gpg-agent.conf` or an agent started with that option.

File: `gpgme.info`, Node: Included Certificates, Next: Key Listing Mode, Prev: Pinentry Mode, Up: Context Attributes

7.4.8 Included Certificates

-- Function: `void gpgme_set_include_certs (gpgme_ctx_t CTX, int NR_OF_CERTS)`

The function `gpgme_set_include_certs` specifies how many certificates should be included in an S/MIME signed message. By default, only the senders certificate is included. The possible values of `NR_OF_CERTS` are:

GPGME_INCLUDE_CERTS_DEFAULT

SINCE: 1.0.3

Fall back to the default of the crypto backend. This is the default for GPGME.

- 2
Include all certificates except the root certificate.
- 1
Include all certificates.
- 0
Include no certificates.
- 1
Include the senders certificate only.
- n
Include the first n certificates of the certificates path,
starting from the senders certificate. The number n must
be positive.

Values of NR_OF_CERTS smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by all other engines.

-- Function: int gpgme_get_include_certs (gpgme_ctx_t CTX)
The function gpgme_get_include_certs returns
the number of
certificates to include into an S/MIME signed message.

File: gpgme.info, Node: Key Listing Mode, Next: Passphrase Callback, Prev: Included Certificates, Up: Context Attributes

7.4.9 Key Listing Mode

-- Function: gpgme_error_t gpgme_set_keylist_mode (gpgme_ctx_t CTX,
gpgme_keylist_mode_t MODE)
The function gpgme_set_keylist_mode changes the default behaviour
of the key listing functions. The value in MODE is a bitwise-or
combination of one or multiple of the following bit values:

GPGME_KEYLIST_MODE_LOCAL

The GPGME_KEYLIST_MODE_LOCAL symbol specifies that the local
keyring should be searched for keys in the keylisting
operation. This is the default.

Using only this option results in a --list-keys.

GPGME_KEYLIST_MODE_EXTERN

The GPGME_KEYLIST_MODE_EXTERN symbol specifies that an
external source should be searched for keys in the keylisting
operation. The type of external source is dependent on the
crypto engine used and whether it is combined with

GPGME_KEYLIST_MODE_LOCAL. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a --search-keys for GPGME_PROTOCOL_OpenPGP and something similar to --list-external-keys for GPGME_PROTOCOL_CMS.

GPGME_KEYLIST_MODE_LOCATE

This is a shortcut for the combination of GPGME_KEYLIST_MODE_LOCAL and GPGME_KEYLIST_MODE_EXTERN, which results in a --locate-keys for GPGME_PROTOCOL_OpenPGP.

GPGME_KEYLIST_MODE_SIGS

The GPGME_KEYLIST_MODE_SIGS symbol specifies that the key signatures should be included in the listed keys.

GPGME_KEYLIST_MODE_SIG_NOTATIONS

SINCE: 1.1.1

The GPGME_KEYLIST_MODE_SIG_NOTATIONS symbol specifies that the signature notations on key signatures should be included

in the listed keys. This only works if GPGME_KEYLIST_MODE_SIGS is also enabled.

GPGME_KEYLIST_MODE_WITH_TOFU

SINCE: 1.7.0

The GPGME_KEYLIST_MODE_WITH_TOFU symbol specifies that information pertaining to the TOFU trust model should be included in the listed keys.

GPGME_KEYLIST_MODE_WITH_KEYGRIP

SINCE: 1.14.0

The GPGME_KEYLIST_MODE_WITH_KEYRIP symbol specifies that the keygrip is always included in the listing. The default depends on the version of the backend and the used protocol.

GPGME_KEYLIST_MODE_WITH_SECRET

SINCE: 1.5.1

The GPGME_KEYLIST_MODE_WITH_SECRET returns information about the presence of a corresponding secret key in a public key listing. A public key listing with this mode is slower than a standard listing but can be used instead of a second run to list the secret keys.

This is only supported for GnuPG

versions ≥ 2.1 . Note that using this option also makes sure that the keygrip is available in the output.

GPGME_KEYLIST_MODE_EPHEMERAL

SINCE: 1.2.0

The GPGME_KEYLIST_MODE_EPHEMERAL symbol specifies that keys flagged as ephemeral are included in the listing.

GPGME_KEYLIST_MODE_VALIDATE

SINCE: 0.4.5

The GPGME_KEYLIST_MODE_VALIDATE symbol specifies that the backend should do key or certificate validation and not just get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

At least one of GPGME_KEYLIST_MODE_LOCAL and GPGME_KEYLIST_MODE_EXTERN must be specified. For future binary compatibility, you should get the current mode with `gpgme_get_keylist_mode` and modify it by setting or clearing the appropriate bits, and then using that calculated value in the `gpgme_set_keylisting_mode` operation. This will leave all other bits in the mode value intact (in particular those that are not used in the current version of the library).

The function returns the error code `GPG_ERR_NO_ERROR` if the mode could be set correctly, and `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer or `MODE` is not a valid mode.

-- Function: `gpgme_keylist_mode_t gpgme_get_keylist_mode`
(`gpgme_ctx_t CTX`)

The function `gpgme_get_keylist_mode` returns the current key listing mode of the context `CTX`. This value can then be modified and used in a subsequent `gpgme_set_keylist_mode` operation to only affect the desired bits (and leave all others intact).

The function returns 0 if `CTX` is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

File: `gpgme.info`, Node: Passphrase

Callback, Next: Progress Meter Callback, Prev: Key Listing Mode, Up: Context Attributes

7.4.10 Passphrase Callback

-- Data type: `gpgme_error_t (*gpgme_passphrase_cb_t)(void *HOOK, const char *UID_HINT, const char *PASSPHRASE_INFO, int PREV_WAS_BAD, int FD)`

The `gpgme_passphrase_cb_t` type is the type of functions usable as passphrase callback function.

The argument `UID_HINT` might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), `UID_HINT` will be `NULL`.

The argument `PASSPHRASE_INFO`, if not `NULL`, will give further information about the context in which the passphrase is required. This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then `PREV_WAS_BAD` is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor `FD`. The function `gpgme_io_writen` should be used for the write operation. Note that if the user returns 0 to indicate success, the user must at least write a newline character before returning from the callback.

If an error occurs, return the corresponding `gpgme_error_t` value. You can use the error code `GPG_ERR_CANCELED` to abort the operation. Otherwise, return 0.

Note: The `passphrase_cb` only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See `gpgme_set_pinentry_mode` for more details on 2.1.x usage.

-- Function: `void gpgme_set_passphrase_cb (gpgme_ctx_t CTX, gpgme_passphrase_cb_t PASSFUNC, void *HOOK_VALUE)`

The function `gpgme_set_passphrase_cb` sets the function that is used when a passphrase needs to be provided by the user to `PASSFUNC`. The function `PASSFUNC` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `HOOK_VALUE`. By default, no passphrase callback function is set.

Not all crypto engines require this callback to retrieve the

passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not even support an external passphrase callback at all, in this case the error code `GPG_ERR_NOT_SUPPORTED` is returned.

For GnuPG \geq 2.1 the pinentry mode has to be set to `GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback. See `gpgme_set_pinentry_mode`.

The user can disable the use of a passphrase callback function by calling `gpgme_set_passphrase_cb` with `PASSFUNC` being `NULL`.

-- Function: `void gpgme_get_passphrase_cb (gpgme_ctx_t CTX, gpgme_passphrase_cb_t *PASSFUNC, void **HOOK_VALUE)`

The function `gpgme_get_passphrase_cb` returns the function that is used when a passphrase needs to be provided by the user in `*PASSFUNC`, and the first argument for this function in `*HOOK_VALUE`.

If no passphrase callback is set, or `CTX` is not a valid pointer, `NULL` is returned in both variables.

`PASSFUNC` or `HOOK_VALUE` can be `NULL`. In this case, the corresponding value will not be returned.

File: `gpgme.info`, Node: Progress Meter Callback, Next: Status Message Callback, Prev: Passphrase Callback, Up: Context Attributes

7.4.11 Progress Meter Callback

-- Data type: `void (*gpgme_progress_cb_t)(void *HOOK, const char *WHAT, int TYPE, int CURRENT, int TOTAL)`

The `gpgme_progress_cb_t` type is the type of functions usable as progress callback function.

The arguments are specific to the crypto engine. More information about the progress information returned from the GnuPG engine can be

found in the GnuPG source code in the file `doc/DETAILS` in the section `PROGRESS`.

-- Function: `void gpgme_set_progress_cb (gpgme_ctx_t CTX, gpgme_progress_cb_t PROGFUNC, void *HOOK_VALUE)`

The function `gpgme_set_progress_cb` sets the function that is used when progress information about a cryptographic operation is available. The function `PROGFUNC` needs to be implemented by the user, and whenever it is called, it is called with its first argument

being `HOOK_VALUE`. By default, no progress callback function is set.

Setting a callback function allows an interactive program to display progress information about a long operation to the user.

The user can disable the use of a progress callback function by calling `gpgme_set_progress_cb` with `PROGFUNC` being `NULL`.

-- Function: `void gpgme_get_progress_cb (gpgme_ctx_t CTX, gpgme_progress_cb_t *PROGFUNC, void **HOOK_VALUE)`

The function `gpgme_get_progress_cb` returns the function that is

used to inform the user about the progress made in `*PROGFUNC`, and the first argument for this function in `*HOOK_VALUE`. If no progress callback is set, or `CTX` is not a valid pointer, `NULL` is returned in both variables.

`PROGFUNC` or `HOOK_VALUE` can be `NULL`. In this case, the corresponding value will not be returned.

File: `gpgme.info`, Node: Status Message Callback, Next: Context Flags, Prev: Progress Meter Callback, Up: Context Attributes

7.4.12 Status Message Callback

-- Data type: `gpgme_error_t (*gpgme_status_cb_t)(void *HOOK, const char *KEYWORD, const char *ARGS)`

The `gpgme_status_cb_t` type is the type of function usable as a status message callback function.

The argument `KEYWORD` is the name of the status message while the `ARGS` argument contains any arguments for the status message.

If an error occurs, return the corresponding `gpgme_error_t` value. Otherwise, return 0.

-- Function: `void gpgme_set_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t STATUSFUNC, void *HOOK_VALUE)`

SINCE: 1.6.0

The function `gpgme_set_status_cb` sets the function that is used when a status message is received from `gpg` to `STATUSFUNC`. The function `STATUSFUNC` needs to be implemented by the user, and whenever it is called, it is called with its first argument being

HOOK_VALUE. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling `gpgme_set_status_cb` with `STATUSFUNC` being `NULL`.

```
-- Function: void gpgme_get_status_cb (gpgme_ctx_t CTX,  
    gpgme_status_cb_t *STATUSFUNC, void **HOOK_VALUE)  
SINCE: 1.6.0
```

The function `gpgme_get_status_cb` returns the function that is used to process status messages from `gpg` in `*STATUSFUNC`, and the first argument for this function in `*HOOK_VALUE`. If no status message callback is set, or `CTX` is not a valid pointer, `NULL` is returned in both variables.

File: `gpgme.info`, Node: Context Flags, Next: Locale, Prev: Status Message Callback, Up: Context Attributes

7.4.13 Context Flags

```
-- Function: gpgme_error_t gpgme_set_ctx_flag (gpgme_ctx_t CTX,  
    const char *NAME, const char *VALUE)
```

SINCE: 1.7.0

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for `NAME`:

"redraw"

This flag is normally not changed by the caller because `GPGME` sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a `Pinentry`. A Curses based application may use this information to redraw the screen; for example:

```
err = gpgme_op_keylist_start (ctx, "foo@example.org", 0);  
while  
(!err)  
{  
    err = gpgme_op_keylist_next (ctx, &key);  
    if (err)  
        break;  
    show_key (key);  
    gpgme_key_release (key);
```

```

    }
    if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
        redraw_screen ();
    gpgme_release (ctx);

```

"full-status"

Using a VALUE of "1" the status callback set by `gpgme_set_status_cb` returns all status lines with the exception of PROGRESS lines. With the default of "0" the status callback is only called in certain situations.

"raw-description"

Setting the VALUE to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the description field of the `gpgme_tofu_info_t` object.

"export-session-key"

Using a VALUE of "1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for VALUE, session keys are not exported.

"override-session-key"

The string given in VALUE is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via `ps(1)`.

"auto-key-retrieve"

Setting the VALUE to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can

see which keys

you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

"auto-key-import"

Setting the VALUE to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

"include-key-block"

Setting the VALUE to "1" forces the GPG backend to embed the signing key as well as an encryption subkey into the the signature.

"request-origin"

The string given in VALUE is passed to the GnuPG engines to request restrictions based on the origin of the request.

Valid values are documented in the GnuPG manual and the gpg man page under the option --request-origin. Requires at least GnuPG 2.2.6 to have an effect.

"no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

"ignore-mdc-error"

This flag passes the option --ignore-mdc-error to gpg. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag legacy_cipher_nomdc set. For failsafe reasons this flag is reset after each operation.

"auto-key-locate"

The string given in VALUE is passed to gpg. This can be used to change the behavior of a GPGME_KEYLIST_MODE_LOCATE keylisting. Valid values are documented in the GnuPG manual and the gpg

man page under the option --auto-key-locate.

Requires at least GnuPG 2.1.18.

Note: Keys retrieved through auto-key-locate are automatically imported in the keyring.

trust-model

SINCE: 1.11.2

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default.

If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail.

Example: "tofu+pgp".

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future operations. A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

"extended-edit"

This flag passes the option --expert to gpg key edit. This can be used to get additional callbacks in gpgme_op_edit.

This function returns 0 on success.

-- Function: const char * gpgme_get_ctx_flag (gpgme_ctx_t CTX, const char *NAME)

SINCE: 1.8.0

The value of flags settable by gpgme_set_ctx_flag can be retrieved by this function. If NAME is unknown the function returns NULL. For boolean flags an empty string is returned for False and the string "1" is returned for True; either atoi(3) or a test for an empty string can be used to get the boolean value.

File: gpgme.info, Node: Locale, Next: Additional Logs, Prev: Context Flags, Up: Context Attributes

7.4.14 Locale

A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

-- Function: gpgme_error_t
gpgme_set_locale (gpgme_ctx_t CTX,
int CATEGORY, const char *VALUE)

SINCE: 0.4.3

The function gpgme_set_locale sets the locale of the context CTX, or the default locale if CTX is a null pointer.

The locale settings that should be changed are specified by CATEGORY. Supported categories are LC_CTYPE, LC_MESSAGES, and

LC_ALL, which is a wildcard you can use if you want to change all the categories at once.

The value to be used for the locale setting is VALUE, which will be copied to GPGMEs internal data structures. VALUE can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default value at startup.

The function returns an error if not enough memory is available.

File: gpgme.info, Node: Additional Logs, Prev: Locale, Up: Context Attributes

7.4.15 Additional Logs

Additional logs can be associated with a context. These logs are engine specific and can be obtained with `gpgme_op_getauditlog`.

-- Function: `gpgme_error_t gpgme_op_getauditlog (gpgme_ctx_t CTX, gpgme_data_t OUTPUT, unsigned int FLAGS)`
SINCE: 1.1.1

The function `gpgme_op_getauditlog` is used to obtain additional logs as specified by `FLAGS` into the `OUTPUT` data. If

The function returns the error code `GPG_ERR_NO_ERROR` if a log could be queried from the engine, and `GPG_ERR_NOT_IMPLEMENTED` if the log specified in `FLAGS` is not available for this engine. If no log is available `GPG_ERR_NO_DATA` is returned.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_AUDITLOG_DIAG`

SINCE: 1.11.2

Obtain diagnostic output which would be written to `stderr` in interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and GPG_ERR_NO_DATA will be returned.

Implemented for: GPGME_PROTOCOL_OpenPGP

GPGME_AUDITLOG_DEFAULT
SINCE: 1.11.2

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the GETAUDITLOG command. For GPGME_PROTOCOL_CMS this provides additional information about the X509 certificate chain.

Implemented for: GPGME_PROTOCOL_CMS

GPGME_AUDITLOG_HTML
SINCE: 1.1.1

Same as GPGME_AUDITLOG_DEFAULT but in HTML.

Implemented for: GPGME_PROTOCOL_CMS

-- Function: gpgme_error_t
gpgme_op_getauditlog_start (gpgme_ctx_t CTX,
gpgme_data_t OUTPUT, unsigned int FLAGS)
SINCE: 1.1.1

This is the asynchronous variant of gpgme_op_getauditlog.

File: gpgme.info, Node: Key Management, Next: Crypto Operations, Prev: Context Attributes, Up: Contexts

7.5 Key Management

=====

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

* Menu:

- * Key objects:: Description of the key structures.
- * Listing Keys:: Browsing the list of available keys.
- * Information About Keys:: Requesting detailed information about keys.
- * Manipulating Keys:: Operations on keys.
- * Generating Keys:: Creating new key pairs.

- * Signing Keys:: Adding key signatures to public keys.
- * Exporting Keys:: Retrieving key data from the key ring.
- * Importing Keys:: Adding keys to the key ring.
- * Deleting Keys:: Removing keys from the key ring.
- * Changing Passphrases:: Change the passphrase of a key.
- * Changing TOFU Data:: Changing data pertaining to TOFU.
- * Advanced Key Editing:: Advanced key edit operation.

File: gpgme.info, Node: Key objects, Next: Listing Keys, Up: Key Management

7.5.1 Key objects

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

-- Data type: gpgme_key_t

The gpgme_key_t type is a pointer to a key object. It has the following members:

gpgme_keylist_mode_t keylist_mode
SINCE: 0.9.0

The keylist mode that was active when the key was retrieved.

unsigned int revoked : 1
This is true if the key is revoked.

unsigned int expired : 1
This is true if the key is expired.

unsigned int disabled : 1
This is true if the key is disabled.

unsigned int invalid : 1
This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

unsigned int can_encrypt : 1
This is true if the key (ie one of its subkeys) can be used for encryption.

unsigned int can_sign : 1

This is true if the key (ie one of its subkeys) can be used to create data signatures.

unsigned int can_certify : 1

This is true if the key (ie one of its subkeys) can be used to create key certificates.

unsigned int can_authenticate : 1

SINCE: 0.4.5

This is true
if the key (ie one of its subkeys) can be used
for authentication.

unsigned int is_qualified : 1

SINCE: 1.1.0

This is true if the key can be used for qualified signatures according to local government regulations.

unsigned int secret : 1

This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if GPGME_KEYLIST_MODE_WITH_SECRET is active.

unsigned int origin : 5

SINCE: 1.8.0

Reserved for the origin of this key.

gpgme_protocol_t protocol

This is the protocol supported by this key.

char *issuer_serial

If protocol is GPGME_PROTOCOL_CMS, then this is the issuer serial.

char *issuer_name

If protocol is GPGME_PROTOCOL_CMS, then this is the issuer name.

char *chain_id

If protocol is GPGME_PROTOCOL_CMS, then this is the chain ID, which can be used to build the certificate chain.

gpgme_validity_t owner_trust

If protocol is GPGME_PROTOCOL_OpenPGP, then this is the owner trust.

gpgme_subkey_t subkeys

This is a linked list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

gpgme_user_id_t uids

This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

char *fpr

SINCE: 1.7.0

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

unsigned long last_update

SINCE: 1.8.0

Reserved for the time of the last update of this key.

-- Data type: gpgme_subkey_t

SINCE: 1.5.0

The gpgme_subkey_t type is a pointer to a subkey structure. Subkeys are one component of a gpgme_key_t object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One gpgme_key_t can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

gpgme_subkey_t next

This is a pointer to the next subkey structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1

This is true if the subkey is revoked.

unsigned int expired : 1

This is true if the subkey is expired.

unsigned int disabled : 1

This is true if the subkey is disabled.

unsigned int

invalid : 1

This is true if the subkey is invalid.

unsigned int can_encrypt : 1

This is true if the subkey can be used for encryption.

unsigned int can_sign : 1

This is true if the subkey can be used to create data signatures.

unsigned int can_certify : 1

This is true if the subkey can be used to create key certificates.

unsigned int can_authenticate : 1

SINCE: 0.4.5

This is true if the subkey can be used for authentication.

unsigned int is_qualified : 1

SINCE: 1.1.0

This is true if the subkey can be used for qualified signatures according to local government regulations.

unsigned int is_de_vs : 1

SINCE: 1.8.0

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a Brainpool curve.

unsigned int secret : 1

This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if GPGME_KEYLIST_MODE_WITH_SECRET is active.

gpgme_pubkey_algo_t pubkey_algo

This is the public key algorithm supported by this subkey.

unsigned int length

This is the length of the subkey (in bits).

char *keyid

This is the key ID of the subkey in hexadecimal digits.

char *fpr

This is the fingerprint of the subkey in hexadecimal digits, if available.

char *keygrip

SINCE: 1.7.0

The keygrip of the subkey in hex digit form or NULL if not available.

long int timestamp

This is the creation timestamp of the subkey.

This is -1 if

the timestamp is invalid, and 0 if it is not available.

long int expires

This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

unsigned int is_cardkey : 1

SINCE: 1.2.0

True if the secret key is stored on a smart card.

char *card_number

SINCE: 1.2.0

The serial number of a smart card holding this key or NULL.

char *curve

For ECC algorithms the name of the curve.

-- Data type: gpgme_user_id_t

A user ID is a component of a gpgme_key_t object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

gpgme_user_id_t next

This is a pointer to the next user ID structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1

This is true if the user ID is revoked.

unsigned int invalid : 1

This is true if the user ID is invalid.

gpgme_validity_t validity

This specifies the validity of the user ID.

char *uid

This is the user ID string.

char *name

This is the name component of uid, if available.

char *comment

This is the comment component of uid, if available.

char *email

This is the email component of uid, if available.

char *address;

The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the email part of this structure but might be slightly different. If no mail address is available NULL is stored.

gpgme_tofu_info_t tofu

SINCE: 1.7.0

If not NULL information from the TOFU database pertaining to this user id.

gpgme_key_sig_t signatures

This is a linked list with the signatures on this user ID.

unsigned int origin :

5

SINCE: 1.8.0

Reserved for the origin of this user ID.

unsigned long last_update

SINCE: 1.8.0

Reserved for the time of the last update of this user ID.

char *uidhash;

A string used by gpg to identify a user ID. This string can be used at certain prompts of gpgme_op_edit to select a user ID. Users must be prepared to see a NULL value here. The format of the value is not specified and may depend on the GPGME or GnuPG version.

-- Data type: gpgme_tofu_info_t

SINCE: 1.7.0

The gpgme_tofu_info_t type is a pointer to a tofu info structure. Tofu info structures are one component of a gpgme_user_id_t object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

gpgme_key_sig_t next

This is a pointer to the next tofu info structure in the linked list, or NULL if this is the last element.

unsigned int validity : 3

This is the TOFU validity. It can have the following values:

0

The value 0 indicates a conflict.

1

The value 1 indicates a key without history.

2

The value 2 indicates a key with too little history.

3

The value 3 indicates a key with enough history for basic trust.

4

The value 4 indicates a key with a lot of history.

unsigned int policy : 4

This is the TOFU policy, see gpgme_tofu_policy_t.

unsigned short sigcount

This is the number of signatures seen for this binding (or USHRT_MAX if there are more than that).

unsigned short encrcount

This is the number of encryptions done with this binding (or USHRT_MAX if there are more than that).

unsigned long signfirst

Number of seconds since Epoch when the first signature was seen with this binding.

unsigned long signlast

Number of seconds since Epoch when the last signature was seen with this binding.

unsigned long encrfirst

Number of seconds since Epoch when the first encryption was done with this binding.

unsigned long enclast

Number of seconds since Epoch when the last encryption was done with this binding.

char *description

A human-readable string summarizing the TOFU data (or NULL).

-- Data type: gpgme_key_sig_t

The gpgme_key_sig_t type is a pointer to a key signature structure. Key signatures are one component of a gpgme_key_t object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the GPGME_KEYLIST_MODE_SIGS mode enabled, because it can be expensive to retrieve all signatures of a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the GPGME_KEYLIST_MODE_SIG_NOTATIONS mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

gpgme_key_sig_t next

This is a pointer to the next key signature structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1

This is true if the key signature is a revocation signature.

unsigned int expired : 1

This is true if the key signature is expired.

unsigned int invalid : 1

This is true if the key signature is invalid.

unsigned int exportable : 1

This is true if the key signature is exportable.

pgpme_pubkey_algo_t pubkey_algo

This is the public key algorithm used to create the signature.

char *keyid

This is the key ID of the key (in hexadecimal digits) used to create the signature.

long int timestamp

This is the creation timestamp of the key signature. This is -1 if the timestamp is invalid, and 0 if it is not available.

long int expires

This is the expiration timestamp of the key signature, or 0 if the key signature does not expire.

pgpme_error_t status

This is the status of the signature and has the same meaning as the member of the same name in a `pgpme_signature_t` object.

unsigned int sig_class

This specifies the signature class of the key signature. The meaning is specific to the crypto engine.

char *uid

This is the main user ID of the key used to create the signature.

char *name

This is the name component of uid, if available.

char *comment

This is the comment component of uid, if available.

char *email

This is the email component of uid, if available.

gpgme_sig_notation_t notations

This is a linked list with the notation data and policy URLs.

File: gpgme.info, Node: Listing Keys, Next: Information About Keys, Prev: Key objects, Up: Key Management

7.5.2 Listing Keys

-- Function: gpgme_error_t gpgme_op_keylist_start (gpgme_ctx_t CTX,
const char *PATTERN, int SECRET_ONLY)

The function gpgme_op_keylist_start initiates a key listing operation inside the context CTX. It sets everything up so that subsequent invocations of gpgme_op_keylist_next return the keys in the list.

If PATTERN is NULL, all available keys are returned. Otherwise, PATTERN contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If SECRET_ONLY is not 0, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and gpgme_op_keylist_next returns GPG_ERR_EOF), or gpgme_op_keylist_end is called to finish the operation.

The function returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_ext_start (gpgme_ctx_t CTX,
const char *PATTERN[], int SECRET_ONLY, int RESERVED)

The function gpgme_op_keylist_ext_start initiates an extended key listing operation inside the context CTX. It sets everything up so

that subsequent invocations of `gpgme_op_keylist_next` return the keys in the list.

If `PATTERN` or `*PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` is a `NULL` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `SECRET_ONLY` is not 0, the list is restricted to secret keys only.

The value of `RESERVED` must be 0.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_keylist_from_data_start`
(`gpgme_ctx_t CTX`, `gpgme_data_t DATA`, `int RESERVED`)

SINCE: 1.8.0

The function `gpgme_op_keylist_from_data_start` initiates a key listing operation inside the context `CTX`. In contrast to the other key listing operation the keys are read from the supplied `DATA` and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys from `DATA`.

The value of `RESERVED` must be 0.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and

`gpgme_op_keylist_next`
returns `GPG_ERR_EOF`), or
`gpgme_op_keylist_end` is called to finish the operation. While
the context is busy DATA may not be released.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is
not a valid pointer, and passes through any errors that are
reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_keylist_next (gpgme_ctx_t CTX,
gpgme_key_t *R_KEY)`

The function `gpgme_op_keylist_next` returns the next key in the
list created by a previous `gpgme_op_keylist_start` operation in
the context `CTX`. The key will have one reference for the user.
*Note Manipulating Keys::.

This is the only way to get at `gpgme_key_t` objects in GPGME.

If the last key in the list has already been returned,
`gpgme_op_keylist_next` returns `GPG_ERR_EOF`.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` or
`R_KEY` is not a valid pointer, and `GPG_ERR_ENOMEM` if there is not
enough memory
for the operation.

-- Function: `gpgme_error_t gpgme_op_keylist_end (gpgme_ctx_t CTX)`

The function `gpgme_op_keylist_end` ends a pending key list
operation in the context `CTX`.

After the operation completed successfully, the result of the key
listing operation can be retrieved with `gpgme_op_keylist_result`.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is
not a valid pointer, and `GPG_ERR_ENOMEM` if at some time during
the operation there was not enough memory available.

The following example illustrates how all keys containing a certain
string (`g10code`) can be listed with their key ID and the name and
email address of the main user ID:

```
gpgme_ctx_t ctx;  
gpgme_key_t key;  
gpgme_error_t err = gpgme_new (&ctx);
```

```
if (!err)
```



```

{
err = gpgme_op_keylist_start (ctx, "g10code", 0);
while (!err)
{
err = gpgme_op_keylist_next (ctx, &key);
if (err)

break;
printf ("%s:", key->subkeys->keyid);
if (key->uids && key->uids->name)
printf (" %s", key->uids->name);
if (key->uids && key->uids->email)
printf (" <%s>", key->uids->email);
putchar ('\n');
gpgme_key_release (key);
}
gpgme_release (ctx);
}
if (gpg_err_code (err) != GPG_ERR_EOF)
{
fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
exit (1);
}

```

-- Data type: `gpgme_keylist_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_keylist_*` operation. After successfully ending a key listing operation, you can retrieve the pointer to the result with `gpgme_op_keylist_result`. The structure contains the following member:

`unsigned int truncated : 1`

This is true if the crypto backend had to truncate the result, and less than the desired keys could be listed.

-- Function: `gpgme_keylist_result_t gpgme_op_keylist_result (gpgme_ctx_t CTX)`

The function `gpgme_op_keylist_result` returns a `gpgme_keylist_result_t` pointer to a structure holding the result of a `gpgme_op_keylist_*` operation. The pointer is only valid if the last operation on the context was a key listing operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

In a simple program, for which a blocking operation is acceptable, the following function can be used to retrieve a single key.

-- Function: `gpgme_error_t gpgme_get_key (gpgme_ctx_t CTX, const char *FPR, gpgme_key_t *R_KEY, int SECRET)`
The function `gpgme_get_key` gets the key with the fingerprint (or key ID) `FPR` from the crypto backend and return it in `R_KEY`. If `SECRET` is true, get the secret key. The currently active keylist mode is used to retrieve the key. The key will have one reference for the user.

If the key is not found in the keyring, `gpgme_get_key` returns the error code `GPG_ERR_EOF` and `*R_KEY` will be set to `NULL`.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` or `R_KEY` is not a valid pointer or `FPR` is not a fingerprint or key ID, `GPG_ERR_AMBIGUOUS_NAME` if the key ID was not a unique specifier for a key, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

File: `gpgme.info`, Node: Information About Keys, Next: Manipulating Keys, Prev: Listing Keys, Up: Key Management

7.5.3 Information About Keys

Please see the beginning of this section for more information about `gpgme_key_t` objects.

-- Data type: `gpgme_validity_t`
The `gpgme_validity_t` type is used to specify the validity of a user ID in a key. The following validities are defined:

`GPGME_VALIDITY_UNKNOWN`

The user

ID is of unknown validity. The string representation of this validity is `?`.

`GPGME_VALIDITY_UNDEFINED`

The validity of the user ID is undefined. The string representation of this validity is `q`.

`GPGME_VALIDITY_NEVER`

The user ID is never valid. The string representation of this validity is `n`.

`GPGME_VALIDITY_MARGINAL`

The user ID is marginally valid. The string representation of this validity is `m`.

GPGME_VALIDITY_FULL

The user ID is fully valid. The string representation of this validity is f.

GPGME_VALIDITY_ULTIMATE

The user ID is ultimately valid. The string representation of this validity is u.

File: gpgme.info, Node: Manipulating Keys, Next: Generating Keys, Prev: Information About Keys, Up: Key Management

7.5.4 Manipulating Keys

-- Function: void gpgme_key_ref (gpgme_key_t KEY)

The function gpgme_key_ref acquires an additional reference for the key KEY.

-- Function: void gpgme_key_unref (gpgme_key_t KEY)

The function gpgme_key_unref releases a reference for the key KEY. If this was the last reference, the key will be destroyed and all resources associated to it will be released.

-- Function: gpgme_error_t gpgme_op_setexpire (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS, unsigned int RESERVED);

SINCE: 1.14.1

The function gpgme_op_setexpire sets the expiration time of the key KEY or of the specified subkeys. This function requires at least version 2.1.22 of GnuPG.

KEY specifies the key to operate on.

EXPIRES specifies the expiration time in seconds from now. To be similar to other usages where expiration times are provided in unsigned long this is similar to the key creation date and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time. Note that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for

timestamps and thus can only encode dates up to the year 2106.

SUBFPRS selects the subkey(s) for which the expiration time should be set. If SUBFPRS is set to NULL, then the expiration time of the primary key is set. If SUBFPRS is an asterisk (*), then the expiration times of all non-revoked and not yet expired subkeys are set. To select more than one subkey put all subkey fingerprints into one string separated by linefeeds characters (\n).

RESERVED is reserved for later use and must be 0.

```
-- Function: gpgme_error_t gpgme_op_setexpire_start (gpgme_ctx_t CTX,  
    gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS,  
    unsigned int FLAGS);
```

SINCE: 1.14.1

The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion:.

```
-- Function: gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX,  
    gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);
```

SINCE: 1.14.1

The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion:.

File: `gpgme.info`, Node: `Generating Keys`, Next: `Signing Keys`, Prev: `Manipulating Keys`, Up: `Key Management`

7.5.5 Generating Keys

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the `gpgme_op_genkey` function can be used. Existing code which wants to update to the new functions or new code which shall supports older

GnuPG versions may try the new functions first and provide a fallback to the old function if the error code `GPG_ERR_NOT_SUPPORTED` is received.

```
-- Function: gpgme_error_t gpgme_op_createkey (gpgme_ctx_t CTX,  
        const char *USERID, const char *ALGO, unsigned long RESERVED,  
        unsigned long EXPIRES, gpgme_key_t EXTRAKEY,  
        unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createkey` generates a new key for the protocol active in the context `CTX`. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

`USERID` is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`ALGO` specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see the GnuPG manual. If `ALGO` is `NULL` or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via `FLAGS`, triggers the creation of a primary key plus a secondary key (subkey).

`RESERVED` must be set to zero.

`EXPIRES` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag `GPGME_CREATE_NOEXPIRE` to create keys that do not expire. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`.

Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`EXTRAKEY` is currently not used and must be set to `NULL`. A future version of GPGME may use this parameter to create X.509 keys.

`FLAGS` can be set to the bit-wise OR of the following flags:

`GPGME_CREATE_SIGN`

GPGME_CREATE_ENCR

GPGME_CREATE_CERT

GPGME_CREATE_AUTH

SINCE: 1.7.0

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: signing, encryption, certification, or authentication. The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

GPGME_CREATE_NOPASSWD

SINCE: 1.7.0

Request generation of the key without password protection.

GPGME_CREATE_SELFSIGNED

SINCE: 1.7.0

For an X.509 key do not create a CSR but a self-signed certificate. This has not yet been implemented.

GPGME_CREATE_NOSTORE

SINCE: 1.7.0

Do not store the created key in the local key database. This has not yet been implemented.

GPGME_CREATE_WANTPUB

GPGME_CREATE_WANTSEC

SINCE: 1.7.0

Return the public or secret key as part of the result structure. This has not yet been implemented.

GPGME_CREATE_FORCE

SINCE: 1.7.0

The engine does not allow the creation of a key with a user ID already existing in the local key database. This flag can be used to override this check.

GPGME_CREATE_NOEXPIRE

SINCE: 1.9.0

Request generation of keys that do not expire.

After the operation completed successfully, information about the created key can be retrieved with `gpgme_op_genkey_result`.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_createkey_start (gpgme_ctx_t CTX,  
    const char *USERID, const char *ALGO, unsigned long RESERVED,  
    unsigned long EXPIRES, gpgme_key_t EXTRAKEY,  
    unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createkey_start` initiates a `gpgme_op_createkey` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion:.

```
-- Function: gpgme_error_t gpgme_op_createsubkey (gpgme_ctx_t CTX,  
    gpgme_key_t KEY, const char *ALGO, unsigned long RESERVED,  
    unsigned long EXPIRES, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createsubkey` creates and adds a new subkey to the primary OpenPGP key given by `KEY`. The only allowed protocol in `CTX` is `GPGME_PROTOCOL_OPENPGP`. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY` specifies the key to operate on.

`ALGO` specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If `ALGO` is `NULL` or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

RESERVED must be set to zero.

EXPIRES specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag GPGME_CREATE_NOEXPIRE to create keys that do not expire. Note that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

FLAGS takes the same values as described above for gpgme_op_createkey.

After the operation completed successfully, information about the created key can be retrieved with gpgme_op_genkey_result.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_createsubkey_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *ALGO,
 unsigned long RESERVED, unsigned long EXPIRES,
 unsigned int FLAGS);
```

SINCE:

1.7.0

The function gpgme_op_createsubkey_start initiates a gpgme_op_createsubkey operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_adduid (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function gpgme_op_adduid adds a new user ID to the OpenPGP key given by KEY. Adding additional user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context CTX must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

KEY specifies the key to operate on.

USERID is the user ID to add to the key. A user ID is commonly the

mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested.

The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

FLAGS are currently not used and must be set to zero.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_adduid_start (gpgme_ctx_t CTX,  
        gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_adduid_start` initiates a `gpgme_op_adduid` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_revuid (gpgme_ctx_t CTX,  
        gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_revuid` revokes a user ID from the OpenPGP key given by `KEY`. Revoking user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY` specifies the key to operate on.

`USERID` is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. This is a required parameter.

FLAGS are currently not used and must be set to zero.

Note that the engine wont allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if

the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX,  
gpgme_key_t KEY, const  
char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_revuid_start` initiates a `gpgme_op_revuid` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_set_ui_flag (gpgme_ctx_t CTX,  
gpgme_key_t KEY, const char *USERID, const char * NAME,  
const char * VALUE);
```

SINCE: 1.8.0

The function `gpgme_op_set_uid_flag` is used to set flags on a user ID from the OpenPGP key given by `KEY`. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP.

`KEY` specifies the key to operate on. This parameter is required.

`USERID` is the user ID of the key to be manipulated. This user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object

(`gpgme_user_id_t`) is to be used. This is a required parameter.

`NAME` names the flag which is to be changed. The only currently supported flag is:

primary

This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. `VALUE` must be given as `NULL`. For technical reasons this function bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_set_uid_flag_start  
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID,
```

cons char * NAME, cons char * VALUE);

SINCE: 1.8.0

The function `gpgme_op_set_uid_flag_start` initiates a `gpgme_op_set_uid_flag` operation; see there for details. It must

be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

-- Function: `gpgme_error_t gpgme_op_genkey (gpgme_ctx_t CTX, const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)`

The function `gpgme_op_genkey` generates a new key pair in the context `CTX`. The meaning of `PUBLIC` and `SECRET` depends on the crypto backend.

GPG does not support `PUBLIC` and `SECRET`, they should be `NULL`. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with `gpgme_op_genkey_result`.

GpgSM requires `PUBLIC` to be a writable data object. GpgSM will generate a secret key (which will be stored by `gpg-agent`, and return a certificate request in `PUBLIC`, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument `PARMS` specifies parameters for the key in an string that looks something like XML. The details about the format of `PARMS` are specific to the crypto engine used by `CTX`. The first line of the parameters must be `<GnupgKeyParams format="internal">` and the last line must be `</GnupgKeyParams>`. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters `<`, `>`, or `&`.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

```
<GnupgKeyParams format="internal">
Key-Type: default
Subkey-Type: default
Name-Real: Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@foo.bar
Expire-Date: 0
```

```
Passphrase: abc
</GnupgKeyParms>
```

Here is an example for GpgSM as the crypto engine (all parameters of OpenPGP key generation are documented in the GPGSM manual):

```
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@foo.bar
</GnupgKeyParms>
```

Strings should be given in UTF-8 encoding. The only format supported for now is internal. The content of the GnupgKeyParms container is passed verbatim to the crypto backend. Control statements are not allowed.

After the operation completed successfully, the result can be retrieved with `gpgme_op_genkey_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `PARMS` is not a well-formed string (e.g. does not have the expected tag-like headers and footers), `GPG_ERR_NOT_SUPPORTED` if `PUBLIC` or `SECRET` is not valid, and `GPG_ERR_GENERAL` if no key was created by the backend.

```
-- Function: gpgme_error_t
gpgme_op_genkey_start (gpgme_ctx_t CTX,
    const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)
```

The function `gpgme_op_genkey_start` initiates a `gpgme_op_genkey` operation. It can be completed by calling `gpgme_wait` on the context. **Note Waiting For Completion::*.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `PARMS` is not a valid XML string, and `GPG_ERR_NOT_SUPPORTED` if `PUBLIC` or `SECRET` is not `NULL`.

```
-- Data type: gpgme_genkey_result_t
```

This is a pointer to a structure used to store the result of a `gpgme_op_genkey` operation. After successfully generating a key, you can retrieve the pointer to the result with `gpgme_op_genkey_result`. The structure contains the following

members:

unsigned int primary : 1

This flag is set to 1 if a primary key was created and to 0 if not.

unsigned int sub : 1

This flag is set to 1 if a subkey was created and to 0 if not.

unsigned int uid : 1

This flag is set to 1 if a user ID was created and to 0 if not.

char *fpr

This is the fingerprint of the key that was created. If both a primary and a subkey were generated, the fingerprint of the primary key will be returned. If the crypto engine does not provide the fingerprint, fpr will be a null pointer.

gpgme_data_t pubkey

SINCE: 1.7.0

This will eventually be used to return the public key. It is currently not used.

gpgme_data_t seckey

SINCE: 1.7.0

This will eventually be used to return the secret key. It is currently not used.

-- Function: gpgme_genkey_result_t gpgme_op_genkey_result
(gpgme_ctx_t CTX)

The function gpgme_op_genkey_result returns a gpgme_genkey_result_t pointer to a structure holding the result of a gpgme_op_genkey operation. The pointer is only valid if the last operation on the context was a gpgme_op_genkey or gpgme_op_genkey_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Signing Keys, Next: Exporting Keys, Prev: Generating Keys, Up: Key Management

7.5.6 Signing Keys

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the `gpgme_op_interact` function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

```
-- Function: gpgme_error_t gpgme_op_keysign (gpgme_ctx_t CTX,  
      gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES,  
      unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_keysign` adds a new key signature to the public key `KEY`. This function requires at least version 2.1.12 of GnuPG.

`CTX` is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, `gpgme_signers_add` can be used. *Note Selecting Signers::.

`KEY` specifies the key to operate on.

`USERID` selects the user ID or user IDs to be signed. If `USERID` is set to `NULL` all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (`\n`) and set the flag `GPGME_KEYSIGN_LFSEP`.

EXPIRES

specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag `GPGME_KEYSIGN_NOEXPIRE` is used. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`FLAGS` can be set to the bit-wise OR of the following flags:

GPGME_KEYSIGN_LOCAL

SINCE: 1.7.0

Instead of creating an exportable key signature, create a key signature which is marked as non-exportable.

GPGME_KEYSIGN_LFSEP

SINCE: 1.7.0

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that USERID may contain several linefeed separated user IDs.

GPGME_KEYSIGN_NOEXPIRE

Force the creation of a key signature without an expiration date. This overrides EXPIRE and any local configuration of the engine.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_keysign_start (gpgme_ctx_t CTX,  
    gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES,  
    unsigned int FLAGS);
```

SINCE: 1.7.0

The function gpgme_op_keysign_start initiates a gpgme_op_keysign operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion:.

```
-- Function: gpgme_error_t gpgme_op_revsign (gpgme_ctx_t CTX,  
    gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID,  
    unsigned int FLAGS);
```

SINCE: 1.14.1

The function gpgme_op_revsign revokes key signatures of the public key KEY made with the key SIGNING_KEY. This function requires at least version 2.2.24 of GnuPG.

KEY specifies the key to operate on.

SIGNING_KEY specifies the key whose signatures shall be revoked.

USERID selects the user ID or user IDs whose signatures shall be revoked. If USERID is set to NULL the signatures on all user IDs are revoked. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme_user_id_t) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (\n) and set the flag GPGME_REVSIG_LFSEP.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_REVSIG_LFSEP

SINCE: 1.14.1

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that USERID may contain several linefeed separated user IDs.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_revsig_start (gpgme_ctx_t CTX,  
        gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID,  
        unsigned int FLAGS);
```

SINCE: 1.14.1

The function gpgme_op_revsig_start initiates a gpgme_op_revsig operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

File: gpgme.info, Node: Exporting Keys, Next: Importing Keys, Prev: Signing Keys, Up: Key Management

7.5.7 Exporting Keys

Exporting keys means the same as running gpg with the command --export. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

GPGME_EXPORT_MODE_EXTERN

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver

at one time. Using this flag requires that the KEYDATA argument of the export function is set to NULL.

GPGME_EXPORT_MODE_MINIMAL

SINCE: 1.3.1

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

GPGME_EXPORT_MODE_SSH

SINCE: 1.4.0

If this bit is set, the latest authentication key of the requested OpenPGP key is exported in the OpenSSH public key format. This accepts just a single key; to force the export of a specific subkey a fingerprint pattern with an appended exclamation mark may be used.

GPGME_EXPORT_MODE_SECRET

SINCE: 1.6.0

Instead of exporting the public key, the secret key is exported.

This may not be combined with GPGME_EXPORT_MODE_EXTERN. For X.509 the export format is PKCS#8.

GPGME_EXPORT_MODE_RAW

SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_PKCS12

SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_NOUID

SINCE: 1.12.0 - experimental Do not export user ids. Works only with certain gpg version.

```
-- Function: gpgme_error_t gpgme_op_export (gpgme_ctx_t CTX,  
      const char *PATTERN, gpgme_export_mode_t MODE,  
      gpgme_data_t KEYDATA)
```

The function `gpgme_op_export` extracts public keys and returns them in the data buffer `KEYDATA`. The output

format of the key data

returned is determined by the ASCII armor attribute set for the context `CTX`, or, if that is not set, by the encoding specified for `KEYDATA`.

If `PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` contains an engine specific expression that is used to limit the list to all keys matching the pattern.

`MODE` is usually 0; other values are described above.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_export_start (gpgme_ctx_t CTX,  
          const char *PATTERN, gpgme_export_mode_t MODE,  
          gpgme_data_t KEYDATA)
```

The function `gpgme_op_export_start` initiates a `gpgme_op_export` operation. It can be completed by calling `gpgme_wait` on the context.

*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer.

```
-- Function: gpgme_error_t gpgme_op_export_ext (gpgme_ctx_t CTX,  
          const char *PATTERN[], gpgme_export_mode_t MODE,  
          gpgme_data_t KEYDATA)
```

The function `gpgme_op_export_ext` extracts public keys and returns them in the data buffer `KEYDATA`. The output format of the key data returned is determined by the ASCII armor attribute set for the context `CTX`, or, if that is not set, by the encoding specified for `KEYDATA`.

If `PATTERN` or `*PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` is a `NULL` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim.

`MODE` is usually 0; other values are described above.

The function returns the error

code GPG_ERR_NO_ERROR if the operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_export_ext_start (gpgme_ctx_t CTX,  
    const char *PATTERN[], gpgme_export_mode_t MODE,  
    gpgme_data_t KEYDATA)
```

The function gpgme_op_export_ext_start initiates a gpgme_op_export_ext operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer.

```
-- Function: gpgme_error_t gpgme_op_export_keys (gpgme_ctx_t CTX,  
    gpgme_key_t keys[], gpgme_export_mode_t MODE,  
    gpgme_data_t KEYDATA)
```

SINCE: 1.2.0

The function gpgme_op_export_keys extracts public keys and returns them in the data buffer KEYDATA. The output format of the key data returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

The keys to export are taken from the NULL terminated array KEYS. Only keys of the currently selected protocol of CTX which do have a fingerprint set are considered for export. Other keys specified by the KEYS are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

MODE is usually 0; other values are described above.

The function returns the error code GPG_ERR_NO_ERROR if the operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, GPG_ERR_NO_DATA if no useful keys are in KEYS and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_export_keys_start  
(gpgme_ctx_t CTX,  
    gpgme_key_t KEYS[], gpgme_export_mode_t MODE,  
    gpgme_data_t KEYDATA)
```

SINCE: 1.2.0

The function `gpgme_op_export_keys_start` initiates a `gpgme_op_export_ext` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer, `GPG_ERR_NO_DATA` if no useful keys are in `KEYS` and passes through any errors that are reported by the crypto engine support routines.

File: `gpgme.info`, Node: Importing Keys, Next: Deleting Keys, Prev: Exporting Keys, Up: Key Management

7.5.8 Importing Keys

Importing keys means the same as running `gpg` with the command `--import`.

-- Function: `gpgme_error_t gpgme_op_import (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)`

The function `gpgme_op_import` adds the keys in the data buffer

`KEYDATA` to the key ring of the crypto engine used by `CTX`. The format of `KEYDATA` can be ASCII armored, for example, but the details are specific to the crypto engine.

After the operation completed successfully, the result can be retrieved with `gpgme_op_import_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` if `CTX` or `KEYDATA` is not a valid pointer, and `GPG_ERR_NO_DATA` if `KEYDATA` is an empty data buffer.

-- Function: `gpgme_error_t gpgme_op_import_start (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)`

The function `gpgme_op_import_start` initiates a `gpgme_op_import` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the import could be started successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEYDATA` is not a valid pointer, and `GPG_ERR_NO_DATA` if `KEYDATA` is an empty data buffer.

-- Function: `gpgme_error_t gpgme_op_import_keys (gpgme_ctx_t CTX,`

gpgme_key_t *KEYS)

SINCE: 1.2.0

The function `gpgme_op_import_keys` adds the keys described by the NULL terminated array `KEYS` to the key ring of the crypto engine used by `CTX`. It is used to actually import and make keys permanent which have been retrieved from an external source (i.e. using `GPGME_KEYLIST_MODE_EXTERN`) earlier. The external keylisting must have been made with the same context configuration (in particular the same home directory). (1) Note that for OpenPGP this may require another access to the keyserver over the network.

Only keys of the currently selected protocol of `CTX` are considered for import. Other keys specified by the `KEYS` are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully, the result can be retrieved with `gpgme_op_import_result`.

To move keys from one home directory to another, export and import the keydata using `gpgme_op_export` and `gpgme_op_import`.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for export.

-- Function: `gpgme_error_t gpgme_op_import_keys_start (gpgme_ctx_t CTX, gpgme_key_t *KEYS)`

SINCE: 1.2.0

The function `gpgme_op_import_keys_start` initiates a `gpgme_op_import_keys` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` if `CTX` or `KEYDATA` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for export.

-- Data type: `gpgme_import_status_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_import` operation. For each considered key one

status is added that contains information about the result of the import. The structure contains the following members:

`gpgme_import_status_t next`

This is a pointer to the next status structure in the linked list, or NULL if this is the last element.

`char *fpr`

This is the fingerprint of the key that was considered.

`gpgme_error_t result`

If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is `GPG_ERR_NO_ERROR`.

`unsigned int status`

This is a bit-wise OR of the following flags that give more information about what part of the key was imported. If the key was already known, this might be 0.

`GPGME_IMPORT_NEW`

The key was new.

`GPGME_IMPORT_UID`

The key contained new user IDs.

`GPGME_IMPORT_SIG`

The key contained new signatures.

`GPGME_IMPORT_SUBKEY`

The key contained new sub keys.

`GPGME_IMPORT_SECRET`

The key contained a secret key.

-- Data type: `gpgme_import_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_import` operation. After a successful import operation, you can retrieve the pointer to the result with `gpgme_op_import_result`. The structure contains the following members:

`int considered`

The total number of considered keys.

`int no_user_id`

The number of keys without user ID.

int imported
The total number
of imported keys.

int imported_rsa
The number of imported RSA keys.

int unchanged
The number of unchanged keys.

int new_user_ids
The number of new user IDs.

int new_sub_keys
The number of new sub keys.

int new_signatures
The number of new signatures.

int new_revocations
The number of new revocations.

int secret_read
The total number of secret keys read.

int secret_imported
The number of imported secret keys.

int secret_unchanged
The number of unchanged secret keys.

int not_imported
The number of keys not imported.

gpgme_import_status_t imports
A list of gpgme_import_status_t objects which contain more
information about the keys for which an import was attempted.

int skipped_v3_keys
For security reasons modern versions of GnuPG do not anymore
support v3 keys (created with PGP
2.x) and ignores them on
import. This counter provides the number of such skipped v3
keys.

-- Function: gpgme_import_result_t gpgme_op_import_result
(gpgme_ctx_t CTX)

The function `gpgme_op_import_result` returns a `gpgme_import_result_t` pointer to a structure holding the result of a `gpgme_op_import` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_import` or `gpgme_op_import_start` operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

----- Footnotes -----

(1) Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.

File: `gpgme.info`, Node: Deleting Keys, Next: Changing Passphrases, Prev: Importing Keys, Up: Key Management

7.5.9 Deleting Keys

-- Function: `gpgme_error_t gpgme_op_delete_ext`
(`gpgme_ctx_t CTX`,
 `const gpgme_key_t KEY`, `unsigned int FLAGS`)
SINCE: 1.9.1

The function `gpgme_op_delete_ext` deletes the key `KEY` from the key ring of the crypto engine used by `CTX`.

`FLAGS` can be set to the bit-wise OR of the following flags:

`GPGME_DELETE_ALLOW_SECRET`
SINCE: 1.9.1

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

`GPGME_DELETE_FORCE`
SINCE: 1.9.1

If set, the user is not asked to confirm the deletion.

The function returns the error code `GPG_ERR_NO_ERROR` if the key was deleted successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer, `GPG_ERR_NO_PUBKEY` if `KEY` could not be found in the keyring, `GPG_ERR_AMBIGUOUS_NAME` if the key was not specified unambiguously, and `GPG_ERR_CONFLICT` if the secret key for `KEY` is available, but `ALLOW_SECRET` is zero.

-- Function: `gpgme_error_t gpgme_op_delete_ext_start`
(`gpgme_ctx_t CTX`,
 `const gpgme_key_t KEY`, `unsigned int FLAGS`)
SINCE: 1.9.1

The function `gpgme_op_delete_ext_start` initiates a `gpgme_op_delete` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

The following functions allow only to use one particular flag.

-- Function: `gpgme_error_t gpgme_op_delete` (`gpgme_ctx_t CTX`,
 `const gpgme_key_t KEY`, `int ALLOW_SECRET`)
Similar to `gpgme_op_delete_ext`, but only the flag
`GPGME_DELETE_ALLOW_SECRET` can be provided.

-- Function: `gpgme_error_t gpgme_op_delete_start` (`gpgme_ctx_t CTX`,
 `const gpgme_key_t KEY`, `int ALLOW_SECRET`)
Similar to `gpgme_op_delete_ext_start`, but only the flag
`GPGME_DELETE_ALLOW_SECRET` can be provided.

File: `gpgme.info`, Node:

Changing Passphrases, Next: Changing TOFU Data, Prev: Deleting Keys, Up: Key Management

7.5.10 Changing Passphrases

-- Function: `gpgme_error_t gpgme_op_passwd` (`gpgme_ctx_t CTX`,
 `const gpgme_key_t KEY`, `unsigned int FLAGS`)

SINCE: 1.3.0

The function `gpgme_op_passwd` changes the passphrase of the private key associated with `KEY`. The only allowed value for `FLAGS` is 0. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old `gpg` engines (before version 2.0.15) do not support this command and will silently ignore it.

-- Function: `gpgme_error_t gpgme_op_passwd_start` (`gpgme_ctx_t CTX`,

const gpgme_key_t KEY, unsigned int FLAGS)

SINCE: 1.3.0

The function `gpgme_op_passwd_start` initiates a `gpgme_op_passwd` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

File: `gpgme.info`, Node: Changing TOFU Data, Next: Advanced Key Editing, Prev: Changing Passphrases, Up: Key Management

7.5.11 Changing TOFU Data

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

-- Data type: enum `gpgme_tofu_policy_t`
SINCE: 1.7.0

The `gpgme_tofu_policy_t` type specifies the set of possible policy values that are supported by GPGME:

`GPGME_TOFU_POLICY_AUTO`

Set the policy to auto.

`GPGME_TOFU_POLICY_GOOD`

Set the policy to good.

`GPGME_TOFU_POLICY_BAD`

Set the policy to

bad.

`GPGME_TOFU_POLICY_ASK`

Set the policy to ask.

`GPGME_TOFU_POLICY_UNKNOWN`

Set the policy to unknown.

To change the policy for a key the following functions can be used:

-- Function: `gpgme_error_t gpgme_op_tofu_policy (gpgme_ctx_t CTX, const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)`

SINCE: 1.7.0

The function `gpgme_op_tofu_policy` changes the TOFU policy of `KEY`. The valid values for `POLICY` are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_tofu_policy_start (gpgme_ctx_t CTX,  
    const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)
```

SINCE: 1.7.0

The function `gpgme_op_tofu_policy_start` initiates a `gpgme_op_tofu_policy` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

File: `gpgme.info`, Node: Advanced Key Editing, Prev: Changing TOFU Data, Up: Key Management

7.5.12 Advanced Key Editing

```
-- Data type: gpgme_error_t (*gpgme_interact_cb_t) (void *HANDLE,  
    const char *STATUS, const char *ARGS, int FD)
```

SINCE: 1.7.0

The `gpgme_interact_cb_t` type is the type of functions which GPGME calls if it a key interact operation is on-going. The status keyword `STATUS` and the argument line `ARGS` are passed through by GPGME from the crypto engine. An empty string represents EOF. The file descriptor `FD` is -1 for normal status messages. If `STATUS` indicates a command rather than a status message, the response to the command should be written to `FD`. The `HANDLE` is provided by the user at start of operation.

The function should return `GPG_ERR_FALSE` if it did not handle the status code, 0 for success, or any other error value.

-- Function: `gpgme_error_t gpgme_op_interact (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

SINCE: 1.7.0

The function `gpgme_op_interact` processes the key `KEY` interactively, using the interact callback function `FNC` with the handle `HANDLE`. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object `OUT`.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

`FLAGS` modifies the behaviour of the function; the only defined bit value is:

`GPGME_INTERACT_CARD`

SINCE: 1.7.0

This is used for smartcard based keys and uses `gpgs --card-edit` command.

The function returns 0 if the edit operation completes successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: `gpgme_error_t gpgme_op_interact_start (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

SINCE: 1.7.0

The function `gpgme_op_interact_start` initiates a `gpgme_op_interact` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

File: `gpgme.info`, Node: Crypto Operations, Next: Miscellaneous, Prev: Key Management, Up: Contexts

7.6 Crypto Operations

=====

Sometimes, the result of a crypto operation returns a list of invalid keys encountered in processing the request. The following structure is used to hold information about such a key.

-- Data type: `gpgme_invalid_key_t`

This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter.

The structure contains the following members:

`gpgme_invalid_key_t next`

This is a pointer to the next invalid key structure in the linked list, or NULL if this is the last element.

`char *fpr`

The fingerprint or key ID of the invalid key encountered.

`gpgme_error_t reason`

An error code describing the reason why the key was found invalid.

* Menu:

* Decrypt:: Decrypting a ciphertext.

* Verify:: Verifying a signature.

* Decrypt and Verify:: Decrypting
a signed ciphertext.

* Sign:: Creating a signature.

* Encrypt:: Encrypting a plaintext.

File: `gpgme.info`, Node: Decrypt, Next: Verify, Up: Crypto Operations

7.6.1 Decrypt

-- Function: `gpgme_error_t gpgme_op_decrypt (gpgme_ctx_t CTX,
gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

The function `gpgme_op_decrypt` decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be decrypted successfully, `GPG_ERR_INV_VALUE` if CTX, CIPHER or PLAIN is not a valid pointer, `GPG_ERR_NO_DATA` if CIPHER does not contain any data to decrypt, `GPG_ERR_DECRYPT_FAILED` if CIPHER is not a valid cipher text,

GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_decrypt_start (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

The function `gpgme_op_decrypt_start` initiates a `gpgme_op_decrypt` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `CIPHER` or `PLAIN` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_decrypt_ext (gpgme_ctx_t CTX, gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

SINCE: 1.8.0

The function `gpgme_op_decrypt_ext` is the same as `gpgme_op_decrypt` but has an additional argument `FLAGS`. If `FLAGS` is 0 both function behave identically.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_DECRYPT_VERIFY`

SINCE: 1.8.0

The `GPGME_DECRYPT_VERIFY` symbol specifies that this function shall exactly act as `gpgme_op_decrypt_verify`.

`GPGME_DECRYPT_UNWRAP`

SINCE: 1.8.0

The `GPGME_DECRYPT_UNWRAP` symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to `GPGME_ENCRYPT_WRAP`.

The function returns the error codes as described for `gpgme_op_decrypt`.

-- Function: `gpgme_error_t gpgme_op_decrypt_ext_start (gpgme_ctx_t CTX, gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

SINCE: 1.8.0

The function `gpgme_op_decrypt_ext_start` initiates a `gpgme_op_decrypt_ext` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `CIPHER` or `PLAIN` is not a valid pointer.

-- Data type: `gpgme_recipient_t`

SINCE: 1.1.0

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a `gpgme_op_decrypt` operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

`gpgme_recipient_t next`

This is a pointer to the next recipient structure in the linked list, or `NULL` if this is the last element.

`gpgme_pubkey_algo_t`

The public key algorithm used in the encryption.

`char *keyid`

This is the key ID of the key (in hexadecimal digits) used as recipient.

`gpgme_error_t status`

This is an error number with the error code `GPG_ERR_NO_SECKEY` if the secret key for this recipient is not available, and 0 otherwise.

-- Data type: `gpgme_decrypt_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_decrypt` operation. After successfully decrypting data, you can retrieve the pointer to the result with `gpgme_op_decrypt_result`. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a structure on its own. The structure contains the following members:

char *unsupported_algorithm

If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

unsigned int wrong_key_usage : 1

SINCE: 0.9.0 This is true if the key was not used according to its policy.

unsigned int legacy_cipher_nomdc : 1

SINCE: 1.11.2 The message was made by a legacy algorithm without any integrity protection. This might be an old but

legitimate message.

unsigned int is_mime : 1;

SINCE: 1.11.0 The message claims that the content is a MIME object.

unsigned int is_de_vs : 1;

SINCE: 1.10.0 The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

gpgme_recipient_t recipients

SINCE: 1.1.0

This is a linked list of recipients to which this message was encrypted.

char *file_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

char *session_key

SINCE: 1.8.0

A textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session keys (see `gpgme_set_ctx_flag`, "export-session-key"), and a session key was available for the

most recent decryption operation.

Otherwise, this is a null pointer.

You must not try to access this member of the struct unless `gpgme_set_ctx_flag` (ctx, "export-session-key") returns success or `gpgme_get_ctx_flag` (ctx, "export-session-key") returns true (non-empty string).

char *symkey_algo
SINCE: 1.11.0

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

-- Function: gpgme_decrypt_result_t gpgme_op_decrypt_result
(gpgme_ctx_t CTX)

The function gpgme_op_decrypt_result returns a gpgme_decrypt_result_t pointer to a structure holding the result of a gpgme_op_decrypt operation. The pointer is only valid if the last operation on the context was a gpgme_op_decrypt or gpgme_op_decrypt_start operation. If the operation failed this

might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Verify, Next: Decrypt and Verify, Prev: Decrypt, Up: Crypto Operations

7.6.2 Verify

-- Function: gpgme_error_t gpgme_op_verify (gpgme_ctx_t CTX,
gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT,
gpgme_data_t PLAIN)

The function gpgme_op_verify verifies that the signature in the data object SIG is a valid signature. If SIG is a detached signature, then the signed text should be provided in SIGNED_TEXT and PLAIN should be a null pointer. Otherwise, if SIG is a normal (or cleartext) signature, SIGNED_TEXT should be a null pointer and PLAIN should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with gpgme_op_verify_result.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be completed successfully, GPG_ERR_INV_VALUE if CTX, SIG or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if SIG does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_verify_start (gpgme_ctx_t CTX,
gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT,

gpgme_data_t PLAIN)

The function `gpgme_op_verify_start` initiates a `gpgme_op_verify` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `CTX`, `SIG` or `PLAIN` is not a valid pointer, and `GPG_ERR_NO_DATA` if `SIG` or `PLAIN` does not contain any data to verify.

-- Data type: `gpgme_sig_notation_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_verify` operation. The structure contains the following members:

`gpgme_sig_notation_t next`

This is a pointer to the next new signature notation structure in the linked list, or `NULL` if this is the last element.

`char *name`

The name of the notation field. If this is `NULL`, then the member value will contain a policy URL.

`int name_len`

The length of the name field. For strings the length is counted without the trailing binary zero.

`char *value`

The value of the notation field. If `name` is `NULL`, then this is a policy URL.

`int value_len`

The length of the value field. For strings the length is counted without the trailing binary zero.

`gpgme_sig_notation_flags_t flags`

The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used

as an argument to the function

`gpgme_sig_notation_add`. The value `flags` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_SIG_NOTATION_HUMAN_READABLE`

SINCE: 1.1.0

The `GPGME_SIG_NOTATION_HUMAN_READABLE` symbol specifies that the notation data is in human readable form

GPGME_SIG_NOTATION_CRITICAL

SINCE: 1.1.0

The GPGME_SIG_NOTATION_CRITICAL symbol specifies that the notation data is critical.

unsigned int human_readable : 1

This is true if the GPGME_SIG_NOTATION_HUMAN_READABLE flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

unsigned int critical : 1

This is true if the GPGME_SIG_NOTATION_CRITICAL flag is set and false otherwise. This flag is valid for notation data and policy URLs.

-- Data type: gpgme_signature_t

This is a pointer to a structure used to store a part of the result of a gpgme_op_verify operation. The structure contains the following members:

gpgme_signature_t next

This is a pointer to the next new signature structure in the linked list, or NULL if this is the last element.

gpgme_sigsum_t summary

This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for GPGME_SIGSUM_VALID like this:

```
if ((sig.summary & GPGME_SIGSUM_VALID))
{
    ..do stuff if valid..
}
else
{
    ..do stuff if not fully valid..
}
```

The defined bits are:

GPGME_SIGSUM_VALID

The signature is fully valid.

GPGME_SIGSUM_GREEN

The signature is good but one might want to display some

extra information. Check the other bits.

GPGME_SIGSUM_RED

The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

GPGME_SIGSUM_KEY_REVOKED

The key or at least one certificate has been revoked.

GPGME_SIGSUM_KEY_EXPIRED

The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

GPGME_SIGSUM_SIG_EXPIRED

The signature has expired.

GPGME_SIGSUM_KEY_MISSING

Cant verify due to a missing
key or certificate.

GPGME_SIGSUM_CRL_MISSING

The CRL (or an equivalent mechanism) is not available.

GPGME_SIGSUM_CRL_TOO_OLD

Available CRL is too old.

GPGME_SIGSUM_BAD_POLICY

A policy requirement was not met.

GPGME_SIGSUM_SYS_ERROR

A system error occurred.

GPGME_SIGSUM_TOFU_CONFLICT

A TOFU conflict was detected.

char *fpr

This is the fingerprint or key ID of the signature.

gpgme_error_t status

This is the status of the signature. In particular, the following status codes are of interest:

GPG_ERR_NO_ERROR

This status indicates that the signature could be

verified or that there is no signature. For the combined result this status means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check the summary field for that.

For example a `gpgme_op_decrypt_verify` returns a verification result with `GPG_ERR_NO_ERROR` for encrypted but unsigned data.

`GPG_ERR_SIG_EXPIRED`

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

`GPG_ERR_KEY_EXPIRED`

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

`GPG_ERR_CERT_REVOKED`

This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures are valid and all keys are revoked.

`GPG_ERR_BAD_SIGNATURE`

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

`GPG_ERR_NO_PUBKEY`

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

`GPG_ERR_GENERAL`

This status indicates that there was some other error which prevented the signature verification.

`gpgme_sig_notation_t` notations

This is a linked list with the notation data and policy URLs.

unsigned long timestamp

The creation timestamp of this signature.

unsigned long exp_timestamp

The expiration timestamp of this signature, or 0 if the signature does not expire.

unsigned int wrong_key_usage : 1

This is true if the key was not used according to its policy.

unsigned int pka_trust : 2

This is set to the trust information gained by means of the PKA system. Values are:

0

No PKA information available or verification not possible.

1

PKA verification failed.

2

PKA verification succeeded.

3

Reserved for future use.

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

unsigned int chain_model : 1

SINCE: 1.1.6

This is true if the validity of the signature has been checked using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

gpgme_validity_t validity

The validity of the signature.

gpgme_error_t validity_reason

If a signature is not valid, this provides a reason why.

gpgme_pubkey_algo_t

The public key algorithm used to create this signature.

gpgme_hash_algo_t

The hash algorithm used to create this signature.

char *pka_address

The mailbox from the PKA information or NULL.

gpgme_key_t key

SINCE: 1.7.0

An object describing the key used to create the signature.

This key object may be incomplete in that it only conveys information available directly with a signature. It may also be NULL if such information is not readily available.

-- Data type: gpgme_verify_result_t

This is a pointer to a structure used to store the result of a gpgme_op_verify operation. After verifying a signature, you can retrieve the pointer to the result with gpgme_op_verify_result. If the operation failed this might be a NULL pointer. The structure contains the following member:

gpgme_signature_t signatures

A linked list with information about all signatures for which a verification was attempted.

char *file_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

unsigned int is_mime : 1;

SINCE: 1.11.0

The message claims that the content is a MIME object.

Warning: This flag is not covered by the signature.

-- Function: gpgme_verify_result_t gpgme_op_verify_result
(gpgme_ctx_t CTX)

The function gpgme_op_verify_result returns a gpgme_verify_result_t pointer to a structure holding the result of a gpgme_op_verify operation. The pointer is only valid if the last operation on the context was a gpgme_op_verify, gpgme_op_verify_start, gpgme_op_decrypt_verify or gpgme_op_decrypt_verify_start operation, and if this operation finished successfully (for gpgme_op_decrypt_verify and gpgme_op_decrypt_verify_start, the error code GPG_ERR_NO_DATA counts as successful in this context). The returned pointer is only valid until the next operation is started on the context.

7.6.3 Decrypt and Verify

-- Function: `gpgme_error_t gpgme_op_decrypt_verify (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

The function `gpgme_op_decrypt_verify` decrypts the ciphertext in the data object `CIPHER` and

stores it into the data object `PLAIN`.

If `CIPHER` contains signatures, they will be verified.

After the operation completed, `gpgme_op_decrypt_result` and `gpgme_op_verify_result` can be used to retrieve more information about the signatures.

If the error code `GPG_ERR_NO_DATA` is returned, `CIPHER` does not contain any data to decrypt. However, it might still be signed.

The information about detected signatures is available with `gpgme_op_verify_result` in this case.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be decrypted successfully, `GPG_ERR_INV_VALUE` if `CTX`, `CIPHER` or `PLAIN` is not a valid pointer, `GPG_ERR_NO_DATA` if `CIPHER` does not contain any data to decrypt, `GPG_ERR_DECRYPT_FAILED` if `CIPHER` is not a valid cipher text, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_decrypt_verify_start (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

The function `gpgme_op_decrypt_verify_start` initiates a `gpgme_op_decrypt_verify` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `CTX`, `CIPHER`, `PLAIN` or `R_STAT` is not a valid pointer, and `GPG_ERR_NO_DATA` if `CIPHER` does not contain any data to decrypt.

When processing mails it is sometimes useful to extract the actual mail address (the `addr-spec`) from a string. `GPGME` provides this helper function which uses the same semantics as the internal functions

in GPGME and GnuPG:

-- Function: char * gpgme_addrspec_from_uid (const char *UID)

SINCE: 1.7.1

Return the mail address (called addr-spec in RFC-5322) from the string

UID which is assumed to be a user id (called address in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must free the result using gpgme_free. Returns NULL if no valid address was found (in which case ERRNO is set to EINVAL) or for other errors.

File: gpgme.info, Node: Sign, Next: Encrypt, Prev: Decrypt and Verify, Up: Crypto Operations

7.6.4 Sign

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

* Menu:

- * Selecting Signers:: How to choose the keys to sign with.
- * Creating a Signature:: How to create a signature.
- * Signature Notation Data:: How to add notation data to a signature.

File: gpgme.info, Node: Selecting Signers, Next: Creating a Signature, Up: Sign

7.6.4.1

Selecting Signers

.....

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list. If no signer has been set into the context a default key is used for signing.

-- Function: void gpgme_signers_clear (gpgme_ctx_t CTX)

The function gpgme_signers_clear releases a reference for each key on the signers list and removes the list of signers from the context CTX.

Every context starts with an empty list.

-- Function: `gpgme_error_t gpgme_signers_add (gpgme_ctx_t CTX, const gpgme_key_t KEY)`

The function `gpgme_signers_add` adds the key `KEY` to the list of signers in the context `CTX`.

Calling this function acquires an additional reference for the key.

-- Function: `unsigned int gpgme_signers_count (const gpgme_ctx_t CTX)`
SINCE: 1.4.3

The function `gpgme_signers_count` returns the number of signer keys in the context `CTX`.

-- Function:
`gpgme_key_t gpgme_signers_enum (const gpgme_ctx_t CTX, int SEQ)`

The function `gpgme_signers_enum` returns the `SEQ`th key in the list of signers in the context `CTX`. An additional reference is acquired for the user.

If `SEQ` is out of range, `NULL` is returned.

File: `gpgme.info`, Node: Creating a Signature, Next: Signature Notation Data, Prev: Selecting Signers, Up: Sign

7.6.4.2 Creating a Signature

.....

-- Data type: `enum gpgme_sig_mode_t`

The `gpgme_sig_mode_t` type is used to specify the desired type of a signature. The following modes are available:

`GPGME_SIG_MODE_NORMAL`

A normal signature is made, the output includes the plaintext and the signature.

`GPGME_SIG_MODE_DETACH`

A detached signature is made.

`GPGME_SIG_MODE_CLEAR`

A clear text signature is made. The ASCII armor and text mode settings of the context are ignored.

-- Function: `gpgme_error_t gpgme_op_sign`

(gpgme_ctx_t CTX,
gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)

The function `gpgme_op_sign` creates a signature for the text in the data object `PLAIN` and returns it in the data object `SIG`. The type of the signature created is determined by the ASCII armor (or, if that is not set, by the encoding specified for `SIG`), the text mode attributes set for the context `CTX` and the requested signature mode `MODE`.

After the operation completed successfully, the result can be retrieved with `gpgme_op_sign_result`.

If an S/MIME signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with `gpgme_set_include_certs`. *Note Included Certificates::.

The function returns the error code `GPG_ERR_NO_ERROR` if the signature could be created successfully, `GPG_ERR_INV_VALUE` if `CTX`, `PLAIN` or `SIG` is not a valid pointer, `GPG_ERR_NO_DATA` if the signature could not be created, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, `GPG_ERR_UNUSABLE_SECKEY` if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_sign_start (gpgme_ctx_t CTX, gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)`

The function `gpgme_op_sign_start` initiates a `gpgme_op_sign` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `CTX`, `PLAIN` or `SIG` is not a valid pointer.

-- Data type: `gpgme_new_signature_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_sign` operation. The structure contains the following members:

`gpgme_new_signature_t`

next

This is a pointer to the next new signature structure in the linked list, or `NULL` if this is the last element.

`gpgme_sig_mode_t` type

The type of this signature.

`gpgme_pubkey_algo_t pubkey_algo`

The public key algorithm used to create this signature.

`gpgme_hash_algo_t hash_algo`

The hash algorithm used to create this signature.

`unsigned int sig_class`

The signature class of this signature.

`long int timestamp`

The creation timestamp of this signature.

`char *fpr`

The fingerprint of the key which was used to create this signature.

-- Data type: `gpgme_sign_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_sign` operation. After successfully generating a signature, you can retrieve the pointer to the result with `gpgme_op_sign_result`. The structure contains the following members:

`gpgme_invalid_key_t`

`invalid_signers`

A linked list with information about all invalid keys for which a signature could not be created.

`gpgme_new_signature_t` `signatures`

A linked list with information about all signatures created.

-- Function: `gpgme_sign_result_t gpgme_op_sign_result (gpgme_ctx_t CTX)`

The function `gpgme_op_sign_result` returns a `gpgme_sign_result_t` pointer to a structure holding the result of a `gpgme_op_sign` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_sign`, `gpgme_op_sign_start`, `gpgme_op_encrypt_sign` or `gpgme_op_encrypt_sign_start` operation. If that operation failed, the function might return a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: `gpgme.info`, Node: Signature Notation Data, Prev: Creating a Signature, Up: Sign

7.6.4.3 Signature Notation Data

.....

Using the following functions, you can attach arbitrary notation data to a signature. This information is then available to the user when the signature is verified.

-- Function: void `gpgme_sig_notation_clear` (`gpgme_ctx_t` CTX)
SINCE: 1.1.0

The function `gpgme_sig_notation_clear` removes the notation data from the context CTX. Subsequent signing operations from this context will not include any notation data.

Every context starts with an empty notation data list.

-- Function: `gpgme_error_t` `gpgme_sig_notation_add` (`gpgme_ctx_t` CTX,
const char *NAME, const char *VALUE,
gpgme_sig_notation_flags_t FLAGS)
SINCE: 1.1.0

The function `gpgme_sig_notation_add` adds the notation data with the name NAME and the value VALUE to the context CTX.

Subsequent signing operations will include this notation data, as well as any other notation data that was added since the creation of the context or the last `gpgme_sig_notation_clear` operation.

The arguments NAME and VALUE must be NUL-terminated strings in human-readable form. The flag `GPGME_SIG_NOTATION_HUMAN_READABLE` is implied (non-human-readable notation data is currently not supported). The strings must be in UTF-8 encoding.

If NAME is NULL, then VALUE should be a policy URL.

The function `gpgme_sig_notation_add` returns the error code `GPG_ERR_NO_ERROR` if the notation data could be added successfully, `GPG_ERR_INV_VALUE` if CTX is not a valid pointer, or if NAME, VALUE and FLAGS are an invalid combination. The function also passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_sig_notation_t` `gpgme_sig_notation_get`
(const `gpgme_ctx_t` CTX)
SINCE: 1.1.0

The function `gpgme_sig_notation_get` returns the linked list of notation data structures that are contained in the context CTX.

If CTX is not a valid pointer, or there is no notation data added for this context, NULL is returned.

File: gpgme.info, Node: Encrypt, Prev: Sign, Up: Crypto Operations

7.6.5 Encrypt

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then passed to the encryption operation.

* Menu:

* Encrypting a Plaintext:: How to encrypt a plaintext.

File: gpgme.info, Node: Encrypting a Plaintext, Up: Encrypt

7.6.5.1 Encrypting a Plaintext

.....

-- Function: gpgme_error_t gpgme_op_encrypt (gpgme_ctx_t CTX,
 gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,
 gpgme_data_t PLAIN, gpgme_data_t CIPHER)

The function gpgme_op_encrypt encrypts the plaintext in the data object PLAIN for the recipients RECP and stores the ciphertext in the data object CIPHER. The type of the ciphertext created is determined by the ASCII armor (or, if that is not set, by the encoding specified for CIPHER) and the text mode attributes set for the context CTX.

RECP must be a NULL-terminated array of keys. The user must keep references for all keys during the whole duration of the call (but see gpgme_op_encrypt_start for the requirements with the asynchronous variant).

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_ENCRYPT_ALWAYS_TRUST

The GPGME_ENCRYPT_ALWAYS_TRUST symbol specifies that all the recipients in RECP should be trusted, even if the keys do not have a high enough validity in the keyring. This flag should be used with care; in general it is not a good idea to use any

untrusted keys.

GPGME_ENCRYPT_NO_ENCRYPT_TO

SINCE: 1.2.0

The GPGME_ENCRYPT_NO_ENCRYPT_TO symbol specifies that no default or hidden default recipients as configured in the crypto backend should be included. This can be useful for managing different user profiles.

GPGME_ENCRYPT_NO_COMPRESS

SINCE: 1.5.0

The GPGME_ENCRYPT_NO_COMPRESS symbol specifies that the plaintext shall not be compressed before it is encrypted. This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

GPGME_ENCRYPT_PREPARE

GPGME_ENCRYPT_EXPECT_SIGN

The GPGME_ENCRYPT_PREPARE symbol is used with the UI Server protocol to prepare an encryption (i.e. sending the PREP_ENCRYPT command). With the GPGME_ENCRYPT_EXPECT_SIGN symbol the UI Server is advised to also expect a sign command.

GPGME_ENCRYPT_SYMMETRIC

SINCE: 1.7.0

The GPGME_ENCRYPT_SYMMETRIC symbol specifies that the output should be additionally encrypted symmetrically even if recipients are provided. This feature is only supported for the OpenPGP crypto engine.

GPGME_ENCRYPT_THROW_KEYIDS

SINCE: 1.8.0

The GPGME_ENCRYPT_THROW_KEYIDS symbols requests that the identifiers for the decryption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

GPGME_ENCRYPT_WRAP

SINCE: 1.8.0

The `GPGME_ENCRYPT_WRAP` symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to `GPGME_DECRYPT_UNWRAP`.

`GPGME_ENCRYPT_WANT_ADDRESS`

SINCE: 1.11.0

The `GPGME_ENCRYPT_WANT_ADDRESS` symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code `GPG_ERR_INV_USER_ID` is

returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the `RECPSTRING` argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

If `GPG_ERR_UNUSABLE_PUBKEY` is returned, some recipients in `RECP` are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in `CIPHER` (if this happens depends on the crypto engine). More information about the invalid recipients is available with `gpgme_op_encrypt_result`.

If `RECP` is `NULL`, symmetric rather than public key encryption is performed. Symmetrically encrypted cipher text can be deciphered with `gpgme_op_decrypt`. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption is currently only supported for the OpenPGP crypto backend.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be created successfully, `GPG_ERR_INV_VALUE` if `CTX`, `RECP`, `PLAIN` or `CIPHER` is not a valid pointer, `GPG_ERR_UNUSABLE_PUBKEY` if `RECP` contains some invalid recipients, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_encrypt_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)`

The function `gpgme_op_encrypt_start` initiates a `gpgme_op_encrypt` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after

this function returns, even
if the operation is not yet finished.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `CTX`, `RSET`, `PLAIN` or `CIPHER` is not a valid pointer, and `GPG_ERR_UNUSABLE_PUBKEY` if `RSET` does not contain any valid recipients.

```
-- Function: gpgme_error_t gpgme_op_encrypt_ext (gpgme_ctx_t CTX,  
        gpgme_key_t RECP[], const char *RECPSTRING,  
        gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,  
        gpgme_data_t CIPHER)
```

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is removed from each line in `RECPSTRING`. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

--hidden

--no-hidden

These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the `gpg` option `-R` (or `-F` in file mode) is used instead of `-r` (`-f` in file mode).

--file

--no-file

These keywords toggle between regular and file mode for all following key specifications. In file mode the option `-f` or `-F` is passed to `gpg`. At least `GnuPG` version 2.1.14 is required to handle these options. The `GPGME_ENCRYPT_WANT_ADDRESS` flag is ignored in file mode.

--

This keyword disables all keyword detection up to the end of the string. All

keywords are treated as verbatim arguments.

To create a RECPSTRING it is often useful to employ a `strconcat` style function. For example this function creates a string to encrypt to two keys:

```
char *
xbuild_recstring (const char *key1, const char *key2)
{
    char *result = gpgrt_strconcat ("--\n", key1, "\n", key2, NULL);
    if (!result)
        { perror ("strconcat failed"); exit (2); }
    return result;
}
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used `strconcat` function is available in Libgpg-error 1.28 and later; Libgpg-error (aka Gpgrt) is a dependency of GPGME. The number of arguments to `gpgrt_strconcat` is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```
char *
xbuild_long_recstring (void)
{
    gpgrt_stream_t memfp;
    const char *s;
    void *result;

    memfp = gpgrt_fopenmem (0, "w+b");
    if (!memfp)
        { perror ("fopenmem failed"); exit (2); }
    gpgrt_fputs ("--", memfp);
    while ((s = get_next_keyspec ()))
        {
            gpgrt_fputc ('\n', memfp);
            gpgrt_fputs (s, memfp);
        }
    gpgrt_fputc (0, memfp);
    if (gpgrt_ferror (memfp))
        { perror ("writing to memstream failed"); exit (2); }
    if (gpgrt_fclose_snatch (memfp, &result, NULL))
        { perror ("fclose_snatch failed"); exit (2); }
    return result;
}
```

In this example `get_next_keyspec` is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to `gpg` which has as a platform specific length limitation.

-- Function: `gpgme_error_t gpgme_op_encrypt_ext_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING, gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)`

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_start` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

-- Data type: `gpgme_encrypt_result_t`
This is a pointer to a structure used to store the result of a `gpgme_op_encrypt` operation. After successfully encrypting data, you can retrieve the pointer to the result with `gpgme_op_encrypt_result`. The structure contains the following members:

`gpgme_invalid_key_t invalid_recipients`
A linked list with information about all invalid keys for which the data could not be encrypted.

-- Function: `gpgme_encrypt_result_t gpgme_op_encrypt_result (gpgme_ctx_t CTX)`
The function `gpgme_op_encrypt_result` returns a `gpgme_encrypt_result_t` pointer to a structure holding the result of a `gpgme_op_encrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_encrypt`, `gpgme_op_encrypt_start`, `gpgme_op_sign` or `gpgme_op_sign_start` operation. If this operation failed, this might be a `NULL` pointer. The returned pointer is only valid until the next operation is started on the context.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign (gpgme_ctx_t CTX,`

gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,
gpgme_data_t PLAIN, gpgme_data_t CIPHER)

The function `gpgme_op_encrypt_sign` does a combined encrypt and sign operation. It is used like `gpgme_op_encrypt`, but the ciphertext also contains signatures for the signers listed in `CTX`.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_start`
(`gpgme_ctx_t CTX`, `gpgme_key_t RECP[]`,
`gpgme_encrypt_flags_t FLAGS`, `gpgme_data_t PLAIN`,
`gpgme_data_t CIPHER`)

The function `gpgme_op_encrypt_sign_start` initiates a `gpgme_op_encrypt_sign` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `CTX`, `RSET`, `PLAIN` or `CIPHER` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_ext` (`gpgme_ctx_t CTX`,
`gpgme_key_t RECP[]`, `const char *RECPSTRING`,
`gpgme_encrypt_flags_t FLAGS`, `gpgme_data_t PLAIN`,
`gpgme_data_t CIPHER`)

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_sign` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_ext_start`
(`gpgme_ctx_t CTX`, `gpgme_key_t RECP[]`, `const char *RECPSTRING`,
`gpgme_encrypt_flags_t FLAGS`, `gpgme_data_t PLAIN`,
`gpgme_data_t CIPHER`)

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_sign_start` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the

keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

File: gpgme.info, Node: Miscellaneous, Next: Run Control, Prev: Crypto Operations, Up: Contexts

7.7 Miscellaneous operations

=====

Here are some support functions which are sometimes useful.

* Menu:

- * Running other Programs:: Running other Programs
- * Using the Assuan protocol:: Using the Assuan protocol
- * Checking for updates:: How to check for software updates

File: gpgme.info, Node: Running other Programs, Next: Using the Assuan protocol, Up: Miscellaneous

7.7.1 Running other Programs

GPGME features an internal subsystem to run the actual backend engines.

Along

with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

```
-- Function: gpgme_error_t gpgme_op_spawn (gpgme_ctx_t CTX,  
      const char *FILE, const char *ARGV[], gpgme_data_t DATAIN,  
      gpgme_data_t DATAOUT, gpgme_data_t DATAERR,  
      unsigned int FLAGS)
```

SINCE: 1.5.0

The function `gpgme_op_spawn` runs the program `FILE` with the arguments taken from the `NULL` terminated array `ARGV`. If no arguments are required `ARGV` may be given as `NULL`. In the latter case or if `argv[0]` is the empty string, GPGME uses the basename of `FILE` for `argv[0]`. The file descriptors `stdin`, `stdout`, and `stderr` are connected to the data objects `DATAIN`, `DATAOUT`, and `DATAERR`. If `NULL` is passed for one of these data objects the corresponding

file descriptor is connected to /dev/null.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_SPAWN_DETACHED`

SINCE: 1.5.0

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

`GPGME_SPAWN_ALLOW_SET_FG`

SINCE: 1.5.0

Under Windows this flag allows the called program to put itself into the foreground.

```
-- Function: gpgme_error_t gpgme_op_spawn_start (gpgme_ctx_t CTX,  
const char *FILE, const char *ARGV[], gpgme_data_t DATAIN,  
gpgme_data_t DATAOUT, gpgme_data_t DATAERR,  
unsigned int FLAGS)
```

SINCE: 1.5.0

This is the asynchronous variant of `gpgme_op_spawn`.

File: `gpgme.info`, Node: Using the Assuan protocol, Next: Checking for updates, Prev: Running other Programs, Up: Miscellaneous

7.7.2

Using the Assuan protocol

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using `gpgme_ctx_set_engine_info`, passing the location of the servers socket as `FILE_NAME` argument, and an empty string as `HOME_DIR` argument.

The Assuan protocol functions use three kinds of callbacks to transfer data:

```
-- Data type: gpgme_error_t (*gpgme_assuan_data_cb_t) (void *OPAQUE,  
const void *DATA, size_t DATALEN)
```

SINCE: 1.2.0

This callback receives any data sent by the server. OPAQUE is the pointer passed to `gpgme_op_assuan_transact_start`, DATA of length DATALEN refers to the data sent.

```
-- Data type: gpgme_error_t (*gpgme_assuan_inquire_cb_t) (void *OPAQUE,  
    const char *NAME, const char *ARGS, gpgme_data_t *R_DATA)
```

SINCE: 1.2.0

This callback is used to provide additional data to the Assuan

server. OPAQUE is the pointer passed to `gpgme_op_assuan_transact_start`, NAME and ARGS specify what kind of data the server requested, and R_DATA is used to return the actual data.

Note: Returning data is currently not implemented in GPGME.

```
-- Data type: gpgme_error_t (*gpgme_assuan_status_cb_t) (void *OPAQUE,  
    const char *STATUS, const char *ARGS)
```

SINCE: 1.2.0

This callback receives any status lines sent by the server. OPAQUE is the pointer passed to `gpgme_op_assuan_transact_start`, STATUS and ARGS denote the status update sent.

```
-- Function: gpgme_error_t gpgme_op_assuan_transact_start  
    (gpgme_ctx_t CTX, const char *COMMAND,  
    gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE,  
    gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE,  
    gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE)
```

SINCE: 1.2.0

Send the Assuan COMMAND and return results via the callbacks. Any callback may be NULL. The result of the operation may be retrieved using `gpgme_wait_ext`.

Asynchronous variant.

```
-- Function: gpgme_error_t gpgme_op_assuan_transact_ext  
    (gpgme_ctx_t CTX, const char *COMMAND,  
    gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE,  
    gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE,  
    gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE,  
    gpgme_error_t *OP_ERR)
```

Send the Assuan COMMAND and return results via the callbacks. The result of the operation is returned in OP_ERR.

Synchronous variant.

File: gpgme.info, Node: Checking for updates, Prev: Using the Assuan protocol, Up: Miscellaneous

7.7.3 How to check for software updates

The GnuPG Project operates a server to query the current versions of software packages related to GnuPG. GPGME can be used to access this online database and check whether a new version of a software package is available.

-- Data type: `gpgme_query_swdb_result_t`
SINCE: 1.8.0

This is a pointer to a structure used to store the result of a `gpgme_op_query_swdb` operation. After success full call to that function, you can retrieve the pointer to the result with `gpgme_op_query_swdb_result`. The structure contains the following member:

`name`

This is the name of the package.

`iversion`

The currently installed version or an empty string. This value is either a copy of the argument given to `gpgme_op_query_swdb` or the version of the installed software as figured out by GPGME or GnuPG.

`created`

This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

`retrieved`

This gives the date the file was downloaded.

`warning`

If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could

not be figured out, the update flag may not reflect a required update status.

update

If this flag is set an update of the software is available.

urgent

If this flag is set an available update is important.

noinfo

If this flag is set, no valid information could be retrieved.

unknown

If this flag is set the given name is not known.

toold

If this flag is set the available information is not fresh enough.

error

If this flag is set some other error has occurred.

version

The version string of the latest released version.

reldate

The release date of the latest released version.

-- Function: `gpgme_error_t gpgme_op_query_swdb (gpgme_ctx_t CTX, const char *NAME, const char *IVERSION, gpgme_data_t RESERVED)`

SINCE: 1.8.0

Query the software version database for software package NAME and check against the installed version given by IVERSION. If IVERSION is given as NULL a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If NULL is used for NAME the current gpgme version is checked. RESERVED must be set to 0.

-- Function: `gpgme_query_swdb_result_t gpgme_op_query_swdb_result (gpgme_ctx_t CTX)`

SINCE: 1.8.0

The function `gpgme_op_query_swdb_result` returns a `gpgme_query_swdb_result_t` pointer to a structure holding the result of a `gpgme_op_query_swdb` operation. The pointer is only

valid if the last operation on the context was a successful call to `gpgme_op_query_swdb`. If that call failed, the result might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context `CTX`.

Here is an example on how to check whether GnuPG is current:

```
#include <gpgme.h>

int
main (void)
{
    gpg_error_t err;
    gpgme_ctx_t ctx;
    gpgme_query_swdb_result_t result;

    gpgme_check_version (NULL);
    err = gpgme_new (&ctx);
    if (err)
        fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
    else
    {
        gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

        err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
        if (err)
            fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
        else
        {
            result = gpgme_op_query_swdb_result (ctx);
            if (!result)
                fprintf (stderr, "error querying swdb\n");
            if (!result->warning && !result->update)
                printf ("GnuPG version %s is current\n",
                    result->iversion);
            else if (!result->warning && result->update)

                printf ("GnuPG version %s can be updated to %s\n",
                    result->iversion, result->version);
            else
                fprintf (stderr, "error finding the update status\n");
        }
        gpgme_release (ctx);
    }
    return 0;
}
```

7.8 Run Control

=====

GPGME supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when GPGME runs. This ensures that GPGME only runs when necessary and also prevents it from blocking for a long time.

* Menu:

- * **Waiting For Completion::** Waiting until an operation is completed.
- * **Using External Event Loops::** Advanced control over what happens when.
- * **Cancellation::** How to
end pending operations prematurely.

7.8.1 Waiting For Completion

-- Function: `gpgme_ctx_t gpgme_wait (gpgme_ctx_t CTX,
 gpgme_error_t *STATUS, int HANG)`

The function `gpgme_wait` continues the pending operation within the context `CTX`. In particular, it ensures the data exchange between GPGME and the crypto backend and watches over the run time status of the backend process.

If `HANG` is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in `STATUS` if `gpgme_wait` does not return `NULL`.

The `CTX` argument can be `NULL`. In that case, `gpgme_wait` waits for any context to complete its operation.

`gpgme_wait` can be used only in conjunction with any context that has a pending operation initiated with one of the `gpgme_op_*_start` functions except `gpgme_op_keylist_start` and

gpgme_op_trustlist_start (for which you should use the corresponding gpgme_op_*_next functions). If CTX is NULL, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect gpgme_wait.

In a multi-threaded environment, only one thread should ever call gpgme_wait at any time, regardless of whether CTX is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

The function returns the CTX of the context which has finished the operation. If HANG is false, and the timeout expires, NULL is returned and *status will be set to 0. If an error occurs, NULL is returned and the error is returned in *status.

File: gpgme.info, Node: Using External Event Loops, Next: Cancellation, Prev: Waiting For Completion, Up: Run Control

7.8.2 Using External Event Loops

GPGME hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrary long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if gpgme_wait is used without the HANG option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. GPGME will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading or writing. It is then the users responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, GPGME will never block. This gives the user more control over the program flow, and allows to perform other tasks when GPGME would block otherwise.

By using this advanced mechanism, GPGME can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

* Menu:

- * I/O Callback Interface:: How I/O callbacks are registered.
- * Registering I/O Callbacks:: How to use I/O callbacks for a context.
- * I/O Callback Example:: An example how to use I/O callbacks.
- * I/O Callback Example GTK+:: How to use GPGME with GTK+.
- * I/O Callback Example GDK:: How to use GPGME with GDK.
- * I/O Callback Example Qt:: How to use GPGME with Qt.

File: gpgme.info, Node: I/O Callback Interface, Next: Registering I/O Callbacks, Up: Using External Event Loops

7.8.2.1 I/O Callback Interface

.....

-- Data type: `gpgme_error_t (*gpgme_io_cb_t) (void *DATA, int FD)`

The `gpgme_io_cb_t` type is the type of functions which GPGME wants to register as I/O callback handlers using the `gpgme_register_io_cb_t` functions provided by the user.

DATA and FD are provided by GPGME when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor FD.

The callback handler always returns 0, but you should consider the return value to be reserved for later use.

-- Data type: `gpgme_error_t (*gpgme_register_io_cb_t) (void *DATA, int FD, int DIR, gpgme_io_cb_t FNC, void *FNC_DATA, void **TAG)`

The `gpgme_register_io_cb_t` type is the type of functions which

can be called by GPGME to register an I/O callback function FNC for the file descriptor FD with the user. FNC_DATA should be passed as the first argument to FNC when the handler is invoked (the second argument should be FD). If DIR is 0, FNC should be called by the user when FD is ready for writing. If DIR is 1, FNC should be called when FD is ready for reading.

DATA was provided by the user when registering the `gpgme_register_io_cb_t` function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the event loop to which the file descriptor should be added.

GPGME will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with `gpgme_set_io_cbs`. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The user should return a unique handle in TAG identifying this I/O callback registration, which will be passed to the `gpgme_register_io_cb_t` function without interpretation when the file descriptor should not be monitored anymore.

-- Data type: `void (*gpgme_remove_io_cb_t)(void *TAG)`
The `gpgme_remove_io_cb_t` type is the type of functions which can be called by GPGME to remove an I/O callback handler that was registered before. TAG is the handle that was returned by the `gpgme_register_io_cb_t` for this I/O callback.

GPGME can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

-- Data type: `enum gpgme_event_io_t`
The `gpgme_event_io_t` type specifies the type of an event that is reported to the user by GPGME as a consequence of an I/O operation. The following events are defined:

GPGME_EVENT_START

The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled. `TYPE_DATA` is NULL and reserved for later use.

GPGME_EVENT_DONE

The operation is finished, the last I/O callback for this operation was removed. The accompanying `TYPE_DATA` points to a struct `gpgme_io_event_done_data` variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

GPGME_EVENT_NEXT_KEY

In a `gpgme_op_keylist_start` operation, the next key was received from the crypto engine. The accompanying `TYPE_DATA` is a `gpgme_key_t` variable that contains the key with one reference for the user.

-- Data type: void (*gpgme_event_io_cb_t)

(void *DATA,

gpgme_event_io_t TYPE, void *TYPE_DATA)

The gpgme_event_io_cb_t type is the type of functions which can be called by GPGME to signal an event for an operation running in a context which has I/O callback functions registered by the user.

DATA was provided by the user when registering the gpgme_event_io_cb_t function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the context in which this event has occurred.

TYPE will specify the type of event that has occurred. TYPE_DATA specifies the event further, as described in the above list of possible gpgme_event_io_t types.

GPGME can call this function in an I/O callback handler.

File: gpgme.info, Node: Registering I/O Callbacks, Next: I/O Callback Example, Prev: I/O Callback Interface, Up: Using External Event Loops

7.8.2.2 Registering I/O Callbacks

.....

-- Data type: struct gpgme_io_cbs

This structure is used to store the I/O callback interface functions described in the previous section. It has the following members:

gpgme_register_io_cb_t add

This is the function called by GPGME to register an I/O callback handler. It must be specified.

void *add_priv

This is passed as the first argument to the add function when it is called by GPGME. For example, it can be used to determine the event loop to which the file descriptor should be added.

gpgme_remove_io_cb_t remove

This is the function called by GPGME to remove an I/O callback handler. It must be specified.

gpgme_event_io_cb_t event

This is the function called by GPGME to signal an event for an operation. It must be specified, because at least the start

event must be processed.

`void *event_priv`

This is passed as the first argument to the event function when it is called by GPGME. For example, it can be used to determine the context in which the event has occurred.

-- Function: `void gpgme_set_io_cbs (gpgme_ctx_t CTX, struct gpgme_io_cbs *IO_CBS)`

The function `gpgme_set_io_cbs` enables the I/O callback interface for the context `CTX`. The I/O callback functions are specified by `IO_CBS`.

If `IO_CBS->add` is `NULL`, the I/O callback interface is disabled for the context, and normal operation is restored.

-- Function: `void gpgme_get_io_cbs (gpgme_ctx_t CTX, struct gpgme_io_cbs *IO_CBS)`

The function `gpgme_get_io_cbs` returns the I/O callback functions set with `gpgme_set_io_cbs` in `IO_CBS`.

File: `gpgme.info`, Node: I/O Callback Example, Next: I/O Callback Example GTK+, Prev: Registering I/O Callbacks, Up: Using External Event Loops

7.8.2.3 I/O Callback Example

.....

To

actually use an external event loop, you have to implement the I/O callback functions that are used by GPGME to register and unregister file descriptors. Furthermore, you have to actually monitor these file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in GPGME is not predictable.

```
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>
```



```

/* The following structure holds the result of a crypto operation. */
struct op_result
{
    int done;
    gpgme_error_t err;
};

/* The following structure holds the
data associated with one I/O
callback. */
struct one_fd
{
    int fd;
    int dir;
    gpgme_io_cb_t fnc;
    void *fnc_data;
    void *loop;
};

struct event_loop
{
    pthread_mutex_t lock;
#define MAX_FDS 32
    /* Unused slots are marked with FD being -1. */
    struct one_fd fds[MAX_FDS];
};

```

The following functions implement the I/O callback interface.

```

gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
          void **r_tag)
{
    struct event_loop *loop = data;
    struct one_fd *fds = loop->fds;
    int i;

    pthread_mutex_lock (&loop->lock);
    for (i = 0; i < MAX_FDS; i++)
    {
        if (fds[i].fd == -1)
        {
            fds[i].fd = fd;
            fds[i].dir = dir;
            fds[i].fnc = fnc;
            fds[i].fnc_data = fnc_data;
            fds[i].loop = loop;
            break;
        }
    }
}

```

```

}
}
pthread_mutex_unlock (&loop->lock);
if (i == MAX_FDS)
    return gpg_error (GPG_ERR_GENERAL);
*r_tag = &fds[i];
return 0;
}

void
remove_io_cb (void *tag)
{
    struct one_fd *fd = tag;
    struct event_loop *loop = fd->loop;

    pthread_mutex_lock (&loop->lock);
    fd->fd = -1;
    pthread_mutex_unlock (&loop->lock);
}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
{
    struct op_result *result = data;

    /* We don't support list operations here. */
    if (type == GPGME_EVENT_DONE)
    {
        result->done = 1;
        result->err = *type_data;
    }
}

```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```

int
do_select (struct event_loop *loop)
{
    fd_set rfd;
    fd_set wfd;
    int i, n;
    int any = 0;
    struct timeval tv;
    struct one_fd *fdlist
= loop->fds;

    pthread_mutex_lock (&loop->lock);

```

```

FD_ZERO (&rfds);
FD_ZERO (&wfds);
for (i = 0; i < MAX_FDS; i++)
    if (fdlist[i].fd != -1)
        FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds);
pthread_mutex_unlock (&loop->lock);

tv.tv_sec = 0;
tv.tv_usec = 1000;

do
{
    n = select (FD_SETSIZE, &rfds, &wfds, NULL, &tv);
}
while (n < 0 && errno == EINTR);

if (n < 0)
    return n; /* Error or timeout. */

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS && n; i++)
{
    if (fdlist[i].fd != -1)
    {
        if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds))
        {
            assert (n);
            n--;
            any = 1;
            /* The I/O callback handler can register/remove callbacks,
            so we have to unlock the file descriptor list. */
            pthread_mutex_unlock (&loop->lock);
            (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
            pthread_mutex_lock (&loop->lock);
        }
    }
}
pthread_mutex_unlock (&loop->lock);
return any;
}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
{
    int ret;

    do
    {

```

```

    ret = do_select (loop);
  }
  while (ret >= 0 && !result->done);
}

```

The main function shows how to put it all together.

```

int
main (int argc, char *argv[])
{
  struct event_loop loop;
  struct op_result result;
  gpgme_ctx_t ctx;
  gpgme_error_t err;
  gpgme_data_t sig, text;
  int i;
  pthread_mutexattr_t attr;
  struct gpgme_io_cbs io_cbs =
  {
    add_io_cb,
    &loop,
    remove_io_cb,
    event_io_cb,
    &result
  };

  init_gpgme ();

  /* Initialize the loop structure. */

  /* The mutex must be
recursive, since remove_io_cb (which acquires a
lock) can be called while holding a lock acquired in do_select. */
  pthread_mutexattr_init (&attr);
  pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
  pthread_mutex_init (&loop.lock, &attr);
  pthread_mutexattr_destroy (&attr);

  for (i = 0; i < MAX_FDS; i++)
    loop.fds[i].fd = -1;

  /* Initialize the result structure. */
  result.done = 0;

  err = gpgme_data_new_from_file (&sig, "signature", 1);
  if (!err)
    err = gpgme_data_new_from_file (&text, "text", 1);
  if (!err)

```

```

    err = gpgme_new (&ctx);
if (!err)
    {
        gpgme_set_io_cbs (ctx, &io_cbs);
        err = gpgme_op_verify_start (ctx, sig, text, NULL);
    }
if (err)
    {
        fprintf (stderr, "gpgme error: %s: %s\n",
                gpgme_strerror (err), gpgme_strerror (err));
        exit (1);
    }

    wait_for_op (&loop,
&result);
if (!result.done)
    {
        fprintf (stderr, "select error\n");
        exit (1);
    }
if (!result.err)
    {
        fprintf (stderr, "verification failed: %s: %s\n",
                gpgme_strerror (result.err), gpgme_strerror (result.err));
        exit (1);
    }
/* Evaluate verify result. */
...
return 0;
}

```

File: gpgme.info, Node: I/O Callback Example GTK+, Next: I/O Callback Example GDK, Prev: I/O Callback Example, Up: Using External Event Loops

7.8.2.4 I/O Callback Example GTK+

.....

The I/O callback interface can be used to integrate GPGME with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific setup.

```
#include <gtk/gtk.h>
```

```

struct my_gpgme_io_cb
{
    gpgme_io_cb_t fnc;
    void *fnc_data;
    guint input_handler_id
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
    struct my_gpgme_io_cb *iocb = data;
    (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
    struct my_gpgme_io_cb *iocb = data;
    gtk_input_remove (data->input_handler_id);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
{
    struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
    iocb->fnc = fnc;
    iocb->data = fnc_data;
    iocb->input_handler_id = gtk_input_add_full (fd, dir
                                                ? GDK_INPUT_READ
                                                : GDK_INPUT_WRITE,
                                                my_gpgme_io_callback,
                                                0, iocb, NULL);

    *tag = iocb;
    return 0;
}

```

File: gpgme.info, Node: I/O Callback Example GDK, Next: I/O Callback Example Qt, Prev: I/O Callback Example GTK+, Up: Using External Event Loops

7.8.2.5 I/O Callback Example GDK

.....

The I/O callback interface can also be used to integrate GPGME with the GDK event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is

unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```
#include <gdk/gdk.h>

struct my_gpgme_io_cb
{
    gpgme_io_cb_t fnc;
    void *fnc_data;
    gint tag;
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
    struct my_gpgme_io_cb *iocb = data;
    (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
    struct my_gpgme_io_cb *iocb = data;
    gdk_input_remove (data->tag);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
{
    struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
    iocb->fnc = fnc;
    iocb->data = fnc_data;
    iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
                                   my_gpgme_io_callback, iocb, NULL);
    *tag = iocb;
    return 0;
}
```

File: gpgme.info, Node: I/O Callback Example Qt, Prev: I/O Callback Example GDK, Up: Using External Event Loops

7.8.2.6 I/O Callback Example Qt

.....

The

I/O callback interface can also be used to integrate GPGME with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any Qt specific setup.

```
#include <qsocketnotifier.h>
#include <qapplication.h>

struct IOCB {
    IOCB( GpgmeIOCb f, void * d, QSocketNotifier * n )
        : func( f ), data( d ), notifier( n ) {}
    GpgmeIOCb func;
    void * data;
    QSocketNotifier * notifier;
}

class MyApp : public QApplication {

// ...

static void registerGpgmeIOCallback( void * data, int fd, int dir,
                                     GpgmeIOCb func, void * func_data,
                                     void ** tag ) {
    QSocketNotifier * n =
        new QSocketNotifier(
fd, dir ? QSocketNotifier::Read
                        : QSocketNotifier::Write );
    connect( n, SIGNAL(activated(int)),
            qApp, SLOT(slotGpgmeIOCallback(int)) );
    qApp->mIOCBs.push_back( IOCB( func, func_data, n ) );
    *tag = (void*)n;
}

static void removeGpgmeIOCallback( void * tag ) {
    if ( !tag ) return;
    QSocketNotifier * n = static_cast<QSocketNotifier*>( tag );
    for ( QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
          it != qApp->mIOCBs.end() ; ++it )
        if ( it->notifier == n ) {
            delete it->notifier;
            qApp->mIOCBs.erase( it );
            return;
        }
}
}
```



```

public slots:
void slotGpgmeIOCallback( int fd ) {
    for ( QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
          it != mIOCBs.end() ; ++it )
        if ( it->notifier && it->notifier->socket() == fd )
            (*(it->func))
                ( it->func_data, fd );
    }

    // ...

private:
    QValueList<IOCB> mIOCBs;
    // ...
};

```

File: gpgme.info, Node: Cancellation, Prev: Using External Event Loops, Up: Run Control

7.8.3 Cancellation

Sometimes you do not want to wait for an operation to finish. GPGME provides two different functions to achieve that. The function `gpgme_cancel` takes effect immediately. When it returns, the operation is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function `gpgme_cancel_async` can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

-- Function: `gpgme_ctx_t gpgme_cancel (gpgme_ctx_t CTX)`
 SINCE: 0.4.5

The function `gpgme_cancel` attempts to cancel a pending operation in the context `CTX`. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call `gpgme_wait` during cancellation. After successful cancellation, you can call `gpgme_wait` (optionally waiting on `CTX`), and the context `CTX` will appear as if it had finished with the error code `GPG_ERR_CANCEL`.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the

event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a GPGME_EVENT_DONE event with the error code GPG_ERR_CANCEL will be signalled.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

-- Function: `gpgme_ctx_t gpgme_cancel_async (gpgme_ctx_t CTX)`
SINCE: 1.1.7

The function `gpgme_cancel_async` attempts to cancel a pending operation in the context CTX. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

File: `gpgme.info`, Node: UI Server Protocol, Next: Debugging, Prev: Contexts, Up: Top

Appendix A The GnuPG UI Server Protocol

This section specifies the protocol used between clients and a User Interface Server (UI server). This protocol helps to build a system where all cryptographic operations are done by a server and the server is responsible for all dialogs. Although GPGME has no direct support for this protocol it is believed that servers will utilize the GPGME library; thus having the specification included in this manual is an appropriate choice. This protocol should be referenced as The GnuPG UI Server Protocol.

A server needs to implement these commands:(1)

* Menu:

- * UI Server Encrypt:: Encrypt a message.
- * UI Server Sign:: Sign a message.
- * UI Server Decrypt:: Decrypt a message.
- * UI Server Verify:: Verify a message.
- * UI Server Set Input Files:: Specifying the input files to operate on.
- * UI Server Sign/Encrypt Files:: Encrypting and signing files.
- * UI Server Verify/Decrypt Files:: Decrypting and verifying files.

- * UI Server Import/Export Keys:: Managing certificates.
- * UI Server Checksum Files:: Create and verify checksums for files.
- * Miscellaneous UI Server Commands:: Commands not related to a specific operation.

----- Footnotes -----

(1) In all examples we assume that the connection has already been established; see the Assuan manual for details.

File: gpgme.info, Node: UI Server Encrypt, Next: UI Server Sign, Up: UI Server Protocol

A.1 UI Server: Encrypt a Message

=====

Before encryption can be done the recipients must be set using the command:

-- Command: RECIPIENT STRING

Set the recipient for the encryption. STRING is an RFC-2822 recipient name ("mailbox" as per section 3.4). This command may or may not check the recipient for validity right away; if it does not all recipients are expected to be checked at the time of the ENCRYPT command. All RECIPIENT commands are cumulative until a successful ENCRYPT command or until a RESET command. Linefeeds are obviously not allowed in STRING and should be folded into spaces (which are equivalent).

To tell the server the source and destination of the data, the next two commands are to be used:

-- Command: INPUT FD=N

Set the file descriptor for the message to be encrypted to N. The message send to the server is binary encoded.

GpgOL is a Windows only program,
thus N is not a libc file

descriptor but a regular system handle. Given that the Assuan connection works over a socket, it is not possible to use regular inheritance to make the file descriptor available to the server. Thus DuplicateHandle needs to be used to duplicate a handle to the server process. This is the reason that the server needs to implement the GETINFO pid command. Sending this command a second time replaces the file descriptor set by the last one.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output (i.e. the encrypted message) to N. If the option `--binary` is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

The setting of the recipients, the data source and destination may happen in any order, even intermixed. If this has been done the actual encryption operation is called using:

-- Command: ENCRYPT --protocol=NAME

This command reads the plaintext from the file descriptor set by the INPUT command, encrypts it and writes the ciphertext to the file descriptor set by the OUTPUT command. The server may (and should) overlap reading and writing. The recipients used for the encryption are all the recipients set so far. If any recipient is not usable the server should take appropriate measures to notify the user about the problem and may cancel the operation by returning an error code. The used file descriptors are void after this command; the recipient list is only cleared if the server returns success.

Because GpgOL uses a streaming mode of operation the server is not allowed to auto select the protocol and must obey to the mandatory PROTOCOL parameter:

OpenPGP

Use the OpenPGP protocol (RFC-2440).

CMS

Use the CMS (PKCS#7) protocol (RFC-3852).

To support automagically selection of the protocol depending on the selected keys, the server MAY implement the command:

-- Command: PREP_ENCRYPT [--protocol=NAME] [--expect-sign]

This commands considers all recipients set so far and decides whether it is able to take input and start the actual encryption. This is kind of a dry-run ENCRYPT without requiring or using the input and output file descriptors. The server shall cache the result of any user selection to avoid asking this again when the actual ENCRYPT command is send. The `--protocol` option is optional; if it is not given, the server should allow the user to select the protocol to be used based on the recipients given or by any other means.

If --expect-sign is given the server should expect that the message will also be signed and use this hint to present a unified recipient and signer selection dialog if possible and desired.

A

selected signer should then be cached for the expected SIGN command (which is expected in the same session but possible on another connection).

If this command is given again before a successful ENCRYPT command, the second one takes effect.

Before sending the OK response the server shall tell the client the protocol to be used (either the one given by the argument or the one selected by the user) by means of a status line:

-- Status line: PROTOCOL NAME

Advise the client to use the protocol NAME for the ENCRYPT command. The valid protocol names are listed under the description of the ENCRYPT command. The server shall emit exactly one PROTOCOL status line.

Here is an example of a complete encryption sequence; client lines are indicated by a C:, server responses by S:

```
C: RESET
S: OK
C: RECIPIENT foo@example.net
S: OK
C: RECIPIENT bar@example.com
S: OK
C: PREP_ENCRYPT
S: S PROTOCOL OpenPGP
S: OK
C: INPUT FD=17
S: OK
C: OUTPUT FD=18
S: OK
C: ENCRYPT
S: OK
```

File: gpgme.info, Node: UI Server Sign, Next: UI Server Decrypt, Prev: UI Server Encrypt, Up: UI Server Protocol

A.2 UI Server: Sign a Message

=====

The server needs to implement opaque signing as well as detached signing. Due to the nature of OpenPGP messages it is always required to send the entire message to the server; sending just the hash is not possible. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N

Set the file descriptor for the message to be signed to N. The message sent to the server is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output. The output is

either the complete signed message or in case of a detached signature just that detached signature. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

To allow the server the selection of a non-default signing key the client may optionally use the SENDER command, see *note command SENDER::.

The signing operation is then initiated by:

-- Command: SIGN --protocol=NAME [--detached]

Sign the data set with the INPUT command and write it to the sink set by OUTPUT. NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. With option --detached given, a detached signature is created; this is actually the usual way the command is used.

The client expects the server to send at least this status information before

the final OK response:

-- Status line: MICALG STRING

The STRING represents the hash algorithm used to create the signature. It is used with RFC-1847 style signature messages and defined by PGP/MIME (RFC-3156) and S/MIME (RFC-3851). The GPGME library has a supporting function `gpgme_hash_algo_name` to return the algorithm name as a string. This string needs to be lowercased and for OpenPGP prefixed with "pgp-".

-----BEGIN PGP PRIVATE KEY BLOCK-----

IQOYBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAttrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJIO1s0N2c
PSht98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFC+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRjLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAEAB/wLJ0gyMjs2fFfT83wM
5Lzz2yQIwV4t3bb1BAujdHTqeN5Zmsm/oakFyjsokULK96Kv0R4ej9eoIgmFvxFk
HRkrngxTrbsNJ7I6QcKYHTPeIj318ykNL6fj0WJUcdPIENukXl5jbqNyk3/4D2y
TTDySyq6jHTgvMH4K4KJUSpglvSJPntTk9RhuFGHAF+sNR9atygDYctAaERMRTSg
LCoSt/AoX5GRMIQjXT9oqQjwSzoZyF4s8HMC8wdTFIE/E0L4IVdHVP8sz2UuszNfT
W/evmCA+KVruKjRH/Fhrq4hHkEamW28+j4L6uAyagONP7BONS+S5Oo2zTT9+tV2R
ILTZBADdgLuAgF6C5Lu9jCF6DfFgaT/uafMyQNkEGNlxOHMWHTgLHe475V2eG9gA
amd4yXKyEFKU1PWnvlGuicQSGdzVcwmq61msvXgYD0FK3LP3yWzKnE4X1tzc9Vp
/uHjXKjewCuyt1f5in919v+t8TbUxBYKc0zX/qWtX+10cTx77QQA6leqhToJ95Yc
u4UBrKMEO+y2v8Svb3LG7yI5oY8tkw0EkJ/kpZ8xTafZYCe6fXdVVE3PHg2lrxyc
Wv/EU3QY/qA3G82mbXYeJ2jNZaTNYo4MylMrt4Mx25x4ke7JlsE8SVrQ+4CrHkqp
OjSla7fppLrQ78uW980AtN8NNQGrlTsD/A9aoA60IgxY1Q3K2uSyDCyjLknv57ym
ZSBD3/t7m0l6Q6gdbfhnGosT+Hd4y3actqEqzXZHW2VG4dKZ/wRNkxtSm9adU9vs
EHyzxb6mKIH32zAG5TaFT20hC+NK6lsyHr9UE2ZrS6ma2sLxGW2O40hqNsdD+5m
NrqeBc2I/js1PMK0EHRlc3RAZXhbbXBsZS5vcmeJAVQEEwEIAD4WIQTUFzW5Ejb9
uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8JnAAULCQgHAgYVCgkICwIEFgIDAQIe
AQIXgAAKCRajAWNe7/DLBf9kB/wOQ/S60HGwFq07W9N01HWULyhHKoMmcHL6rfZ6
4oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6kaBe+wF6Kqir6udFSBW9rPcFg6/V
ZXPltT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rNgkYo1JCBR0XdRJYCSX3yB4TWv/eX
nZ37/WjmiTOIzh35rjs+NuU/S5JPDfAp2/k70DevQeBsv+UjVXjWpNTZmPbvDnd9
95uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6UunOf9Rlp1oMzdxMool/d1MICxg2h
3jheuhv7lgUF4KpvhOuEPXQ7UO417E0TYcDZ1J8Nsv87SZeEnQOYBFrsKEkBCADj
oEBhG/QPqZHg8VyoD1xYRAWGxyDjkX/GrSs6yE+x2hk5FoQCajxKa/d4AVxOnJpd
whAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0pO7bgAiZxkA6RHxtNqhpPnPQoXvUz
kzpRgpL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/8i9Taz67pdZwuJjac8qBuJHjzAo1
bjYctFYUSG5pbmMQyNlySzziNkFa4DajODlt3RuqVGP316Fk+Sy2+60tC/HIX8jg
MyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyLUGKU+L8cB2g1PGGp2biBFWqZbudZ
oyRBet/0yH/zirBdQJw1ABEBAAEAB/4IN3gXOI4OuoOcsvHak4pebx61Mt0YP9cT
qZASIBqxok5x8E28pFh/tYfkYdqRCtdNYZOnxcEoUWh5j6nfwZkEnJ9P/T8GPNk7
pMKnKXmExi05b5uGHD8nU1rSbf/YkvAF0vpbx4d/RDxbbtQhbUwGzusSI+pBLM0w
5TreEB+vRGCe2gOvXXOtKLNEa7M9rH2EwbAkP3jOGGwgk6adxbQdBcRqx4merqHL
YrVz73bCj8TDc0fsNjyIaZZJ++ejfBFYavsF1pvx9z7FNFi8rSXoiB3SBtaWGfhr
bwNaMZrDc7TRIq/fgGaL6g/bzcWrr1YaHXZ10Bgx6UymDOIYkCpBADm0Hv46sPw
07SO8+IACcaQliOto1pndOPwTimCeo58/7rf8I2a5uuJloGrnPwAX65bKDnUALp6
X3lnXRNmhnB3Uewx4i00LQmjsxhJfQiGLpMv0j58tn64s7GqQzGVV1JKcQm992RV
jFOydyjZ+K4LGWEOITG/bZrMEVNGCM+OnQQA/Haz8xN0NFSIq7tyfFc0pkx/TiCX
xGfBqbO0wU2b5GMnZbY/06HENpidIzpa231VQaw5/nPTvfhllKW1iGakc148cX1q
IL9w2ksXuaHR3LXud2VcfVTIdXU/7h7u1dD/85+c0+7j1GOBd9cXKxIM6OjPIJ1
l5/1h3C5S0TuxHkEAL/3BGihkhNfv1Xx0rWu0/732usX/nE/A9C26hGu41FUf3fp
0ilonKpKZUEwWt5hWSEFCsrznNvekiO0rxvuu3RVegvzThPNU4Pf4JztJpRVhvUQ
d9ulxJw7V9rs75uNBatTNC0kXuGoXhehw4Bn93xa67gYGd3LfrH+oT0GCDpTSHCJ
ATwEGAEIACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAK
CRajAWNe7/DLBf0pCACpp5hBuUWngu2Hqvg+tNiuifsiYzId3MffFxek3CbXeHcJ

5F32NDJ9PYCnra4L8wSv+NZt9gIa8IFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7
Jq3e/4Iy0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02L
kr+2Cc/Qk6H+v1NOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe
23nntMSDA+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t
9Mmd7bM1+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=hkUm

-----END

PGP PRIVATE KEY BLOCK-----

```
from __future__ import absolute_import
```

```
import cython
```

```
import gpg
```

```
c = gpg.Context()
```

```
seckeys = c.keylist(pattern=None, secret=True)
```

```
pubkeys = c.keylist(pattern=None, secret=False)
```

```
seclist = list(seckeys)
```

```
secnum = len(seclist)
```

```
publist = list(pubkeys)
```

```
pubnum = len(publist)
```

```
if cython.compiled is True:
```

```
    cc = "Powered by Cython compiled C code."
```

```
else:
```

```
    cc = "Powered by Python."
```

```
print("""
```

```
    Number of secret keys: {0}
```

```
    Number of public keys: {1}
```

```
    {2}
```

```
    """).format(secnum, pubnum, cc)
```

```
This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.
```

```
Copyright 20022008, 2010, 20122018 g10 Code GmbH.
```

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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gpgme.info-1: 1688

gpgme.info-2: 301751

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pca.cr10 `HB0) `HBhttps://mystic.pca.dfn.de/0A `HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html0 `HB

This certificate was issued by the DFN-PCA, the Top
Level Certification Authority of the German Research
Network (Deutsches Forschungsnetz, DFN).

The key owner's identity was authenticated in
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1 xOK?ps

\input texinfo @c -* mode: texinfo; coding: utf-8; -*-

@documentencoding UTF-8

@setfilename gpgme.info

@include defs.inc

@settitle The `GnuPG Made Easy' Reference Manual

```
@dircategory GNU Libraries
@direntry
* @acronym{GPGME}: (gpgme).      Adding support for cryptography to your program.
@end direntry
```

```
@c Unify some of the indices.
@syncodeindex tp fn
@syncodeindex pg fn
```

```
@copying
Copyright @copyright{ } 2002--2008, 2010, 2012--2018 g10 Code GmbH.
```

```
@quotation
Permission is granted to copy, distribute and/or modify this document
under the terms of the GNU General Public License as published by the
Free Software Foundation; either version 3 of the License, or (at your
option) any later version. The text of the license can be found in the
section entitled ``Copying".
@end quotation
```

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MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See
the GNU
General Public License for more details.
@end copying
```

```
@c Macros used by the description of the UI server protocol
@macro clnt{string}
@sc{c:} \string\
@end macro
@macro srvr{string}
@sc{s:} \string\
@end macro
```

```
@c API version.
@macro since{string}
@sc{Since:} \string\
@end macro
```

```
@c
@c T I T L E P A G E
@c
@ifinfo
This file documents the @acronym{GPGME} library.
```

This is Edition @value{EDITION}, last updated @value{UPDATED}, of
@cite{The `GnuPG Made Easy' Reference Manual}, for Version
@value{VERSION}.

@c NOTE: Don't forget to update the year for the TeX version, too.
@insertcopying

@end ifinfo

@c We do not want that bastard short titlepage.

@c @iftex

@c @shorttitlepage The `GnuPG Made Easy' Reference Manual

@c @end iftex

@titlepage

@center @titlefont{The `GnuPG Made Easy'}

@sp 1

@center @titlefont{Reference Manual}

@sp 6

@center Edition @value{EDITION}

@sp 1

@center last updated @value{UPDATED}

@sp 1

@center for version @value{VERSION}

@page

@vskip 0pt plus 1filll

Published

by The GnuPG Project@* c/o g10 Code GmbH@* Httenstr. 61@* 40699 Erkrath, Germany

@insertcopying

@end titlepage

@page

@summarycontents

@contents

@ifnottex

@node Top

@top Main Menu

This is Edition @value{EDITION}, last updated @value{UPDATED}, of

@cite{The `GnuPG Made Easy' Reference Manual}, for Version

@value{VERSION} of the @acronym{GPGME} library.

@end ifnottex

@menu

- * Introduction:: How to use this manual.
- * Preparation:: What you should do before using the library.
- * Protocols and Engines:: Supported crypto protocols.
- * Algorithms:: Supported algorithms.

- * Error Handling:: Error numbers and their meanings.
- * Exchanging Data:: Passing data to and from @acronym{GPGME}.
- * Contexts:: Handling @acronym{GPGME} contexts.

Appendices

- * UI Server Protocol:: The GnuPG UI Server Protocol.
- * Debugging:: How to solve problems.
- * Deprecated Functions:: Documentation of deprecated functions.
- * Library Copying:: The GNU Lesser General Public License says how you can copy and share `GnuPG Made Easy'.
- * Copying:: The GNU General Public License says how you can copy and share this manual.

Indices

- * Concept Index:: Index of concepts and programs.
- * Function and Data Index:: Index of functions, variables and data types.

@detailmenu

--- The Detailed Node Listing ---

Introduction

- * Getting Started:: Purpose of the manual, and how to use it.
- * Features:: Reasons to install and use @acronym{GPGME}.
- * Overview:: Basic architecture of the @acronym{GPGME} library.

Preparation

- * Header:: What header file you need to include.
- * Building the Source:: Compiler options to be used.
- * Largefile Support (LFS)::
How to use @acronym{GPGME} with LFS.
- * Using Automake:: Compiler options to be used the easy way.
- * Using Libtool:: Avoiding compiler options entirely.
- * Library Version Check:: Getting and verifying the library version.
- * Signal Handling:: How @acronym{GPGME} affects signal handling.
- * Multi-Threading:: How @acronym{GPGME} can be used in an MT environment.

Protocols and Engines

- * Engine Version Check:: Verifying the engine version.
- * Engine Information:: Obtaining more information about the engines.
- * Engine Configuration:: Changing the engine configuration.
- * OpenPGP:: Support for the OpenPGP protocol.

- * Cryptographic Message Syntax:: Support for the CMS.

Algorithms

- * Public Key Algorithms:: A list of all public key algorithms.
- * Hash Algorithms:: A list of all hash algorithms.

Error Handling

- * Error Values:: The error value and what it means.
- * Error Codes:: A list of important error codes.
- * Error Sources:: A list of important error sources.
- * Error Strings:: How to get a descriptive string from a value.

Exchanging Data

- * Creating Data Buffers:: Creating new data buffers.
- * Destroying Data Buffers:: Releasing data buffers.
- * Manipulating Data Buffers:: Operations on data buffers.

Creating Data Buffers

- * Memory Based Data Buffers:: Creating memory based data buffers.
- * File Based Data Buffers:: Creating file based data buffers.
- * Callback Based Data Buffers:: Creating callback based data buffers.

Manipulating Data Buffers

- * Data Buffer I/O Operations:: I/O operations on data buffers.
- * Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- * Data Buffer Convenience:: Convenience function for data buffers.

Contexts

- * Creating Contexts:: Creating new @acronym{GPGME} contexts.
*
- * Destroying Contexts:: Releasing @acronym{GPGME} contexts.
- * Result Management:: Managing the result of crypto operations.
- * Context Attributes:: Setting properties of a context.
- * Key Management:: Managing keys with @acronym{GPGME}.
- * Crypto Operations:: Using a context for cryptography.
- * Miscellaneous:: Miscellaneous operations.
- * Run Control:: Controlling how operations are run.

Context Attributes

- * Protocol Selection:: Selecting the protocol used by a context.

- * Crypto Engine:: Configuring the crypto engine.
- * Setting the Sender:: How to tell the engine the sender.
- * ASCII Armor:: Requesting @acronym{ASCII} armored output.
- * Text Mode:: Choosing canonical text mode.
- * Offline Mode:: Choosing offline mode.
- * Included Certificates:: Including a number of certificates.
- * Key Listing Mode::
Selecting key listing mode.
- * Passphrase Callback:: Getting the passphrase from the user.
- * Progress Meter Callback:: Being informed about the progress.
- * Status Message Callback:: Status messages received from gpg.
- * Locale:: Setting the locale of a context.

Key Management

- * Key objects:: Description of the key structures.
- * Listing Keys:: Browsing the list of available keys.
- * Information About Keys:: Requesting detailed information about keys.
- * Manipulating Keys:: Operations on keys.
- * Generating Keys:: Creating new key pairs.
- * Signing Keys:: Adding key signatures to public keys.
- * Exporting Keys:: Retrieving key data from the key ring.
- * Importing Keys:: Adding keys to the key ring.
- * Deleting Keys:: Removing keys from the key ring.
- * Changing Passphrases:: Change the passphrase of a key.
- * Changing TOFU Data:: Changing data pertaining to TOFU.
- * Advanced Key Editing:: Advanced key edit operation.

Crypto Operations

- * Decrypt:: Decrypting a ciphertext.
- * Verify:: Verifying a signature.
- * Decrypt and Verify:: Decrypting a signed ciphertext.
- * Sign:: Creating a signature.
- * Encrypt:: Encrypting a plaintext.

Sign

- * Selecting Signers:: How to choose the keys to sign with.
- * Creating a Signature:: How to create a signature.
- * Signature Notation Data:: How to add notation data to a signature.

Encrypt

- * Encrypting a Plaintext:: How to encrypt a plaintext.

Miscellaneous

- * Running other Programs:: Running other Programs.
- * Using the Assuan protocol:: Using the Assuan protocol.
- * Checking for updates:: How to check for software updates.

Run Control

- * Waiting For Completion:: Waiting until an operation is completed.
- * Using External Event Loops:: Advanced control over what happens when.
- * Cancellation:: How to end pending operations prematurely.

Using External Event Loops

- * I/O Callback Interface:: How I/O callbacks are registered.
- * Registering I/O Callbacks:: How to use I/O callbacks for a context.
- * I/O Callback Example:: An example how to use I/O callbacks.
- * I/O Callback Example GTK+:: How to integrate @acronym{GPGME} in GTK+.
- * I/O Callback Example GDK:: How to integrate @acronym{GPGME} in GDK.
- * I/O Callback Example Qt:: How to integrate @acronym{GPGME} in Qt.

@end detailmenu

@end menu

@node Introduction

@chapter Introduction

`GnuPG Made Easy' (@acronym{GPGME}) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. @acronym{GPGME} provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

@acronym{GPGME} uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

@menu

- * Getting Started:: Purpose of the manual, and how to use it.
- * Features:: Reasons to install and use @acronym{GPGME}.
- * Overview:: Basic architecture of the @acronym{GPGME} library.

@end menu

@node Getting Started

@section Getting Started

This manual documents the @acronym{GPGME} library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to @acronym{GPGME} or its users.

This manual

can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those languages bindings follow the general programming model of @acronym{GPGME} but may provide some extra high level abstraction on top of the @acronym{GPGME} style API. For now please see the README files in the @file{lang/} directory of the source distribution.

@node Features

@section Features

@acronym{GPGME} has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

@table @asis

@item it's free software

Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (@pxref{Library Copying}).

@item it's flexible

@acronym{GPGME} provides transparent support for several cryptographic protocols by different engines. Currently, @acronym{GPGME} supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

@item it's easy

@acronym{GPGME} hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for @acronym{GPGME} has been added to a program, it is easy to add support for other crypto protocols once @acronym{GPGME} backends provide them.

@item it's language friendly

@acronym{GPGME}

comes with languages bindings for several common programming languages: Common Lisp, C++, Python 2, and Python 3.

@end table

@node Overview

@section Overview

@acronym{GPGME} provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, @acronym{GPGME} has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, @acronym{GPGME} can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

@node Preparation

@chapter Preparation

To use @acronym{GPGME}, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

```

@menu
* Header::          What header file you need to include.
* Building the Source::  Compiler options to be used.
* Largefile Support (LFS)::  How to use @acronym{GPGME} with LFS.
* Using Automake::      Compiler options to be used the easy way.
* Using Libtool::       Avoiding compiler options entirely.
* Library Version Check::  Getting and verifying the library version.
* Signal Handling::
    How @acronym{GPGME} affects signal handling.
* Multi-Threading::     How @acronym{GPGME} can be used in an MT environment.
@end menu

```

```

@node Header
@section Header
@cindex header file
@cindex include file

```

All interfaces (data types and functions) of the library are defined in the header file ``gpgme.h'`. You must include this in all programs using the library, either directly or through some other header file, like this:

```

@example
#include <gpgme.h>
@end example

```

The name space of @acronym{GPGME} is @code{gpgme_*} for function names and data types and @code{GPGME_*} for other symbols. Symbols internal to @acronym{GPGME} take the form @code{_gpgme_*} and @code{_GPGME_*}.

Because @acronym{GPGME} makes use of the GPG Error library, using @acronym{GPGME} will also use the @code{GPG_ERR_*} name space directly, and the @code{gpg_err*}, @code{gpg_str*}, and @code{gpgtr_*} name space indirectly.

```

@node Building the Source
@section Building the Source
@cindex compiler options
@cindex
    compiler flags

```

If you want to compile a source file including the ``gpgme.h'` header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the @option{-I} option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, gpgme ships with a small helper program `@command{gpgme-config}` that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the `@option{--cflags}` option to `@command{gpgme-config}`. The following example shows how it can be used at the command line:

```
@example
gcc -c foo.c `gpgme-config --cflags`
@end example
```

Adding the output of `@samp{gpgme-config --cflags}` to the compiler command line will ensure that the compiler can find the `@acronym{GPGME}` header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the `@option{-L}` option). For this, the option `@option{--libs}` to `@command{gpgme-config}` can be used. For convenience, this option also outputs all other options that are required to link the program with `@acronym{GPGME}` (in particular, the `@samp{-lgpgme}` option). The example shows how to link `@file{foo.o}` with the `@acronym{GPGME}` library to a program `@command{foo}`.

```
@example
gcc -o foo foo.o `gpgme-config --libs`
@end example
```

Of course you can also combine both examples to a single command by specifying both options to `@command{gpgme-config}`:

```
@example
gcc -o foo foo.c `gpgme-config --cflags --libs`
@end example
```

If you need to detect the installed language bindings you can use list them using:

```
@example
gpgme-config --print-lang
@end example
```

or

test for the availability using

```
@example
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
@end example
```

```
@node Largefile Support (LFS)
@section Largefile Support (LFS)
@cindex largefile support
@cindex LFS
```

@acronym{GPGME} is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type @code{off_t} is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type @code{off64_t} is provided, which is 64 bit wide. Or you can replace the existing @code{off_t} data type with its 64 bit wide counterpart. All occurrences of @code{off_t} are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for @acronym{GPGME}, because some data types it uses in its interfaces are affected by that. For example, the @code{off_t} data type is used in the @code{gpgme_data_seek} function, to match its @acronym{POSIX} counterpart. This affects the call-frame of the

function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms `@acronym{GPGME}` is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the `@file{gpgme.h}` header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms `@code{off_t}` is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (`@code{CreateFile}` et al.) for large files. Released binary versions of `@acronym{GPGME}` (`libgpgme-11.dll`) have always been build with a 32 bit `@code{off_t}`. To avoid an ABI break we stick to this convention for 32 bit Windows by using `@code{long}` there. `@acronym{GPGME}` versions for 64 bit Windows have never been released and thus we are able to use `@code{int64_t}` instead of `@code{off_t}` there. For easier migration the typedef `@code{gpgme_off_t}` has been defined. The reason we cannot use `@code{off_t}` directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for `@code{off_t}`. Some widely used toolkits make use of this hack and in turn `@acronym{GPGME}` would need to use it also. However, this would introduce an ABI break and existing software making use of `libgpgme` might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using `@code{off_t}` to use `@code{gpgme_off_t}` which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in `@acronym{GPGME}` is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro `@code{AC_SYS_LARGEFILE}`. If you do this, then you don't need to worry about anything else: It will just work. In this case you might also want to use `@code{AC_FUNC_FSEEKO}` to take advantage of some new interfaces, and `@code{AC_TYPE_OFF_T}` (just in case).

If you do not use Autoconf, you can define the preprocessor symbol `_FILE_OFFSET_BITS` to 64 **before** including any header files, for example by specifying the option `-D_FILE_OFFSET_BITS=64` on the compiler command line. You will also want to define the preprocessor symbol `LARGEFILE_SOURCE` to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the `GPGME` header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (`_LARGEFILE64_SOURCE`).

`@node Using Automake`
`@section Using Automake`
`@cindex automake`
`@cindex autoconf`

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the `gpgme-config` script at all. `GPGME` provides an extension to Automake that does all the work for you.

```
@c A simple macro for optional variables.
@macro ovar{varname}
@r{[]@var{\varname}@r{[]}}
@end
macro
@defmac AM_PATH_GPGME (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTH (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTHREAD (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
Check whether GPGME (at least version @var{minimum-version}, if given) exists on the host system. If it is found, execute @var{action-if-found}, otherwise do @var{action-if-not-found}, if given.
```

Additionally, the function defines `GPGME_CFLAGS` to the flags needed for compilation of the program to find the `gpgme.h` header file, and `GPGME_LIBS` to the linker flags needed to link the program to the `GPGME` library. If the used helper script does not match the target type you are building for a warning is printed and the string `libgcrypt` is appended to the variable `gpg_config_script_warn`.

`AM_PATH_GPGME_PTH` checks for the version of `GPGME` that can be used with GNU Pth, and defines `GPGME_PTH_CFLAGS` and `GPGME_PTH_LIBS`.

`AM_PATH_GPGME_PTHREAD` checks for the version of `GPGME` that can be used with the native pthread implementation, and defines `GPGME_PTHREAD_CFLAGS` and `GPGME_PTHREAD_LIBS`. Since version 1.8.0 this is no longer required to `GPGME_PTHREAD` as `GPGME` itself is thread safe.

This macro searches for `gpgme-config` along the PATH. If you are cross-compiling, it is useful to set the environment variable `SYSROOT` to the top directory of your target. The macro will then first look for the helper program in the `bin` directory below that top directory. An absolute directory name must be used for `SYSROOT`. Finally, if the configure command line option `--with-gpgme-prefix` is used, only its value is used for the top directory below which the helper script is expected.

`@end defmac`

You can use the defined Autoconf variables like this in your `Makefile.am`:

```
@example
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
@end example
```

`@node Using Libtool`
`@section Using Libtool`
`@cindex libtool`

The easiest way is to just use GNU Libtool. If you use libtool, and link to `libgpgme.la`, `libgpgme-pth.la` or `libgpgme-pthread.la` respectively, everything will be done automatically by Libtool.

`@node Library Version Check`
`@section Library Version Check`
`@cindex version check, of the library`

```
@deftypedefun {const char *} gpgme_check_version (@w{const char *}@var{required_version})
```

The function `gpgme_check_version` has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems, and for this reason alone it must be invoked early in your program, before you make use of the other functions in `GPGME`. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If `required_version` is `NULL`, the function returns a pointer to a statically allocated string containing the version number of the library.

If `required_version` is not `NULL`, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If `REQUIRED_VERSION` is not a valid version number, or if the version requirement is not met, the function returns `NULL`.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking `gpgme_new` or `gpgme_data_new`, so that a detailed error code can be returned (historically, `gpgme_check_version` does not return a detailed error code).

`@end deftypefun`

```
@deftypefun {int} gpgme_set_global_flag @
    (@w{const char *@var{name}}, @
    @w{const char *@var{value}})
```

`@since{1.4.0}`

On some systems it is not easy to set environment variables and thus hard to use `GPGME`'s internal trace facility for debugging.

This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses `@acronym{GPGME}` functions between a call to this function and after the return from the call to `@code{gpgme_check_version}`.

All currently supported features require that this function is called as early as possible

--- even before `@code{gpgme_check_version}`. The features are identified by the following values for `@var{name}`:

`@table @code`

`@item debug`

To enable debugging use the string ```debug``` for `@var{name}` and `@var{value}` identical to the value used with the environment variable `@code{GPGME_DEBUG}`.

`@item disable-gpgconf`

Using this feature with any `@var{value}` disables the detection of the `gpgconf` program and thus forces GPGME to fallback into the simple OpenPGP only mode. It may be used to force the use of GnuPG-1 on systems which have both GPG versions installed. Note that in general the use of `@code{gpgme_set_engine_info}` is a better way to select a specific engine version.

`@item gpgconf-name`

`@itemx gpg-name`

Set the name of the `gpgconf` respective `gpg` binary. The defaults are `@code{GNU/GnuPG/gpgconf}` and `@code{GNU/GnuPG/gpg}`. Under Unix the leading directory part is ignored. Under Windows the leading directory part is used as the default installation directory; the `@code{.exe}` suffix is added by GPGME. Use forward slashed even under Windows.

`@item require-gnupg`

Set the minimum version of the required GnuPG engine. If that version is not met, GPGME fails early instead of trying to use the existent version. The given version must be a string with major, minor, and micro number. Example: "2.1.0".

`@item w32-inst-dir`

On Windows GPGME needs to know its installation directory to find its spawn helper. This is in general no problem because a DLL has this information. Some applications however link statically to GPGME and thus GPGME can only figure out the installation directory of this application which may be wrong in certain cases. By supplying an installation directory as value to this flag, GPGME will assume that

that directory is the installation directory. This flag has no effect on non-Windows platforms.

@end table

This function returns @code{0} on success. In contrast to other functions the non-zero return value on failure does not convey any error

code. For setting ``debug" the only possible error cause is an out of memory condition; which would exhibit itself later anyway.

Thus the return value may be ignored.

@end deftypefun

After initializing @acronym{GPGME}, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

@example

```
#include <locale.h>
```

```
#include <gpgme.h>
```

```
void
```

```
init_gpgme (void)
```

```
{
```

```
    /* Initialize the locale environment. */
```

```
    setlocale (LC_ALL, "");
```

```
    gpgme_check_version (NULL);
```

```
    gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
```

```
    #ifdef LC_MESSAGES
```

```
        gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
```

```
    #endif
```

```
}
```

```
@end example
```

Note that you are highly recommended to initialize the locale settings like this. @acronym{GPGME} can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for portability to W32 systems.

@node Signal Handling

@section Signal Handling

@cindex signals

@cindex signal handling

The `gpgme` library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a `SIGPIPE` signal will be delivered to the application. The default action is to abort the program. To protect against this, `gpgme_check_version` sets the `SIGPIPE` signal action to `SIG_IGN`, which means that the signal will be ignored.

`gpgme` will only do that if the signal action for `SIGPIPE` is `SIG_DEF` at the time `gpgme_check_version` is called. If it is something different, `gpgme` will take no action.

This means that if your application does not install any signal handler for `SIGPIPE`, you don't need to take any precautions. If you do install a signal handler for `SIGPIPE`, you must be prepared to handle any `SIGPIPE` events that occur due to `gpgme` writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for `SIGPIPE`, you must make sure you do this either before `gpgme_check_version` is called or afterwards.

`Multi-Threading`
`Multi-Threading`
`thread-safeness`
`multi-threading`

The `gpgme` library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

`itemize` `bullet`
`item`

The function `gpgme_check_version` must be called before any other function in the library, because it initializes the thread support subsystem in `gpgme`. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use `gpgme`. For this, it is sufficient to call `gpgme_check_version` before creating the other threads using `gpgme`.
`At least this is true for`
POSIX threads, as `pthread_create` is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term "Memory Synchronization". For other thread

packages other, more relaxed or more strict rules may apply.}).

@item

Any @code{gpgme_data_t} and @code{gpgme_ctx_t} object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

@item

Only one thread at any time is allowed to call @code{gpgme_wait}. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

@item

The function @code{gpgme_strerror} is not thread safe. You have to use @code{gpgme_strerror_r} instead.
@end itemize

@node Protocols and Engines

@chapter Protocols and Engines

@cindex protocol

@cindex engine

@cindex crypto engine

@cindex backend

@cindex crypto backend

@acronym{GPGME} supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. @acronym{GPGME} uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by @acronym{GPGME}. Where an exchange of information between the application and the backend is necessary, @acronym{GPGME} provides the necessary callback function hooks and further interfaces.

@deftp {Data type} {enum gpgme_protocol_t}

@tindex gpgme_protocol_t

The @code{gpgme_protocol_t} type specifies the set of possible protocol values that are supported by @acronym{GPGME}. The following protocols are supported:

@table @code

@item GPGME_PROTOCOL_OpenPGP
@itemx GPGME_PROTOCOL_OPENPGP

This specifies the OpenPGP protocol.

@item GPGME_PROTOCOL_CMS

This specifies the Cryptographic Message Syntax.

@item GPGME_PROTOCOL_GPGCONF

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_ASSUAN

@since{1.2.0}

This specifies the raw Assuan protocol.

@item GPGME_PROTOCOL_G13

@since{1.3.0}

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_UISEVER

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_SPAWN

@since{1.5.0}

Special protocol for use with @code{gpgme_op_spawn}.

@item GPGME_PROTOCOL_UNKNOWN

Reserved for future extension. You may use this to indicate that the used protocol is not known to the application. Currently, @acronym{GPGME} does not accept this value in any operation, though, except for @code{gpgme_get_protocol_name}.

@end

table

@end deftp

@deftypefun {const char *} gpgme_get_protocol_name (@w{gpgme_protocol_t} @var{protocol})

The function @code{gpgme_get_protocol_name} returns a statically allocated string describing the protocol @var{protocol}, or @code{NULL} if the protocol number is not valid.

@end deftypefun

@menu

- * Engine Version Check:: Verifying the engine version.
- * Engine Information:: Obtaining more information about the engines.
- * Engine Configuration:: Changing the engine configuration.

* OpenPGP:: Support for the OpenPGP protocol.
* Cryptographic Message Syntax:: Support for the CMS.
* Assuan:: Support for the raw Assuan protocol.
@end menu

@node Engine Version Check
@section Engine Version Check
@cindex version check, of the engines

@deftypefun @w{const char *} gpgme_get_dirinfo (@w{const char *}@var{what})
@since{1.5.0}

The function @code{gpgme_get_dirinfo} returns a statically allocated string with the value associated to @var{what}. The returned values are the defaults and won't change even after @code{gpgme_set_engine_info} has been used to configure a different engine. @code{NULL} is returned if no value is available. Commonly supported values for @var{what} are:

@table @code
@item homedir
Return the default home directory.

@item sysconffdir
Return the name of the system configuration directory

@item bindir
Return the name of the directory with GnuPG program files.

@item libdir
Return the name of the directory with GnuPG related library files.

@item libexecdir
Return the name of the directory with GnuPG helper program files.

@item datadir
Return the name of the directory with GnuPG shared data.

@item localedir
Return the name of the directory with GnuPG locale data.

@item agent-socket
Return the name of the socket to connect to the gpg-agent.

@item agent-ssh-socket
Return the name of the socket to connect to the ssh-agent component of

gpg-agent.

@item

dirmngr-socket

Return the name of the socket to connect to the dirmngr.

@item uiserver-socket

Return the name of the socket to connect to the user interface server.

@item gpgconf-name

Return the file name of the engine configuration tool.

@item gpg-name

Return the file name of the OpenPGP engine.

@item gpgsm-name

Return the file name of the CMS engine.

@item g13-name

Return the name of the file container encryption engine.

@item gpg-wks-client-name

Return the name of the Web Key Service tool.

@end table

@end deftypefun

@deftypefun gpgme_error_t gpgme_engine_check_version (@w{gpgme_protocol_t @var{protocol}})

The function @code{gpgme_engine_check_version} verifies that the engine implementing the protocol @var{PROTOCOL} is installed in the expected path and meets the version requirement of @acronym{GPGME}.

This function returns the error code @code{GPG_ERR_NO_ERROR} if the engine is available and @code{GPG_ERR_INV_ENGINE} if it is not.

@end deftypefun

@node Engine

Information

@section Engine Information

@cindex engine, information about

@deftp {Data type} {gpgme_engine_info_t}

@tindex gpgme_protocol_t

The @code{gpgme_engine_info_t} type specifies a pointer to a structure describing a crypto engine. The structure contains the following

elements:

@table @code

@item gpgme_engine_info_t next

This is a pointer to the next engine info structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme_protocol_t protocol

This is the protocol for which the crypto engine is used. You can convert this to a string with @code{gpgme_get_protocol_name} for printing.

@item const char *file_name

This is a string holding the file name of the executable of the crypto engine. Currently, it is never @code{NULL}, but using @code{NULL} is reserved for future use, so always check before you use it.

@item const char *home_dir

This is a string holding the directory name of the crypto engine's configuration directory. If it is @code{NULL}, then the default directory is used. See @code{gpgme_get_dirinfo} on how to get the default directory.

@item const char *version

This is a string containing the version number of the crypto engine. It might be @code{NULL} if the version number can not be determined, for example because the executable doesn't exist or is invalid.

@item const char *req_version

This is a string containing the minimum required version number of the crypto engine for @acronym{GPGME} to work correctly. This is the version number that @code{gpgme_engine_check_version} verifies against. Currently, it is never @code{NULL}, but using @code{NULL} is reserved for future use, so always check before you use it.

@end table

@end deftp

@deftypefun gpgme_error_t gpgme_get_engine_info (@w{gpgme_engine_info_t *}@var{info})

The function @code{gpgme_get_engine_info} returns a linked list of engine info structures in @var{info}. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code @code{GPG_ERR_NO_ERROR} if

successful, and a system error if the memory could not be allocated.

```
@end deftypefun
```

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

```
@example
```

```
gpgme_ctx_t ctx;
```

```
gpgme_error_t err;
```

```
[...]
```

```
if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
```

```
@{
```

```
  gpgme_engine_info_t info;
```

```
  err = gpgme_get_engine_info (&info);
```

```
  if (!err)
```

```
    @{
```

```
      while (info && info->protocol != gpgme_get_protocol (ctx))
```

```
        info = info->next;
```

```
      if (!info)
```

```
        fprintf (stderr, "GPGME compiled without support for protocol %s",
```

```
                gpgme_get_protocol_name (info->protocol));
```

```
      else if (info->file_name && !info->version)
```

```
        fprintf (stderr, "Engine %s not installed properly",
```

```
                info->file_name);
```

```
      else if (info->file_name && info->version && info->req_version)
```

```
        fprintf (stderr, "Engine %s version %s installed, "
```

```
                "but at least version %s required", info->file_name,
```

```
                info->version, info->req_version);
```

```
      else
```

```
        fprintf (stderr, "Unknown problem with engine for protocol %s",
```

```
                gpgme_get_protocol_name (info->protocol));
```

```
    @}
```

```
@}
```

```
@end example
```

```
@node Engine Configuration
```

```
@section Engine Configuration
```

```
@cindex engine, configuration of
```

```
@cindex configuration of crypto backend
```

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

```
@deftypefun gpgme_error_t gpgme_set_engine_info (@w{gpgme_protocol_t @var{proto}}, @w{const char
*@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}
```

The function `gpgme_set_engine_info` changes the default configuration of the crypto engine implementing the protocol `proto`.

`file_name` is the file name of the executable program implementing this protocol, and `home_dir` is the directory name of the configuration directory for this crypto engine. If `home_dir` is `NULL`, the engine's default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

```
@end deftypefun
```

The functions `gpgme_ctx_get_engine_info` and `gpgme_ctx_set_engine_info` can be used to change the engine configuration per context. [Crypto Engine](#).

```
@node OpenPGP
@section OpenPGP
@cindex OpenPGP
@cindex GnuPG
@cindex protocol, GnuPG
@cindex engine, GnuPG
```

OpenPGP is implemented by GnuPG, the GNU Privacy Guard. This is the first protocol that was supported by GPGME.

The OpenPGP protocol is specified by `GPGME_PROTOCOL_OpenPGP`.

```
@node
Cryptographic Message Syntax
@section Cryptographic Message Syntax
@cindex CMS
@cindex cryptographic message syntax
@cindex GpgSM
@cindex protocol, CMS
@cindex engine, GpgSM
@cindex S/MIME
@cindex protocol, S/MIME
```

@acronym{CMS} is implemented by GpgSM, the S/MIME implementation for GnuPG.

The @acronym{CMS} protocol is specified by @code{GPGME_PROTOCOL_CMS}.

@node Assuan

@section Assuan

@cindex ASSUAN

@cindex protocol, ASSUAN

@cindex engine, ASSUAN

Assuan is the RPC library used by the various @acronym{GnuPG} components. The Assuan protocol allows one to talk to arbitrary Assuan servers using @acronym{GPGME}. @xref{Using the Assuan protocol}.

The ASSUAN protocol is specified by @code{GPGME_PROTOCOL_ASSUAN}.

@node Algorithms

@chapter Algorithms

@cindex algorithms

The crypto backends support a variety of algorithms used in public key cryptography. @footnote{Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.} The following sections list the identifiers used to denote such an algorithm.

@menu

* Public Key Algorithms:: A list of all public key algorithms.

* Hash Algorithms:: A list of all hash algorithms.

@end menu

@node Public Key Algorithms

@section Public Key Algorithms

@cindex algorithms, public key

@cindex public key algorithms

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

@deftp {Data type} {enum gpgme_pubkey_algo_t}

@tindex gpgme_pubkey_algo_t

The `{gpgme_pubkey_algo_t}` type specifies the set of all public key algorithms that are supported by `{GPGME}`. Possible values are:

`{table}` `{code}`

`{item}` `GPGME_PK_RSA`

This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

`{item}` `GPGME_PK_RSA_E`

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

`{item}` `GPGME_PK_RSA_S`

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

`{item}` `GPGME_PK_DSA`

This value indicates DSA, the Digital Signature Algorithm.

`{item}` `GPGME_PK_ELG`

This value indicates ElGamal.

`{item}` `GPGME_PK_ELG_E`

This value also indicates ElGamal and is used specifically in GnuPG.

`{item}` `GPGME_PK_ECC`

`{since}`{1.5.0}

This value is a generic indicator for elliptic curve algorithms.

`{item}` `GPGME_PK_ECDSA`

`{since}`{1.3.0}

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

`{item}` `GPGME_PK_ECDH`

`{since}`{1.3.0}

This value indicates ECDH, the Elliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

`{item}` `GPGME_PK_EDDSA`

`{since}`{1.7.0}

This value indicates the EdDSA algorithm.

@end table

@end deftp

@deftypefun {const char *} gpgme_pubkey_algo_name (@w{gpgme_pubkey_algo_t @var{algo}})

The function @code{gpgme_pubkey_algo_name} returns a pointer to a statically allocated string containing a description of the public key algorithm

@var{algo}. This string can be used to output the name of the public key algorithm to the user.

If @var{algo} is not a valid public key algorithm, @code{NULL} is returned.

@end deftypefun

@deftypefun {char *} gpgme_pubkey_algo_string (@w{gpgme_subkey_t @var{key}})

@since{1.7.0}

The function @code{gpgme_pubkey_algo_string} is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. ``rsa2048" or ``ed25519"). The caller must free the result using @code{gpgme_free}. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets @code{ERRNO}.

@end deftypefun

@node Hash Algorithms

@section Hash Algorithms

@cindex algorithms, hash

@cindex algorithms, message digest

@cindex hash algorithms

@cindex message digest algorithms

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

@defntp {Data type} {enum gpgme_hash_algo_t}

@tindex gpgme_hash_algo_t

The

@code{gpgme_hash_algo_t} type specifies the set of all hash algorithms that are supported by @acronym{GPGME}. Possible values are:

@table @code

@item GPGME_MD_MD5

@item GPGME_MD_SHA1

@item GPGME_MD_RMD160

@item GPGME_MD_MD2

@item GPGME_MD_TIGER

@item GPGME_MD_HAVAL


```
@item GPGME_MD_SHA256
@item GPGME_MD_SHA384
@item GPGME_MD_SHA512
@item GPGME_MD_SHA224
@since{1.5.0}
```

```
@item GPGME_MD_MD4
@item GPGME_MD_CRC32
@item GPGME_MD_CRC32_RFC1510
@item GPGME_MD_CRC24_RFC2440
@end table
@end deftp
```

```
@deftypefun {const char *} gpgme_hash_algo_name (@w{gpgme_hash_algo_t @var{algo}})
```

The function `gpgme_hash_algo_name` returns a pointer to a statically allocated string containing a description of the hash algorithm `@var{algo}`. This string can be used to output the name of the hash algorithm to the user.

If `@var{algo}` is not a valid hash algorithm, `NULL` is returned.

```
@end deftypefun
```

```
@node Error Handling
@chapter Error Handling
@cindex error handling
```

Many functions in `@acronym{GPGME}` can return an error if they fail.

For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

`@acronym{GPGME}` uses the `libgpg-error` library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no

information is lost. As a consequence, `@acronym{GPGME}` does not use its own identifiers for error codes, but uses those provided by `@code{libgpg-error}`. They usually start with `@code{GPG_ERR_}`.

However, `@acronym{GPGME}` does provide aliases for the functions defined in `libgpg-error`, which might be preferred for name space consistency.

`@menu`

- * Error Values:: The error value and what it means.
- * Error Sources:: A list of important error sources.
- * Error Codes:: A list of important error codes.
- * Error Strings:: How to get a descriptive string from a value.

`@end menu`

`@node Error Values`

`@section Error Values`

`@cindex error values`

`@cindex error codes`

`@cindex error sources`

`@deftp {Data type} {gpgme_err_code_t}`

The `@code{gpgme_err_code_t}` type is an alias for the `@code{libgpg-error}` type `@code{gpg_err_code_t}`. The error code indicates the type of an error, or the reason why an operation failed.

A list of important error codes can be found in the next section.

`@end deftp`

`@deftp {Data type} {gpgme_err_source_t}`

The `@code{gpgme_err_source_t}` type is an alias for the `@code{libgpg-error}` type `@code{gpg_err_source_t}`. The error source has not a precisely defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.

`@end deftp`

`@deftp {Data type} {gpgme_error_t}`

The `@code{gpgme_error_t}` type is an alias for the `@code{libgpg-error}` type `@code{gpg_error_t}`. An error value like this has always two components, an error code and an error source. Both together form the error value.

Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used. However, it is guaranteed that only 0 is used to indicate success (`GPG_ERR_NO_ERROR`), and that in this case all other parts of the error value are set to 0, too.

Note that in `GPGME`, the error source is used purely for diagnostical purposes. Only the error code should be checked to test for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

`@end deftp`

```
@deftypefun {static inline gpgme_err_code_t} gpgme_err_code (@w{gpgme_error_t @var{err}})
```

The static inline function `gpgme_err_code` returns the `gpgme_err_code_t` component of the error value `@var{err}`. This function must be used to extract the error code from an error value in order to compare it with the `GPG_ERR_*` error code macros.

`@end deftypefun`

```
@deftypefun {static inline gpgme_err_source_t}
gpgme_err_source (@w{gpgme_error_t @var{err}})
```

The static inline function `gpgme_err_source` returns the `gpgme_err_source_t` component of the error value `@var{err}`. This function must be used to extract the error source from an error value in order to compare it with the `GPG_ERR_SOURCE_*` error source macros.

`@end deftypefun`

```
@deftypefun {static inline gpgme_error_t} gpgme_err_make (@w{gpgme_err_source_t @var{source}},
@w{gpgme_err_code_t @var{code}})
```

The static inline function `gpgme_err_make` returns the error value consisting of the error source `@var{source}` and the error code `@var{code}`.

This function can be used in callback functions to construct an error value to return it to the library.

`@end deftypefun`

```
@deftypefun {static inline gpgme_error_t} gpgme_error (@w{gpgme_err_code_t @var{code}})
```

The static inline function `gpgme_error` returns the error value consisting of the default error source and the error code `@var{code}`.

For `GPGME`

applications, the default error source is

`GPG_ERR_SOURCE_USER_1`. You can define

`GPGME_ERR_SOURCE_DEFAULT` before including `gpgme.h` to

change this default.

This function can be used in callback functions to construct an error value to return it to the library.

```
@end deftypefun
```

The `libgpg-error` library provides error codes for all system error numbers it knows about. If `err` is an unknown error number, the error code `GPG_ERR_UNKNOWN_ERRNO` is used. The following functions can be used to construct error values from system error numbers.

```
@deftypefun {gpgme_error_t} gpgme_err_make_from_errno (@w{gpgme_err_source_t @var{source}}, @w{int @var{err}})
```

The function `gpgme_err_make_from_errno` is like `gpgme_err_make`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

```
@end deftypefun
```

```
@deftypefun {gpgme_error_t} gpgme_error_from_errno (@w{int @var{err}})
```

The function `gpgme_error_from_errno` is like `gpgme_error`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

```
@end deftypefun
```

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

```
@deftypefun {gpgme_err_code_t} gpgme_err_code_from_errno (@w{int @var{err}})
```

The function `gpgme_err_code_from_errno` returns the error code for the system error `err`. If `err` is not a known system error, the function returns `GPG_ERR_UNKNOWN_ERRNO`.

```
@end deftypefun
```

```
@deftypefun {int} gpgme_err_code_to_errno (@w{gpgme_err_code_t @var{err}})
```

The function `gpgme_err_code_to_errno` returns the system error for the error code `err`. If `err` is not an error code representing a system error, or if this system error is not defined on this system, the function returns `0`.

```
@end deftypefun
```

```
@node Error Sources
```

```
@section
```

Error Sources

```
@cindex error codes, list of
```

The library `libpgp-error` defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is `{0}`, the whole error value will be `{0}`. In this case the error source part is of course `GPG_ERR_SOURCE_UNKNOWN`.

The list of error sources that might occur in applications using `GPGME` is:

`@table @code`

`@item GPG_ERR_SOURCE_UNKNOWN`

The error source is not known. The value of this error source is `{0}`.

`@item GPG_ERR_SOURCE_GPGME`

The error source is `GPGME` itself. This is the default for errors that occur in the `GPGME` library.

`@item GPG_ERR_SOURCE_GPG`

The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

`@item GPG_ERR_SOURCE_GPGSM`

The error source is GPGSM, which is the crypto engine used for the CMS protocol.

`@item GPG_ERR_SOURCE_GCRYPT`

The error source is `libgcrypt`, which is used by crypto engines to perform cryptographic operations.

`@item GPG_ERR_SOURCE_GPGAGENT`

The error source is `gpg-agent`, which is used by crypto engines to perform operations with the secret key.

`@item GPG_ERR_SOURCE_PINENTRY`

The error source is `pinentry`, which is used by `gpg-agent` to query the passphrase to unlock a secret key.

`@item GPG_ERR_SOURCE_SCD`

The error source is the SmartCard Daemon, which is used by `gpg-agent` to delegate operations with the secret key to a SmartCard.

@item GPG_ERR_SOURCE_KEYBOX

The error source is @code{libkbx}, a library used by the crypto engines to manage local keyrings.

@item GPG_ERR_SOURCE_USER_1

@item GPG_ERR_SOURCE_USER_2

@item GPG_ERR_SOURCE_USER_3

@item GPG_ERR_SOURCE_USER_4

These error sources are not used by any GnuPG component and can be used by other software. For example, applications

using

@acronym{GPGME} can use them to mark error values coming from callback handlers. Thus @code{GPG_ERR_SOURCE_USER_1} is the default for errors created with @code{gpgme_error} and @code{gpgme_error_from_erno}, unless you define @code{GPGME_ERR_SOURCE_DEFAULT} before including @file{gpgme.h}.

@end table

@node Error Codes

@section Error Codes

@cindex error codes, list of

The library @code{libpgp-error} defines many error values. Most of them are not used by @code{GPGME} directly, but might be returned by @acronym{GPGME} because it received them from the crypto engine. The below list only includes such error codes that have a specific meaning in @code{GPGME}, or which are so common that you should know about them.

@table @code

@item GPG_ERR_EOF

This value indicates the end of a list, buffer or file.

@item GPG_ERR_NO_ERROR

This value indicates success. The value of this error code is @code{0}. Also, it is guaranteed that an error value made from the error code @code{0}

will be @code{0} itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

@item GPG_ERR_GENERAL

This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

@item GPG_ERR_ENOMEM

This value means that an out-of-memory condition occurred.

@item GPG_ERR_E...

System errors are mapped to GPG_ERR_FOO where FOO is the symbol for the system error.

@item GPG_ERR_INV_VALUE

This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty

@code{gpgme_data_t} object was expected, but one containing data was provided, this error value is returned.

@item GPG_ERR_UNUSABLE_PUBKEY

This value means that some recipients for a message were invalid.

@item GPG_ERR_UNUSABLE_SECKEY

This

value means that some signers were invalid.

@item GPG_ERR_NO_DATA

This value means that a @code{gpgme_data_t} object which was expected to have content was found empty.

@item GPG_ERR_CONFLICT

This value means that a conflict of some sort occurred.

@item GPG_ERR_NOT_IMPLEMENTED

This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

@item GPG_ERR_DECRYPT_FAILED

This value indicates that a decryption operation was unsuccessful.

@item GPG_ERR_BAD_PASSPHRASE

This value means that the user did not provide a correct passphrase when requested.

@item GPG_ERR_CANCELED

This value means that the operation was canceled.

@item GPG_ERR_INV_ENGINE

This value means that the engine that implements the desired protocol is currently not available. This can either be because

the sources

were configured to exclude support for this engine, or because the

engine is not installed properly.

@item GPG_ERR_AMBIGUOUS_NAME

This value indicates that a user ID or other specifier did not specify a unique key.

@item GPG_ERR_WRONG_KEY_USAGE

This value indicates that a key is not used appropriately.

@item GPG_ERR_CERT_REVOKED

This value indicates that a key signature was revoked.

@item GPG_ERR_CERT_EXPIRED

This value indicates that a key signature expired.

@item GPG_ERR_NO_CRL_KNOWN

This value indicates that no certificate revocation list is known for the certificate.

@item GPG_ERR_NO_POLICY_MATCH

This value indicates that a policy issue occurred.

@item GPG_ERR_NO_SECKEY

This value indicates that no secret key for the user ID is available.

@item GPG_ERR_MISSING_CERT

This value indicates that a key could not be imported because the issuer certificate is missing.

@item GPG_ERR_BAD_CERT_CHAIN

This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

@item GPG_ERR_UNSUPPORTED_ALGORITHM

This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

@item GPG_ERR_BAD_SIGNATURE

This value means a verification failed because the signature is bad.

@item GPG_ERR_NO_PUBKEY

This value means a verification failed because the public key is not available.

@item GPG_ERR_USER_1

@item GPG_ERR_USER_2

@item ...

@item GPG_ERR_USER_16

These error codes are not used by any GnuPG component and can be freely used by other software. Applications using @acronym{GPGME} might use them to mark specific errors returned by callback handlers if no suitable error codes (including the system errors) for these errors exist already.

@end table

@node Error Strings

@section Error Strings

@cindex error values, printing of

@cindex error codes, printing of

@cindex error sources, printing of

@cindex error strings

@deftypefun {const char *} gpgme_strerror

(@w{gpgme_error_t @var{err}})

The function @code{gpgme_strerror} returns a pointer to a statically allocated string containing a description of the error code contained in the error value @var{err}. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use @code{gpgme_strerror_r} in multi-threaded programs.

@end deftypefun

@deftypefun {int} gpgme_strerror_r (@w{gpgme_error_t @var{err}}, @w{char *@var{buf}}, @w{size_t @var{buflen}})

The function @code{gpgme_strerror_r} returns the error string for @var{err} in the user-supplied buffer @var{buf} of size @var{buflen}.

This function is, in contrast to @code{gpgme_strerror}, thread-safe if a thread-safe @code{strerror_r} function is provided by the system.

If the function succeeds, 0 is returned and @var{buf} contains the string describing the error. If the buffer was not large enough, ERANGE is returned and @var{buf} contains as much of the beginning of the error string as fits into the buffer.

@end deftypefun

@deftypefun {const char *} gpgme_strsource (@w{gpgme_error_t @var{err}})

The function @code{gpgme_strsource} returns a pointer to a statically allocated string containing a description of the error source contained in the error value @var{err}. This string can be used to output a diagnostic message to the user.

@end deftypefun

The following example illustrates the use of `gpgme_strerror`:

```
@example
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
@{
    fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
            argv[0], gpgme_strerror (err), gpgme_strerror (err));
    exit (1);
@}
@end example
```

```
@node Exchanging Data
@chapter Exchanging Data
@cindex data, exchanging
```

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by `GPGME`.

The

user provides and receives the data via `gpgme_data_t` objects, regardless of the communication protocol between `GPGME` and the crypto engine in use.

```
@deftp {Data type} {gpgme_data_t}
The gpgme_data_t type is a handle for a container for generic data, which is used by GPGME to exchange data with the user.
@end deftp
```

`gpgme_data_t` objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all `GPGME` data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

```
@deftp {Data type} {gpgme_off_t}
@since{1.4.1}
```

On POSIX platforms the `gpgme_off_t` type is an alias for `off_t`; it may be used interchangeably. On Windows platforms `gpgme_off_t` is defined as

a long (i.e. 32 bit) for 32 bit
Windows and as a 64 bit signed integer for 64 bit Windows.

@end deftp

@deftp {Data type} {gpgme_ssize_t}

The @code{gpgme_ssize_t} type is an alias for @code{ssize_t}. It has only been introduced to overcome portability problems pertaining to the declaration of @code{ssize_t} by different toolchains.

@end deftp

@menu

- * Creating Data Buffers:: Creating new data buffers.
- * Destroying Data Buffers:: Releasing data buffers.
- * Manipulating Data Buffers:: Operations on data buffers.

@end menu

@node Creating Data Buffers

@section Creating Data Buffers

@cindex data buffer, creation

Data objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

@menu

- * Memory Based Data Buffers:: Creating memory based data buffers.
- * File Based Data Buffers:: Creating file based data buffers.
- * Callback Based Data Buffers:: Creating callback based data buffers.

@end menu

@node

Memory Based Data Buffers

@subsection Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source and to its destination, which can often be avoided by using one of the other data object

@deftypefun gpgme_error_t gpgme_data_new (@w{gpgme_data_t *}@var{dh})

The function @code{gpgme_data_new} creates a new @code{gpgme_data_t} object and returns a handle for it in @var{dh}. The data object is memory based and initially empty.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `@var{dh}` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_mem (@w{gpgme_data_t *}@var{dh}), @w{const char
*@var{buffer}}, @w{size_t @var{size}},
@w{int @var{copy}})
```

The function `gpgme_data_new_from_mem` creates a new `gpgme_data_t` object and fills it with `@var{size}` bytes starting from `@var{buffer}`.

If `@var{copy}` is not zero, a private copy of the data is made. If `@var{copy}` is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains valid for the whole life span of the data object.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `@var{dh}` or `@var{buffer}` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_file (@w{gpgme_data_t *}@var{dh}), @w{const char
*@var{filename}}, @w{int @var{copy}})
```

The function `gpgme_data_new_from_file` creates a new `gpgme_data_t` object and fills it with the content of the file `@var{filename}`.

If `@var{copy}` is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for `@var{copy}` might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `@var{dh}` or `@var{filename}` is not a valid pointer, `GPG_ERR_NOT_IMPLEMENTED` if `@var{code}` is zero, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_filepart (@w{gpgme_data_t *}@var{dh}), @w{const char
*@var{filename}}, @w{FILE *}@var{fp}), @w{off_t @var{offset}}, @w{size_t @var{length}})
```

The function `gpgme_data_new_from_filepart` creates a new

@code{gpgme_data_t} object and fills it with a part of the file specified by @var{filename} or @var{fp}.

Exactly one of @var{filename} and @var{fp} must be non-zero, the other must be zero. The argument that is not zero specifies the file from which @var{length} bytes are read into the data object, starting from @var{offset}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, @code{GPG_ERR_INV_VALUE} if @var{dh} and exactly one of @var{filename} and @var{fp} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@node File Based Data Buffers
@subsection File Based Data Buffers

File based data objects operate directly on file descriptors or streams. Only a small amount of data is stored in core at any time, so the size of the data objects is not limited by @acronym{GPGME}.

@deftypefun gpgme_error_t gpgme_data_new_from_fd (@w{gpgme_data_t *@var{dh}}, @w{int @var{fd}})
The function @code{gpgme_data_new_from_fd} creates a new @code{gpgme_data_t} object and uses the file descriptor @var{fd} to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_stream (@w{gpgme_data_t *@var{dh}}, @w{FILE *@var{stream}})

The function @code{gpgme_data_new_from_stream} creates a new @code{gpgme_data_t} object and uses the I/O stream @var{stream} to read from (if used as an input data object) and write to (if used as an

output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_estream (@w{gpgme_data_t *}@var{dh}),  
@w{gpgme_stream_t @var{stream}})
```

The function `gpgme_data_new_from_estream` creates a new `gpgme_data_t` object and uses the `gpgme_stream_t` `@var{stream}` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

@node Callback Based Data Buffers

@subsection Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your application, you can implement the functions a data object provides yourself and create a data object from these callback functions.

```
@defpt {Data type} {ssize_t (*gpgme_data_read_cb_t) (@w{void *}@var{handle}), @w{void @var{*buffer}},  
@w{size_t @var{size}})}
```

@tindex gpgme_data_read_cb_t

The `gpgme_data_read_cb_t` type is the type of functions which `GPGME` calls if it wants to read data from a user-implemented data object. The function should read up to `size` bytes from the current read position into the space starting at `buffer`. The `handle` is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, `errno` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {ssize_t (*gpgme_data_write_cb_t) (@w{void *@var{handle}}, @w{const void @var{*buffer}}, @w{size_t @var{size}})}
```

```
@tindex gpgme_data_write_cb_t
```

The `gpgme_data_write_cb_t` type is the type of functions which `GPGME` calls if it wants to write data to a user-implemented data object. The function should write up to `size` bytes to the current write position from the space starting at `buffer`. The `handle` is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available.

Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, `errno` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {off_t (*gpgme_data_seek_cb_t) (@w{void *@var{handle}}, @w{off_t @var{offset}}, @w{int @var{whence}})}
```

```
@tindex gpgme_data_seek_cb_t
```

The `gpgme_data_seek_cb_t` type is the type of functions which `GPGME` calls if it wants to change the current read/write position in a user-implemented data object, just like the `lseek` function.

The function should return the new read/write position, and -1 on error. If an error occurs, `errno` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {void (*gpgme_data_release_cb_t) (@w{void *@var{handle}})}
@tindex gpgme_data_release_cb_t
The @code{gpgme_data_release_cb_t} type is the type of functions which
@acronym{GPGME}
calls if it wants to destroy a user-implemented data
object. The @var{handle} is provided by the user at data object
creation time.
@end deftp
```

```
@deftp {Data type} {struct gpgme_data_cbs}
This structure is used to store the data callback interface functions
described above. It has the following members:
```

```
@table @code
@item gpgme_data_read_cb_t read
This is the function called by @acronym{GPGME} to read data from the
data object. It is only required for input data object.
```

```
@item gpgme_data_write_cb_t write
This is the function called by @acronym{GPGME} to write data to the
data object. It is only required for output data object.
```

```
@item gpgme_data_seek_cb_t seek
This is the function called by @acronym{GPGME} to change the current
read/write pointer in the data object (if available). It is optional.
```

```
@item gpgme_data_release_cb_t release
This is the function called by @acronym{GPGME} to release a data
object. It is optional.
@end table
@end deftp
```

```
@deftypefun gpgme_error_t gpgme_data_new_from_cbs
(@w{gpgme_data_t *@var{dh}}, @w{gpgme_data_cbs_t @var{cbs}}, @w{void *@var{handle}})
The function @code{gpgme_data_new_from_cbs} creates a new
@code{gpgme_data_t} object and uses the user-provided callback functions
to operate on the data object.
```

The handle @var{handle} is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, and @code{GPG_ERR_ENOMEM} if not enough memory is available.

```
@end deftypefun
```

```
@node Destroying Data Buffers
```


@section Destroying Data Buffers

@cindex data buffer, destruction

```
@deftypefun void gpgme_data_release (@w{gpgme_data_t @var{dh}})
```

The function @code{gpgme_data_release} destroys the data object with the handle @var{dh}. It releases all associated resources that were not provided by the user in the first place.

```
@end deftypefun
```

```
@deftypefun {char *} gpgme_data_release_and_get_mem (@w{gpgme_data_t @var{dh}}, @w{size_t *@var{length}})
```

The function @code{gpgme_data_release_and_get_mem} is like @code{gpgme_data_release}, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with @code{gpgme_free}. In case the user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return @code{NULL}. In any case, the data object @var{dh} is destroyed.

```
@end deftypefun
```

```
@deftypefun void gpgme_free (@w{void *@var{buffer}})
```

```
@since{1.1.1}
```

The function @code{gpgme_free} releases the memory returned by @code{gpgme_data_release_and_get_mem} and @code{gpgme_pubkey_algo_string}. It should be used instead of the system libraries @code{free} function in case different allocators are used by a program. This is often the case if gpgme is used under Windows as a DLL.

```
@end deftypefun
```

@node

Manipulating Data Buffers

@section Manipulating Data Buffers

@cindex data buffer, manipulation

Data buffers contain data and meta-data. The following operations can be used to manipulate both.

@menu

* Data Buffer I/O Operations:: I/O operations on data buffers.

* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.

* Data Buffer Convenience:: Convenience function for data buffers.

@end menu

@node Data Buffer I/O Operations

@subsection Data Buffer I/O Operations

@cindex data buffer, I/O operations

@cindex data buffer, read

@cindex data buffer, write

@cindex data buffer, seek

@deftypefun ssize_t gpgme_data_read (@w{gpgme_data_t @var{dh}}, @w{void *@var{buffer}}, @w{size_t @var{length}})

The function @code{gpgme_data_read} reads up to @var{length} bytes from the data object with the handle @var{dh} into the space starting at @var{buffer}.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets @var{errno}.

@end deftypefun

@deftypefun ssize_t gpgme_data_write (@w{gpgme_data_t @var{dh}}, @w{const void *@var{buffer}}, @w{size_t @var{size}})

The function @code{gpgme_data_write} writes up to @var{size} bytes starting from @var{buffer} into the data object with the handle @var{dh} at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, @var{errno} is set.

@end deftypefun

@deftypefun off_t gpgme_data_seek (@w{gpgme_data_t @var{dh}}, @w{off_t @var{offset}}, @w{int @var{whence}})

The function @code{gpgme_data_seek} changes the current read/write position.

The @var{whence} argument specifies how the @var{offset} should be interpreted. It must be one of the following symbolic constants:

@table @code

@item SEEK_SET

Specifies that @var{offset} is a count of characters from the beginning of the data object.

@item SEEK_CUR

Specifies that @var{offset}

is a count of characters from the current file position. This count may be positive or negative.

@item SEEK_END

Specifies that @var{offset} is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

@end table

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with @code{SEEK_CUR} to read the current read/write position.

If the function fails, -1 is returned and @var{errno} is set.

@end deftypefun

@node Data Buffer Meta-Data

@subsection Data Buffer Meta-Data

@cindex data buffer, meta-data

@cindex data buffer, file name

@cindex data buffer, encoding

@deftypefun {char *} gpgme_data_get_file_name

(@w{gpgme_data_t} @var{dh})

@since{1.1.0}

The function @code{gpgme_data_get_file_name} returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned.

Otherwise, @code{NULL} will be returned.

@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_file_name (@w{gpgme_data_t} @var{dh}, @w{const char} *@var{file_name})

@since{1.1.0}

The function `gpgme_data_set_file_name` sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code `GPG_ERR_INV_VALUE` if `dh` is not a valid pointer and `GPG_ERR_ENOMEM` if not enough memory is available.

`@end`
`deftypefun`

`@deftp {Data type} {enum gpgme_data_encoding_t}`

`@tindex gpgme_data_encoding_t`

The `gpgme_data_encoding_t` type specifies the encoding of a `gpgme_data_t` object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

`@table @code`

`@item GPGME_DATA_ENCODING_NONE`

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

`@item GPGME_DATA_ENCODING_BINARY`

This specifies that the data is encoding in binary form; i.e. there is no special encoding.

`@item GPGME_DATA_ENCODING_BASE64`

This specifies that the data is encoded using the Base-64 encoding scheme as used by `MIME` and other protocols.

`@item`

`GPGME_DATA_ENCODING_ARMOR`

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

`@item GPGME_DATA_ENCODING_MIME`

`@since{1.7.0}`

This specifies that the data is encoded as a MIME part.

`@item GPGME_DATA_ENCODING_URL`

`@since{1.2.0}`

The data is a list of linefeed delimited URLs. This is only useful with `{gpgme_op_import}`.

`{GPGME_DATA_ENCODING_URL0}`
`{1.2.0}`

The data is a list of binary zero delimited URLs. This is only useful with `{gpgme_op_import}`.

`{GPGME_DATA_ENCODING_URLESC}`
`{1.2.0}`

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is is not yet implemented.

`{end table}`
`{end deftp}`

`{deftypefun gpgme_data_encoding_t gpgme_data_get_encoding (@w{gpgme_data_t @var{dh}})}`
The function `{gpgme_data_get_encoding}` returns the encoding of the data object with the handle `{dh}`. If `{dh}` is not a valid pointer (e.g. `{NULL}`) `{GPGME_DATA_ENCODING_NONE}` is returned.
`{end deftypefun}`

`{deftypefun gpgme_error_t gpgme_data_set_encoding (@w{gpgme_data_t @var{dh}}, gpgme_data_encoding_t @var{enc}})`
The function `{gpgme_data_set_encoding}` changes the encoding of the data object with the handle `{dh}` to `{enc}`.
`{end deftypefun}`

`{deftypefun {gpgme_error_t} gpgme_data_set_flag @`
 `{w{gpgme_data_t @var{dh}}, @`
 `{const char *@var{name}}, @`
 `{const char *@var{value}})`

`{1.7.0}`

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for `{name}`:

`{table @code}`
`{item size-hint}`

The value is a decimal number with the length `{gpgme}` shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the applications knows the total size of

the data. If this is set the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

@end table

This function returns @code{0} on success.

@end deftypefun

@node Data Buffer Convenience

@subsection Data Buffer Convenience Functions

@cindex data buffer, convenience

@cindex type of data

@cindex identify

@deftp {Data type} {enum gpgme_data_type_t}

@tindex gpgme_data_type_t

@since{1.4.3}

The @code{gpgme_data_type_t} type is used to return the detected type of the content of a data buffer.

@end deftp

@table @code

@item GPGME_DATA_TYPE_INVALID

This is returned by @code{gpgme_data_identify} if it was not possible to identify the data. Reasons for this might be a non-seekable stream or a memory problem. The value is 0.

@item GPGME_DATA_TYPE_UNKNOWN

The type of the data is not known.

@item GPGME_DATA_TYPE_PGP_SIGNED

The data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.

@item GPGME_DATA_TYPE_PGP_ENCRYPTED

@since{1.7.0}

The data is an OpenPGP encrypted message.

@item GPGME_DATA_TYPE_PGP_SIGNATURE

@since{1.7.0}

The

data is an OpenPGP detached signature.

@item GPGME_DATA_TYPE_PGP_OTHER

This is a generic OpenPGP message. In most cases this will be encrypted data.

@item GPGME_DATA_TYPE_PGP_KEY

This is an OpenPGP key (private or public).

@item GPGME_DATA_TYPE_CMS_SIGNED

This is a CMS signed message.

@item GPGME_DATA_TYPE_CMS_ENCRYPTED

This is a CMS encrypted (enveloped data) message.

@item GPGME_DATA_TYPE_CMS_OTHER

This is used for other CMS message types.

@item GPGME_DATA_TYPE_X509_CERT

The data is a X.509 certificate

@item GPGME_DATA_TYPE_PKCS12

The data is a PKCS#12 message. This is commonly used to exchange private keys for X.509.

@end table

@deftypefun gpgme_data_type_t gpgme_data_identify (@w{gpgme_data_t @var{dh}})

@since{1.4.3}

The function @code{gpgme_data_identify} returns the type of the data with the handle @var{dh}. If it is not possible to perform the identification, the function returns zero

(@code{GPGME_DATA_TYPE_INVALID}). Note that depending on how the data

object has been created the identification may not be possible or the data object may change its internal state (file pointer moved). For file or memory based data object, the state should not change.

@end deftypefun

@c

@c Chapter Contexts

@c

@node Contexts

@chapter Contexts

@cindex context

All cryptographic operations in @acronym{GPGME} are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

@defstp {Data type} {gpgme_ctx_t}

The @code{gpgme_ctx_t} type is a handle for a @acronym{GPGME} context, which is used to hold the configuration, status and result of cryptographic operations.

@end defstp

@menu

- * Creating Contexts:: Creating new @acronym{GPGME} contexts.
 - * Destroying Contexts:: Releasing @acronym{GPGME} contexts.
 - * Result Management:: Managing the
result of crypto operations.
 - * Context Attributes:: Setting properties of a context.
 - * Key Management:: Managing keys with @acronym{GPGME}.
 - * Crypto Operations:: Using a context for cryptography.
 - * Miscellaneous:: Miscellaneous operations
 - * Run Control:: Controlling how operations are run.
- @end menu

@node Creating Contexts
@section Creating Contexts
@cindex context, creation

@deftypefun gpgme_error_t gpgme_new (@w{gpgme_ctx_t *}@var{ctx})
The function @code{gpgme_new} creates a new @code{gpgme_ctx_t} object and returns a handle for it in @var{ctx}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the context was successfully created, @code{GPG_ERR_INV_VALUE} if @var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available. Also, it returns @code{GPG_ERR_NOT_OPERATIONAL} if @code{gpgme_check_version} was not called to initialize GPGME, and @code{GPG_ERR_SELFTEST_FAILED} if a selftest failed. Currently, the only selftest is for Windows MingW32 targets to see if @code{-mms-bitfields} was used (as required).
@end deftypefun

@node Destroying Contexts
@section Destroying Contexts
@cindex context, destruction

@deftypefun void gpgme_release (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_release} destroys the context with the handle @var{ctx} and releases all associated resources.
@end deftypefun

@node Result Management
@section Result Management
@cindex context, result of operation

The detailed result of an operation is returned in operation-specific structures such as @code{gpgme_decrypt_result_t}. The corresponding

retrieval functions such as `gpgme_op_decrypt_result` provide static access to the results after an operation completes. Those structures shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context and give it a lifetime beyond that of the current operation or context.

```
@deftypefun void gpgme_result_ref (@w{void *}@var{result})
@since{1.2.0}
```

The function `gpgme_result_ref` acquires an additional reference for the result `@var{result}`, which may be of any type `gpgme_*_result_t`. As long as the user holds a reference, the result structure is guaranteed to be valid and unmodified.

```
@end deftypefun
```

```
@deftypefun void gpgme_result_unref (@w{void *}@var{result})
@since{1.2.0}
```

The function `gpgme_result_unref` releases a reference for the result `@var{result}`. If this was the last reference, the result structure will be destroyed and all resources associated to it will be released.

```
@end deftypefun
```

Note that a context may hold its own references to result structures, typically until the context is destroyed or the next operation is started. In fact, these references are accessed through the `gpgme_op_*_result` functions.

```
@node Context Attributes
@section
Context Attributes
@cindex context, attributes
```

```
@menu
```

- * Protocol Selection:: Selecting the protocol used by a context.
- * Crypto Engine:: Configuring the crypto engine.
- * Setting the Sender:: How to tell the engine the sender.
- * ASCII Armor:: Requesting `ASCII` armored output.
- * Text Mode:: Choosing canonical text mode.
- * Offline Mode:: Choosing offline mode.
- * Pinentry Mode:: Choosing the pinentry mode.
- * Included Certificates:: Including a number of certificates.
- * Key Listing Mode:: Selecting key listing mode.

- * Passphrase Callback:: Getting the passphrase from the user.
- * Progress Meter Callback:: Being informed about the progress.
- * Status Message Callback:: Status messages received from gpg.
- * Context Flags:: Additional flags for a context.
- * Locale:: Setting the locale of a context.
- *
- Additional Logs:: Additional logs of a context.

@end menu

@node Protocol Selection
 @subsection Protocol Selection
 @cindex context, selecting protocol
 @cindex protocol, selecting

@deftypefun gpgme_error_t gpgme_set_protocol (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t @var{proto}})

The function @code{gpgme_set_protocol} sets the protocol used within the context @var{ctx} to @var{proto}. All crypto operations will be performed by the crypto engine configured for that protocol. @xref{Protocols and Engines}.

Setting the protocol with @code{gpgme_set_protocol} does intentionally not check if the crypto engine for that protocol is available and installed correctly. @xref{Engine Version Check}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the protocol could be set successfully, and @code{GPG_ERR_INV_VALUE} if @var{protocol} is not a valid protocol.
 @end deftypefun

@deftypefun gpgme_protocol_t gpgme_get_protocol (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_get_protocol} retrieves the protocol currently use with the context @var{ctx}.
 @end deftypefun

@node Crypto Engine
 @subsection Crypto Engine
 @cindex context, configuring engine
 @cindex engine, configuration per context

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context. @xref{Engine Information}. The default can also be changed globally. @xref{Engine Configuration}.

```
@deftypefun gpgme_engine_info_t gpgme_ctx_get_engine_info (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}
```

The function `gpgme_ctx_get_engine_info` returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context `@var{ctx}`.

The result is valid until the next invocation of `gpgme_ctx_set_engine_info` for this particular context.

This function can not fail.
`@end deftypefun`

```
@deftypefun
gpgme_error_t gpgme_ctx_set_engine_info (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t
@var{proto}}, @w{const char *@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}
```

The function `gpgme_ctx_set_engine_info` changes the configuration of the crypto engine implementing the protocol `@var{proto}` for the context `@var{ctx}`.

`@var{file_name}` is the file name of the executable program implementing this protocol, and `@var{home_dir}` is the directory name of the configuration directory for this crypto engine. If `@var{home_dir}` is `NULL`, the engine's default will be used.

Currently this function must be used before starting the first crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context `@var{ctx}`.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

```
@end deftypefun
```

`@node` Setting the Sender

`@subsection` How to tell
the engine the sender.

`@cindex` context, sender

`@cindex` sender

`@cindex` From:

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification

and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. `@acronym{GPGME}` provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not supported.

```
@deftypefun gpgme_error_t gpgme_set_sender @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{int @var{address}})
```

```
@since{1.8.0}
```

The function `@code{gpgme_set_sender}` specifies the sender address for use in sign and verify operations. `@var{address}` is expected to be the ```addr-spec``` part of an address but may also be a complete mailbox address, in which case this function extracts the ```addr-spec``` from it. Using `@code{NULL}` for `@var{address}` clears the sender address.

The function returns 0 on success or an error code on failure. The most likely failure is that no valid ```addr-spec``` was found in `@var{address}`.

```
@end deftypefun
```

```
@deftypefun @w{const char *} gpgme_get_sender @
  (@w{gpgme_ctx_t @var{ctx}})
```

```
@since{1.8.0}
```

The function `@code{gpgme_get_sender}` returns the current sender address from the context, or `NULL` if none was set. The returned value is valid as long as the `@var{ctx}` is valid and `@code{gpgme_set_sender}` has not been called again.

```
@end deftypefun
```

`@c FIXME`: Unfortunately, using `@acronym` here breaks `texi2dvi`.

```
@node ASCII Armor
```

```
@subsection @acronym{ASCII} Armor
```

```
@cindex context, armor mode
```

```
@cindex @acronym{ASCII} armor
```

```
@cindex armor mode
```

```
@deftypefun void gpgme_set_armor (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
```

The function `@code{gpgme_set_armor}` specifies if the output should be `@acronym{ASCII}` armored. By default, output is not `@acronym{ASCII}`

armored.

@acronym{ASCII} armored output is disabled if @var{yes} is zero, and enabled otherwise.

@end deftypefun

@deftypefun int gpgme_get_armor (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_get_armor} returns 1 if the output is @acronym{ASCII} armored, and @code{0} if it is not, or if @var{ctx} is not a valid pointer.

@end deftypefun

@node Text Mode

@subsection Text Mode

@cindex context, text mode

@cindex text mode

@cindex canonical text mode

@deftypefun void gpgme_set_textmode (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})

The function @code{gpgme_set_textmode} specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if @var{yes} is zero, and enabled otherwise.

@end deftypefun

@deftypefun int gpgme_get_textmode (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_get_textmode} returns 1 if canonical text mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a valid pointer.

@end deftypefun

@node Offline Mode

@subsection Offline Mode

@cindex context, offline mode

@cindex offline mode

```
@deftypefun void gpgme_set_offline (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
@since{1.6.0}
```

The function `gpgme_set_offline` specifies if offline mode should be used. Offline mode is disabled if `yes` is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode `GPGME_KEYLIST_MODE_VALIDATE`.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

```
@end deftypefun
```

```
@deftypefun int gpgme_get_offline (@w{gpgme_ctx_t @var{ctx}})
@since{1.6.0}
```

The function `gpgme_get_offline` returns 1 if offline mode is enabled, and `0` if it is not, or if `ctx` is not a valid pointer.

```
@end deftypefun
```

```
@node Pinentry Mode
```

```
@subsection Pinentry Mode
```

```
@cindex context, pinentry mode
```

```
@cindex pinentry mode
```

```
@deftypefun gpgme_error_t gpgme_set_pinentry_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_pinentry_mode_t @var{mode}})
```

```
@since{1.4.0}
```

The function `gpgme_set_pinentry_mode` specifies the pinentry mode to be used.

For GnuPG ≥ 2.1 this option is required to be set to `GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback mechanism in GPGME through `gpgme_set_passphrase_cb`.

```
@deftypefun gpgme_pinentry_mode_t gpgme_get_pinentry_mode (@w{gpgme_ctx_t @var{ctx}})
@since{1.4.0}
```

The function `gpgme_get_pinentry_mode` returns the mode set for the context.

```
@deftp {Data type} {enum gpgme_pinentry_mode_t}
@tindex gpgme_pinentry_mode_t
@since{1.4.0}
```

The `gpgme_pinentry_mode_t` type specifies the set of possible pinentry modes that are supported by `GPGME` if GnuPG ≥ 2.1 is used. The following modes are supported:

```
@table @code
@item GPGME_PINENTRY_MODE_DEFAULT
@since{1.4.0}
```

Use the default of the agent, which is ask.

```
@item GPGME_PINENTRY_MODE_ASK
@since{1.4.0}
```

Force the use of the Pinentry.

```
@item GPGME_PINENTRY_MODE_CANCEL
@since{1.4.0}
```

Emulate use of Pinentry's cancel button.

```
@item GPGME_PINENTRY_MODE_ERROR
@since{1.4.0}
```

Return a Pinentry error `No Pinentry`.

```
@item GPGME_PINENTRY_MODE_LOOPBACK
@since{1.4.0}
```

Redirect Pinentry queries to the caller. This enables

the use of `gpgme_set_passphrase_cb` because pinentry queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires `allow-loopback-pinentry` to be enabled in the `gpg-agent.conf` or an agent started with that option.

`@end table`
`@end deftp`

`@node Included Certificates`
`@subsection Included Certificates`
`@cindex certificates, included`

`@deftypefun void gpgme_set_include_certs (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{nr_of_certs}})`
The function `gpgme_set_include_certs` specifies how many certificates should be included in an S/MIME signed message. By default, only the sender's certificate is included. The possible values of `@var{nr_of_certs}` are:

`@table @code`
`@item GPGME_INCLUDE_CERTS_DEFAULT`
`@since{1.0.3}`

Fall back to the default of the crypto backend. This is the default for GPGME.

`@item -2`

Include all certificates except the root certificate.

`@item -1`

Include all certificates.

`@item 0`

Include no certificates.

`@item 1`

Include the sender's certificate only.

`@item n`

Include the first n certificates of the certificates path, starting from the sender's certificate. The number `@code{n}` must be positive.

`@end table`

Values of `@var{nr_of_certs}` smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by all other engines.

`@end deftypefun`

`@deftypefun int gpgme_get_include_certs (@w{gpgme_ctx_t @var{ctx}})`

The function `gpgme_get_include_certs` returns the number of

certificates to include into an S/MIME signed message.

@end deftypefun

@node Key Listing Mode

@subsection Key Listing Mode

@cindex key listing mode

@cindex key listing, mode of

@deftypefun gpgme_error_t gpgme_set_keylist_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_keylist_mode_t @var{mode}})

The function @code{gpgme_set_keylist_mode} changes the default behaviour of the key listing functions. The value in @var{mode} is a bitwise-or combination of one or multiple of the following bit values:

@table @code

@item GPGME_KEYLIST_MODE_LOCAL

The

@code{GPGME_KEYLIST_MODE_LOCAL} symbol specifies that the local keyring should be searched for keys in the keylisting operation. This is the default.

Using only this option results in a @code{--list-keys}.

@item GPGME_KEYLIST_MODE_EXTERN

The @code{GPGME_KEYLIST_MODE_EXTERN} symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with @code{GPGME_KEYLIST_MODE_LOCAL}. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a @code{--search-keys} for

@code{GPGME_PROTOCOL_OpenPGP} and something similar to

@code{--list-external-keys} for @code{GPGME_PROTOCOL_CMS}.

@item GPGME_KEYLIST_MODE_LOCATE

This is a shortcut for the combination of

@code{GPGME_KEYLIST_MODE_LOCAL} and @code{GPGME_KEYLIST_MODE_EXTERN}, which results in a @code{--locate-keys} for @code{GPGME_PROTOCOL_OpenPGP}.

@item

GPGME_KEYLIST_MODE_SIGS

The @code{GPGME_KEYLIST_MODE_SIGS} symbol specifies that the key signatures should be included in the listed keys.

@item GPGME_KEYLIST_MODE_SIG_NOTATIONS

@since{1.1.1}

The `{GPGME_KEYLIST_MODE_SIG_NOTATIONS}` symbol specifies that the signature notations on key signatures should be included in the listed keys. This only works if `{GPGME_KEYLIST_MODE_SIGS}` is also enabled.

@item GPGME_KEYLIST_MODE_WITH_TOFU

@since{1.7.0}

The `{GPGME_KEYLIST_MODE_WITH_TOFU}` symbol specifies that information pertaining to the TOFU trust model should be included in the listed keys.

@item GPGME_KEYLIST_MODE_WITH_KEYGRIP

@since{1.14.0}

The `{GPGME_KEYLIST_MODE_WITH_KEYRIP}` symbol specifies that the keygrip is always included in the listing. The default depends on the version of the backend and the used protocol.

@item GPGME_KEYLIST_MODE_WITH_SECRET

@since{1.5.1}

The `{GPGME_KEYLIST_MODE_WITH_SECRET}` returns information about the presence of a corresponding secret key in a public key listing. A public key listing with this mode is slower than a standard listing but can be used instead of a second run to list the secret keys. This is only supported for GnuPG versions ≥ 2.1 . Note that using this option also makes sure that the keygrip is available in the output.

@item GPGME_KEYLIST_MODE_EPHEMERAL

@since{1.2.0}

The `{GPGME_KEYLIST_MODE_EPHEMERAL}` symbol specifies that keys flagged as ephemeral are included in the listing.

@item GPGME_KEYLIST_MODE_VALIDATE

@since{0.4.5}

The `{GPGME_KEYLIST_MODE_VALIDATE}` symbol specifies that the backend should do key or certificate validation and not just get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

@end table

At least one of `{GPGME_KEYLIST_MODE_LOCAL}` and

`GPGME_KEYLIST_MODE_EXTERN` must be specified. For future binary compatibility, you should get the current mode with `gpgme_get_keylist_mode` and modify it by setting or clearing the appropriate bits, and then using that calculated value in the `gpgme_set_keylisting_mode` operation. This will leave all other bits in the mode value intact (in particular those that are not used in the current version of the library).

The function returns the error code `GPG_ERR_NO_ERROR` if the mode could be set correctly, and `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer or `mode` is not a valid mode.

`@end deftypefun`

`@deftypefun gpgme_keylist_mode_t gpgme_get_keylist_mode (@w{gpgme_ctx_t @var{ctx}})`

The function `gpgme_get_keylist_mode` returns the current key listing mode of the context `ctx`. This value can then be modified and used in a subsequent `gpgme_set_keylisting_mode` operation to only affect the desired bits (and leave all others intact).

The function returns 0 if `ctx` is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

`@end deftypefun`

`@node` Passphrase Callback
`@subsection` Passphrase Callback
`@cindex` callback, passphrase
`@cindex` passphrase callback

`@defpt` {Data type} `{gpgme_error_t (*gpgme_passphrase_cb_t)(void *@var{hook}, const char *@var{uid_hint}, const char *@var{passphrase_info}, @w{int @var{prev_was_bad}}, @w{int @var{fd}})}`
`@tindex` `gpgme_passphrase_cb_t`

The `gpgme_passphrase_cb_t` type is the type of functions usable as passphrase callback function.

The argument `uid_hint` might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), `uid_hint` will be `NULL`.

The argument `passphrase_info`, if not `NULL`, will give further information about the context in which the passphrase is required. This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then `@var{prev_was_bad}` is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor `@var{fd}`. The function `@code{gpgme_io_writen}` should be used for the write operation. Note that if the user returns 0 to indicate success, the user must at least write a newline character before returning from the callback.

If an error occurs, return the corresponding `@code{gpgme_error_t}` value. You can use the error code `@code{GPG_ERR_CANCELED}` to abort the operation. Otherwise, return `@code{0}`.

Note: The `passphrase_cb` only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See `@code{gpgme_set_pinentry_mode}` for more details on 2.1.x usage.

`@end deftp`

```
@deftypefun void gpgme_set_passphrase_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t @var{passfunc}}, @w{void *@var{hook_value}})
```

The function `@code{gpgme_set_passphrase_cb}` sets the function that is used

when a passphrase needs to be provided by the user to `@var{passfunc}`. The function `@var{passfunc}` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `@var{hook_value}`. By default, no passphrase callback function is set.

Not all crypto engines require this callback to retrieve the passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not even support an external passphrase callback at all, in this case the error code `@code{GPG_ERR_NOT_SUPPORTED}` is returned.

For GnuPG ≥ 2.1 the pinentry mode has to be set to `@code{GPGME_PINENTRY_MODE_LOOPBACK}` to enable the passphrase callback. See `@code{gpgme_set_pinentry_mode}`.

The user can disable the use of a passphrase callback function by calling `@code{gpgme_set_passphrase_cb}` with `@var{passfunc}` being `@code{NULL}`.

`@end deftypefun`

```
@deftypefun void gpgme_get_passphrase_cb
```

```
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t *@var{passfunc}}, @w{void
**@var{hook_value}})
```

The function `gpgme_get_passphrase_cb` returns the function that is used when a passphrase needs to be provided by the user in `*passfunc`, and the first argument for this function in `*hook_value`. If no passphrase callback is set, or `ctx` is not a valid pointer, `NULL` is returned in both variables.

`passfunc` or `hook_value` can be `NULL`. In this case, the corresponding value will not be returned.

```
@end deftypefun
```

```
@node Progress Meter Callback
```

```
@subsection Progress Meter Callback
```

```
@cindex callback, progress meter
```

```
@cindex progress meter callback
```

```
@deftp {Data type} {void (*gpgme_progress_cb_t)(void *@var{hook}, const char *@var{what}, int @var{type},
int @var{current}, int @var{total})}
```

```
@tindex gpgme_progress_cb_t
```

The `gpgme_progress_cb_t` type is the type of functions usable as progress callback function.

The arguments are

specific to the crypto engine. More information about the progress information returned from the GnuPG engine can be found in the GnuPG source code in the file `doc/DETAILS` in the section `PROGRESS`.

```
@end deftp
```

```
@deftypefun void gpgme_set_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t
@var{progfunc}}, @w{void *@var{hook_value}})
```

The function `gpgme_set_progress_cb` sets the function that is used when progress information about a cryptographic operation is available. The function `progfunc` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `hook_value`. By default, no progress callback function is set.

Setting a callback function allows an interactive program to display progress information about a long operation to the user.

The user can disable the use of a progress callback function by calling `gpgme_set_progress_cb` with `progfunc` being `NULL`.

```
@end deftypefun
```

```
@deftypefun void
gpgme_get_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t *@var{progfunc}},
@w{void **@var{hook_value}})
```

The function `gpgme_get_progress_cb` returns the function that is used to inform the user about the progress made in `*progfunc`, and the first argument for this function in `*hook_value`. If no progress callback is set, or `ctx` is not a valid pointer, `NULL` is returned in both variables.

`*progfunc` or `*hook_value` can be `NULL`. In this case, the corresponding value will not be returned.

```
@end deftypefun
```

```
@node Status Message Callback
@subsection Status Message Callback
@cindex callback, status message
@cindex status message callback
```

```
@deftp {Data type} {gpgme_error_t (*gpgme_status_cb_t)(void *@var{hook}, const char *@var{keyword}, const
char *@var{args})}
```

```
@tindex gpgme_status_cb_t
```

The `gpgme_status_cb_t` type is the type of function usable as a status message callback function.

The argument `keyword` is the name of the status message while the `args` argument contains any arguments for the status message.

If an error occurs, return the corresponding `gpgme_error_t` value. Otherwise, return `0`.

```
@end deftp
```

```
@deftypefun void gpgme_set_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t
@var{statusfunc}}, @w{void **@var{hook_value}})
@since{1.6.0}
```

The function `gpgme_set_status_cb` sets the function that is used when a status message is received from gpg to `statusfunc`. The function `statusfunc` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `*hook_value`. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling `gpgme_set_status_cb` with `statusfunc` being `NULL`.

```
@end deftypefun
```

```
@deftypefun void gpgme_get_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t
```

```
*@var{statusfunc}}, @w{void **@var{hook_value}})
@since{1.6.0}
```

The

function `@code{gpgme_get_status_cb}` returns the function that is used to process status messages from gpg in `@var{*statusfunc}`, and the first argument for this function in `@var{*hook_value}`. If no status message callback is set, or `@var{ctx}` is not a valid pointer, `@code{NULL}` is returned in both variables.

```
@end deftypefun
```

```
@node Context Flags
```

```
@subsection Context Flags
```

```
@cindex flags, of a context
```

```
@deftypefun {gpgme_error_t} gpgme_set_ctx_flag @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{const char *@var{name}}, @
   @w{const char *@var{value}})
```

```
@since{1.7.0}
```

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for `@var{name}`:

```
@table @code
```

```
@item "redraw"
```

This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a Pinentry.

A Curses based application may use this information to redraw the screen; for example:

```
@example
```

```
err = gpgme_op_keylist_start (ctx, "foo@@example.org", 0);
while (!err)
  @{
    err = gpgme_op_keylist_next (ctx, &key);
    if (err)
      break;
    show_key (key);
    gpgme_key_release (key);
  @}
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
  redraw_screen ();
gpgme_release (ctx);
```

@end example

@item "full-status"

Using a `@var{value}` of "1" the status callback set by `gpgme_set_status_cb` returns all status lines with the exception of PROGRESS lines. With the default of "0" the status callback is only called in certain situations.

@item "raw-description"

Setting the `@var{value}` to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the `@code{description}` field of the `@code{gpgme_tofu_info_t}` object.

@item "export-session-key"

Using a `@var{value}` of "1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for `@var{value}`, session keys are not exported.

@item "override-session-key"

The string given in `@var{value}` is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via `ps(1)`.

@item "auto-key-retrieve"

Setting the `@var{value}` to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can see which keys you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

@item "auto-key-import"

Setting the `@var{value}` to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

@item "include-key-block"

Setting the `@var{value}` to "1" forces the GPG backend to embed the signing key as well as an encryption subkey into the the signature.

@item "request-origin"

The string given in @var{value} is passed to the GnuPG engines to request restrictions based on the origin of the request. Valid values are documented in the GnuPG manual and the gpg man page under the option @option{--request-origin}. Requires at least GnuPG 2.2.6 to have an effect.

@item "no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

@item "ignore-mdc-error"

This flag passes the option @option{--ignore-mdc-error} to gpg. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag @code{legacy_cipher_nomdc} set. For failsafe reasons this flag is reset after each operation.

@item "auto-key-locate"

The string given in @var{value} is passed to gpg. This can be used to change the behavior of a @code{GPGME_KEYLIST_MODE_LOCATE} keylisting. Valid values are documented in the GnuPG manual and the gpg man page under the option @option{--auto-key-locate}. Requires at least GnuPG 2.1.18.

Note: Keys retrieved through @code{auto-key-locate} are automatically imported in the keyring.

@item trust-model

@since{1.11.2}

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default. If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail. Example: "tofu+pgp".

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future operations. A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

@item "extended-edit"

This flag passes the option `@option{--expert}` to `gpg key edit`. This can be used to get additional callbacks in `@code{gpgme_op_edit}`.

@end table

This function returns `@code{0}` on success.

@end dectyfefun

```
@dectyfefun {const char *} gpgme_get_ctx_flag @
    (@w{gpgme_ctx_t @var{ctx}}, @
    @w{const char *@var{name}})
```

@since{1.8.0}

The value of flags settable by `@code{gpgme_set_ctx_flag}` can be retrieved by this function. If `@var{name}` is unknown the function returns `@code{NULL}`. For boolean flags an empty string is returned for False and the string "1" is returned for True; either `atoi(3)` or a test for an empty string can be used to get the boolean value.

@end dectyfefun

@node Locale

@subsection Locale

@cindex locale, default

@cindex locale, of a context

A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

```
@dectyfefun gpgme_error_t gpgme_set_locale (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{category}},
    @w{const char *@var{value}})
@since{0.4.3}
```

The function `@code{gpgme_set_locale}` sets the locale of the context `@var{ctx}`, or the default locale if `@var{ctx}` is a null pointer.

The locale settings that should be changed are specified by `@var{category}`. Supported categories are `@code{LC_CTYPE}`, `@code{LC_MESSAGES}`, and `@code{LC_ALL}`, which is a wildcard you can use

if you want to change
all the categories at once.

The value to be used for the locale setting is `@var{value}`, which will be copied to `@acronym{GPGME}`'s internal data structures. `@var{value}` can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default value at startup.

The function returns an error if not enough memory is available.
`@end dectypedefun`

`@node Additional Logs`
`@subsection Additional Logs`
`@cindex auditlog, of the engine`
`@cindex auditlog`

Additional logs can be associated with a context. These logs are engine specific and can be obtained with `@code{gpgme_op_getauditlog}`.

```
@deftypefun gpgme_error_t gpgme_op_getauditlog @
    (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}},
    @
    @w{unsigned int @var{flags}})
@since{1.1.1}
```

The function `@code{gpgme_op_getauditlog}` is used to obtain additional logs as specified by `@var{flags}` into the `@var{output}` data. If

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if a log could be queried from the engine, and `@code{GPG_ERR_NOT_IMPLEMENTED}` if the log specified in `@var{flags}` is not available for this engine. If no log is available `@code{GPG_ERR_NO_DATA}` is returned.

The value in `@var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

```
@table @code
@item GPGME_AUDITLOG_DIAG
@since{1.11.2}
```

Obtain diagnostic output which would be written to `@code{stderr}` in

interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and `{GPG_ERR_NO_DATA}` will be returned.

Implemented for: `{GPGME_PROTOCOL_OpenPGP}`

`@item`
`GPGME_AUDITLOG_DEFAULT`
`@since{1.11.2}`

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the `{GETAUDITLOG}` command. For `{GPGME_PROTOCOL_CMS}` this provides additional information about the X509 certificate chain.

Implemented for: `{GPGME_PROTOCOL_CMS}`

`@item GPGME_AUDITLOG_HTML`
`@since{1.1.1}`

Same as `{GPGME_AUDITLOG_DEFAULT}` but in HTML.

Implemented for: `{GPGME_PROTOCOL_CMS}`
`@end table`
`@end deftypefun`

`@deftypefun gpgme_error_t gpgme_op_getauditlog_start @`
`(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}}, @`
`@w{unsigned int @var{flags}})`
`@since{1.1.1}`

This is the asynchronous variant of `{gpgme_op_getauditlog}`.
`@end deftypefun`

`@node Key Management`
`@section Key Management`
`@cindex key management`

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

`@menu`

- * Key objects:: Description of the key structures.
- * Listing Keys:: Browsing the list of available keys.
- * Information About Keys:: Requesting detailed information about keys.
- * Manipulating Keys:: Operations on keys.
- * Generating Keys:: Creating new key pairs.
- * Signing Keys:: Adding key signatures to public keys.
- * Exporting Keys:: Retrieving key data from the key ring.
- * Importing Keys:: Adding keys to the key ring.
- * Deleting Keys:: Removing keys from the key ring.
- * Changing Passphrases:: Change the passphrase of a key.
- * Changing TOFU Data:: Changing data pertaining to TOFU.
- * Advanced Key Editing:: Advanced key edit operation.

@end menu

@node Key objects

@subsection Key objects

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

@deftp {Data type} gpgme_key_t

The @code{gpgme_key_t} type is a pointer to a key object. It has the following members:

@table @code

@item gpgme_keylist_mode_t keylist_mode

@since{0.9.0}

The keylist mode that was active when the key was retrieved.

@item unsigned int revoked : 1

This is true if the key is revoked.

@item unsigned int expired : 1

This is true if the key is expired.

@item unsigned int disabled : 1

This is true if the key is disabled.

@item unsigned int invalid : 1

This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

@item unsigned int can_encrypt : 1

This is true if the key (ie one of its subkeys) can be used for encryption.

@item unsigned int can_sign

: 1

This is true if the key (ie one of its subkeys) can be used to create data signatures.

@item unsigned int can_certify : 1

This is true if the key (ie one of its subkeys) can be used to create key certificates.

@item unsigned int can_authenticate : 1

@since{0.4.5}

This is true if the key (ie one of its subkeys) can be used for authentication.

@item unsigned int is_qualified : 1

@since{1.1.0}

This is true if the key can be used for qualified signatures according to local government regulations.

@item unsigned int secret : 1

This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if @code{GPGME_KEYLIST_MODE_WITH_SECRET} is active.

@item unsigned int origin : 5

@since{1.8.0}

Reserved for the origin of this key.

@item gpgme_protocol_t protocol

This is the protocol supported by this key.

@item char *issuer_serial

If

@code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the issuer serial.

@item char *issuer_name

If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the issuer name.

@item char *chain_id

If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the chain ID, which can be used to build the certificate chain.

@item gpgme_validity_t owner_trust

If @code{protocol} is @code{GPGME_PROTOCOL_OpenPGP}, then this is the owner trust.

@item gpgme_subkey_t subkeys

This is a linked list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

@item gpgme_user_id_t uids

This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

@item char *fpr

@since{1.7.0}

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

@item unsigned long last_update

@since{1.8.0}

Reserved for the time of the last update of this key.

@end table

@end deftp

@deftp {Data type} gpgme_subkey_t

@since{1.5.0}

The @code{gpgme_subkey_t} type is a pointer to a subkey structure. Subkeys are one component of a @code{gpgme_key_t} object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One @code{gpgme_key_t} can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

@table @code

@item gpgme_subkey_t next

This is a pointer to the next subkey structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1

This is true if the subkey is revoked.

@item unsigned int expired : 1

This is true if the subkey is expired.

@item unsigned int disabled : 1

This is true if the subkey is disabled.

@item unsigned int invalid : 1

This is true if the subkey is invalid.

@item unsigned int can_encrypt : 1

This is true if the subkey can be used for encryption.

@item unsigned int can_sign : 1

This is true if the subkey can be used to create data signatures.

@item unsigned int can_certify : 1

This is true if the subkey can be used to create key certificates.

@item unsigned int can_authenticate : 1

@since{0.4.5}

This is true if the subkey can be used for authentication.

@item unsigned int is_qualified : 1

@since{1.1.0}

This is true if the subkey can be used for qualified signatures according to local government regulations.

@item unsigned int is_de_vs : 1

@since{1.8.0}

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a Brainpool curve.

@item unsigned int secret : 1

This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation

is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if `{GPGME_KEYLIST_MODE_WITH_SECRET}` is active.

`@item gpgme_pubkey_algo_t pubkey_algo`

This is the public key algorithm supported by this subkey.

`@item unsigned int length`

This is the length of the subkey (in bits).

`@item char *keyid`

This is the key ID of the subkey in hexadecimal digits.

`@item char *fpr`

This is the fingerprint of the subkey in hexadecimal digits, if available.

`@item char *keygrip`

`@since{1.7.0}`

The keygrip of the subkey in hex digit form or `{NULL}` if not available.

`@item long int timestamp`

This is the creation timestamp of the subkey. This is -1 if the timestamp is invalid, and 0 if it is not available.

`@item long int expires`

This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

`@item unsigned int is_cardkey : 1`

`@since{1.2.0}`

True if

the secret key is stored on a smart card.

`@item char *card_number`

`@since{1.2.0}`

The serial number of a smart card holding this key or `{NULL}`.

`@item char *curve`

For ECC algorithms the name of the curve.

`@end table`

`@end deftp`

@deftp {Data type} gpgme_user_id_t

A user ID is a component of a @code{gpgme_key_t} object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

@table @code

@item gpgme_user_id_t next

This is a pointer to the next user ID structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1

This is true if the user ID is revoked.

@item unsigned int invalid : 1

This is true if the user ID is invalid.

@item gpgme_validity_t validity

This specifies the validity of the user ID.

@item char *uid

This is the user ID string.

@item char *name

This is the name component of @code{uid}, if available.

@item char *comment

This is the comment component of @code{uid}, if available.

@item char *email

This is the email component of @code{uid}, if available.

@item char *address;

The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the @code{email} part of this structure but might be slightly different. If no mail address is available @code{NULL} is stored.

@item gpgme_tofu_info_t tofu

@since{1.7.0}

If not @code{NULL} information from the TOFU database pertaining to this user id.

@item gpgme_key_sig_t signatures

This is a linked list with the signatures on this user ID.

```
@item unsigned int origin : 5
@since{1.8.0}
```

Reserved for the origin of this user ID.

```
@item unsigned long last_update
@since{1.8.0}
```

Reserved for the time of the last update of this user ID.

```
@item char *uidhash;
```

A string used by gpg to identify a user ID. This string can be used at certain prompts of `@code{gpgme_op_edit}` to select a user ID. Users must be prepared to see a `@code{NULL}` value here. The format of the value is not specified and may depend on the GPGME or GnuPG version.

```
@end table
@end deftp
```

```
@deftp {Data type} gpgme_tofu_info_t
```

```
@since{1.7.0}
```

The `@code{gpgme_tofu_info_t}` type is a pointer to a tofu info structure. Tofu info structures are one component of a `@code{gpgme_user_id_t}` object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

```
@table @code
@item gpgme_key_sig_t next
```

This is a pointer to the next tofu info structure in the linked list, or `@code{NULL}` if this is the last element.

```
@item unsigned int validity : 3
```

This is the TOFU validity. It can have the following values:

```
@table @code
@item 0
```

The value `@code{0}` indicates a conflict.

```
@item 1
```

The value `@code{1}` indicates a key without history.

@item 2

The value @code{2} indicates a key with too little history.

@item 3

The value @code{3} indicates a key with enough history for basic trust.

@item 4

The value @code{4} indicates a key
with a lot of history.

@end table

@item unsigned int policy : 4

This is the TOFU policy, see @code{gpgme_tofu_policy_t}.

@item unsigned short signcount

This is the number of signatures seen for this binding (or
@code{USHRT_MAX} if there are more than that).

@item unsigned short encrcount

This is the number of encryptions done with this binding (or
@code{USHRT_MAX} if there are more than that).

@item unsigned long signfirst

Number of seconds since Epoch when the first signature was seen with
this binding.

@item unsigned long signlast

Number of seconds since Epoch when the last signature was seen with
this binding.

@item unsigned long encrfirst

Number of seconds since Epoch when the first encryption was done with
this binding.

@item unsigned long enclast

Number of seconds since Epoch when the last encryption was done with
this binding.

@item char *description

A human-readable string summarizing the TOFU data (or NULL).

@end table

@end deftp

@deftp {Data type} gpgme_key_sig_t

The

`gpgme_key_sig_t` type is a pointer to a key signature structure. Key signatures are one component of a `gpgme_key_t` object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIGS` mode enabled, because it can be expensive to retrieve all signatures of a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIG_NOTATIONS` mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

`@table @code`

`@item gpgme_key_sig_t next`

This is a pointer to the next key signature structure in the linked list, or `NULL` if this is the last element.

`@item unsigned int revoked : 1`

This is true if the key signature is a revocation signature.

`@item unsigned int expired : 1`

This is true if the key signature is expired.

`@item unsigned int invalid : 1`

This is true if the key signature is invalid.

`@item unsigned int exportable : 1`

This is true if the key signature is exportable.

`@item gpgme_pubkey_algo_t pubkey_algo`

This is the public key algorithm used to create the signature.

`@item char *keyid`

This is the key ID of the key (in hexadecimal digits) used to create the signature.

`@item long int timestamp`

This is the creation timestamp of the key signature. This is -1 if the timestamp is invalid, and 0 if it is not available.

`@item long int expires`

This is the expiration timestamp of the key signature, or 0 if the key signature does not expire.

@item gpgme_error_t status

This is the status of the signature and has the same meaning as the member of the same name in a @code{gpgme_signature_t} object.

@item unsigned int sig_class

This specifies the signature class of the key signature. The meaning is specific to the crypto engine.

@item char *uid

This is the main user ID of the key used to create the signature.

@item char *name

This is the name component of @code{uid}, if available.

@item char *comment

This is the comment component of @code{uid}, if available.

@item char *email

This is the email component of @code{uid}, if available.

@item gpgme_sig_notation_t notations

This is a linked list with the notation data and policy URLs.

@end table

@end deftp

@node Listing Keys

@subsection Listing Keys

@cindex listing keys

@cindex key listing

@cindex key listing, start

@cindex key ring, list

@cindex key ring, search

@deftypefun gpgme_error_t gpgme_op_keylist_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}}, @w{int @var{secret_only}})

The function @code{gpgme_op_keylist_start} initiates a key listing operation inside the context @var{ctx}. It sets everything up so that subsequent invocations of @code{gpgme_op_keylist_next} return the keys in the list.

If @var{pattern} is @code{NULL}, all available keys are returned.

Otherwise,

`@var{pattern}` contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `@var{secret_only}` is not `@code{0}`, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and `@code{gpgme_op_keylist_next}` returns `@code{GPG_ERR_EOF}`), or `@code{gpgme_op_keylist_end}` is called to finish the operation.

The function returns the error code `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_keylist_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}[]}, @w{int @var{secret_only}}, @w{int @var{reserved}})
```

The function `@code{gpgme_op_keylist_ext_start}` initiates an extended key listing operation inside the context `@var{ctx}`. It sets everything up so that subsequent invocations of `@code{gpgme_op_keylist_next}` return the keys in the list.

If `@var{pattern}` or `@var{*pattern}` is `@code{NULL}`, all available keys are returned. Otherwise, `@var{pattern}` is a `@code{NULL}` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `@var{secret_only}` is not `@code{0}`, the list is restricted to secret keys only.

The value of `@var{reserved}` must be `@code{0}`.

The context will be busy until either all keys are received (and `@code{gpgme_op_keylist_next}` returns `@code{GPG_ERR_EOF}`), or

`gpgme_op_keylist_end` is called to finish the operation.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

`gpgme_op_keylist_end`

```
@deftypefun gpgme_error_t gpgme_op_keylist_from_data_start @
  (@w{gpgme_ctx_t} ctx, @
   @w{gpgme_data_t} data, @
   @w{int} reserved))
```

Since 1.8.0

The function `gpgme_op_keylist_from_data_start` initiates a key listing operation inside the context `ctx`. In contrast to the other key listing operation the keys are read from the supplied `data` and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys from `data`.

The value of `reserved` must be `0`.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation. While the context is busy `data` may not be released.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

`gpgme_op_keylist_next`

```
@deftypefun gpgme_error_t gpgme_op_keylist_next (@w{gpgme_ctx_t} ctx, @w{gpgme_key_t}
  *key)
```

The function `gpgme_op_keylist_next` returns the next key in the list created by a previous `gpgme_op_keylist_start` operation in the context `ctx`. The key will have one reference for the user.

[Manipulating Keys](#).

This is the only way to get at `gpgme_key_t` objects in

@acronym{GPGME}.

If the last key in the list has already been returned,

@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if

@var{ctx} or @var{r_key} is not a valid pointer, and

@code{GPG_ERR_ENOMEM} if there is not enough memory for the operation.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_keylist_end (@w{gpgme_ctx_t @var{ctx}})
```

The function @code{gpgme_op_keylist_end} ends a pending key list operation in the context @var{ctx}.

After the operation completed successfully, the result of the key listing operation can be retrieved with

@code{gpgme_op_keylist_result}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if

@var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if at some time during the operation there was not enough memory available.

@end deftypefun

The following

example illustrates how all keys containing a certain string (@code{g10code}) can be listed with their key ID and the name and email address of the main user ID:

@example

```
gpgme_ctx_t ctx;
```

```
gpgme_key_t key;
```

```
gpgme_error_t err = gpgme_new (&ctx);
```

```
if (!err)
```

```
@{
```

```
err = gpgme_op_keylist_start (ctx, "g10code", 0);
```

```
while (!err)
```

```
@{
```

```
err = gpgme_op_keylist_next (ctx, &key);
```

```
if (err)
```

```
break;
```

```
printf ("%s:", key->subkeys->keyid);
```

```
if (key->uids && key->uids->name)
```

```
printf (" %s", key->uids->name);
```

```
if (key->uids && key->uids->email)
```

```
printf (" <%s>", key->uids->email);
```

```
putchar ('\n');
```

```

    gpgme_key_release (key);
    @}
    gpgme_release (ctx);
    @}
if (gpg_err_code (err) != GPG_ERR_EOF)
    @{
    fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
    exit (1);
    @}
@end example

```

`@def tp {Data type} {gpgme_keylist_result_t}`
This is a pointer to a structure used to store the result of a
`@code{gpgme_op_keylist_*}`
operation. After successfully ending a key
listing operation, you can retrieve the pointer to the result with
`@code{gpgme_op_keylist_result}`. The structure contains the following
member:

```

@table @code
@item unsigned int truncated : 1
This is true if the crypto backend had to truncate the result, and
less than the desired keys could be listed.
@end table
@end deftp

```

```

@def typefun gpgme_keylist_result_t gpgme_op_keylist_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_keylist_result} returns a  

@code{gpgme_keylist_result_t} pointer to a structure holding the  

result of a @code{gpgme_op_keylist_*} operation. The pointer is only  

valid if the last operation on the context was a key listing  

operation, and if this operation finished successfully. The returned  

pointer is only valid until the next operation is started on the  

context.
@end def typefun

```

In a simple program, for which a blocking operation is acceptable, the
following function can be used to retrieve
a single key.

```

@def typefun gpgme_error_t gpgme_get_key (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{fpr}},
@w{gpgme_key_t *@var{r_key}}, @w{int @var{secret}})
The function @code{gpgme_get_key} gets the key with the fingerprint  

(or key ID) @var{fpr} from the crypto backend and return it in  

@var{r_key}. If @var{secret} is true, get the secret key. The  

currently active keylist mode is used to retrieve the key. The key  

will have one reference for the user.

```

If the key is not found in the keyring, `gpgme_get_key` returns the error code `GPG_ERR_EOF` and `*r_key` will be set to `NULL`.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` or `r_key` is not a valid pointer or `fpr` is not a fingerprint or key ID, `GPG_ERR_AMBIGUOUS_NAME` if the key ID was not a unique specifier for a key, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

`@end deftypefun`

`@node` Information About Keys

`@subsection`

Information About Keys

`@cindex` key, information about

`@cindex` key, attributes

`@cindex` attributes, of a key

Please see the beginning of this section for more information about

`gpgme_key_t` objects.

`@deftp` {Data type} `gpgme_validity_t`

The `gpgme_validity_t` type is used to specify the validity of a user ID in a key. The following validities are defined:

`@table @code`

`@item` `GPGME_VALIDITY_UNKNOWN`

The user ID is of unknown validity. The string representation of this validity is `?`.

`@item` `GPGME_VALIDITY_UNDEFINED`

The validity of the user ID is undefined. The string representation of this validity is `q`.

`@item` `GPGME_VALIDITY_NEVER`

The user ID is never valid. The string representation of this validity is `n`.

`@item` `GPGME_VALIDITY_MARGINAL`

The user ID is marginally valid. The string representation of this validity is `m`.

`@item` `GPGME_VALIDITY_FULL`

The user ID is fully valid. The string representation of this validity is `f`.

`@item` `GPGME_VALIDITY_ULTIMATE`

The user ID is ultimately valid. The string representation of this validity is ``u".

@end table

@end deftp

@node Manipulating Keys

@subsection Manipulating Keys

@cindex key, manipulation

@deftypefun void gpgme_key_ref (@w{gpgme_key_t @var{key}})

The function @code{gpgme_key_ref} acquires an additional reference for the key @var{key}.

@end deftypefun

@deftypefun void gpgme_key_unref (@w{gpgme_key_t @var{key}})

The function @code{gpgme_key_unref} releases a reference for the key @var{key}. If this was the last reference, the key will be destroyed and all resources associated to it will be released.

@end deftypefun

@c

@c gpgme_op_setexpire

@c

@deftypefun gpgme_error_t gpgme_op_setexpire @

 (@w{gpgme_ctx_t @var{ctx}}, @

 @w{gpgme_key_t @var{key}}, @

 @w{unsigned long @var{expires}}, @

 @w{const char *@var{subfprs}}, @

 @w{unsigned int @var{reserved}});

@since{1.14.1}

The function @code{gpgme_op_setexpire} sets the expiration time of the key @var{key} or of the specified subkeys. This function requires at least version 2.1.22 of GnuPG.

@var{key} specifies the key to operate on.

@var{expires} specifies the expiration time in seconds from now. To be similar to other usages where expiration times are provided in unsigned long this is similar to the key creation date and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`@var{subfprs}` selects the subkey(s) for which the expiration time should be set. If `@var{subfprs}` is set to `NULL`, then the expiration time of the primary key is set. If `@var{subfprs}` is an asterisk (`*`), then the expiration times of all non-revoked and not yet expired subkeys are set.

To select more than one subkey put all subkey fingerprints into one string separated by linefeeds characters (`\n`).

`@var{reserved}` is reserved for later use and must be `0`.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_setexpire_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{unsigned long @var{expires}}, @
   @w{const char *@var{subfprs}}, @
   @w{unsigned int @var{flags}});
```

`@since{1.14.1}`

The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. [@xref{Waiting For Completion}](#).

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_revuid_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{const char *@var{userid}}, @
   @w{unsigned int @var{flags}});
```

`@since{1.14.1}`

The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire`

operation; see there for details. It must be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

`@end deftypefun`

`@node Generating Keys`

`@subsection Generating Keys`

`@cindex key, creation`

`@cindex key ring, add`

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the `gpgme_op_genkey` function can be used. Existing code which wants to update to the new functions or new code which shall supports older GnuPG versions may try the new functions first and provide a fallback to the old function if the error code `GPG_ERR_NOT_SUPPORTED` is received.

`@c`

`@c gpgme_op_createkey`

`@c`

`@deftypefun gpgme_error_t gpgme_op_createkey @`

`(@w{gpgme_ctx_t @var{ctx}}, @`

`@w{const char *@var{userid}}, @`

`@w{const char *@var{algo}}, @`

`@w{unsigned long @var{reserved}}, @`

`@w{unsigned long @var{expires}}, @`

`@w{gpgme_key_t @var{extrakey}},`

`@`

`@w{unsigned int @var{flags}});`

`@since{1.7.0}`

The function `gpgme_op_createkey` generates a new key for the protocol active in the context `@var{ctx}`. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

`@var{userid}` is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`@var{algo}` specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see

the GnuPG manual. If `@var{algo}` is `@code{NULL}` or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine;

however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via `@var{flags}`, triggers the creation of a primary key plus a secondary key (subkey).

`@var{reserved}` must be set to zero.

`@var{expires}` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag `@code{GPGME_CREATE_NOEXPIRE}` to create keys that do not expire. Note that this parameter takes an unsigned long value and not a `@code{time_t}` to avoid problems on systems which use a signed 32 bit `@code{time_t}`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`@var{extrakey}` is currently not used and must be set to `@code{NULL}`. A future version of GPGME may use this parameter to create X.509 keys.

`@var{flags}` can be set to the bit-wise OR of the following flags:

```
@table @code
@item GPGME_CREATE_SIGN
@itemx GPGME_CREATE_ENCR
@itemx GPGME_CREATE_CERT
@itemx GPGME_CREATE_AUTH
@since{1.7.0}
```

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: "signing", "encryption", "certification", or "authentication". The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

```
@item GPGME_CREATE_NOPASSWD
@since{1.7.0}
```

Request generation of the key without password protection.

@item GPGME_CREATE_SELFSIGNED

@since{1.7.0}

For an X.509 key do not create a CSR but a self-signed certificate.
This has not yet been implemented.

@item GPGME_CREATE_NOSTORE

@since{1.7.0}

Do not store the created key in the local key database.
This has not yet been implemented.

@item GPGME_CREATE_WANTPUB

@itemx GPGME_CREATE_WANTSEC

@since{1.7.0}

Return

the public or secret key as part of the result structure.
This has not yet been implemented.

@item GPGME_CREATE_FORCE

@since{1.7.0}

The engine does not allow the creation of a key with a user ID
already existing in the local key database. This flag can be used to
override this check.

@item GPGME_CREATE_NOEXPIRE

@since{1.9.0}

Request generation of keys that do not expire.

@end table

After the operation completed successfully, information about the
created key can be retrieved with @code{gpgme_op_genkey_result}.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deffun

@deffun gpgme_error_t gpgme_op_createkey_start @

(@w{gpgme_ctx_t @var{ctx}}, @

@w{const char *@var{userid}}, @


```
@w{const char *@var{algo}}, @  
@w{unsigned long @var{reserved}}, @  
@w{unsigned long @var{expires}}, @  
@w{gpgme_key_t @var{extrakey}}, @  
@w{unsigned int  
@var{flags}});
```

```
@since{1.7.0}
```

The function `gpgme_op_createkey_start` initiates a `gpgme_op_createkey` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

```
@end deftypefun
```

```
@c
```

```
@c gpgme_op_createsubkey
```

```
@c
```

```
@deftypefun gpgme_error_t gpgme_op_createsubkey @  
  (@w{gpgme_ctx_t @var{ctx}}, @  
   @w{gpgme_key_t @var{key}}, @  
   @w{const char *@var{algo}}, @  
   @w{unsigned long @var{reserved}}, @  
   @w{unsigned long @var{expires}}, @  
   @w{unsigned int @var{flags}});
```

```
@since{1.7.0}
```

The function `gpgme_op_createsubkey` creates and adds a new subkey to the primary OpenPGP key given by `KEY`. The only allowed protocol in `ctx` is `GPGME_PROTOCOL_OPENPGP`. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.

`key` specifies the key to operate on.

`algo` specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If `algo` is `NULL` or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

@var{reserved} must be set to zero.

@var{expires} specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag @code{GPGME_CREATE_NOEXPIRE} to create keys that do not expire. Note that this parameter takes an unsigned long value and not a @code{time_t} to avoid problems on systems which use a signed 32 bit @code{time_t}. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

@var{flags} takes the same values as described above for @code{gpgme_op_createkey}.

After the operation completed successfully, information about the created key can be retrieved with @code{gpgme_op_genkey_result}.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end dectypedefun

```
@deftypefun gpgme_error_t gpgme_op_createsubkey_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{const char *@var{algo}}, @
   @w{unsigned long @var{reserved}}, @
   @w{unsigned long @var{expires}}, @
   @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_createsubkey_start} initiates a @code{gpgme_op_createsubkey} operation; see there for details. It must be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

@end dectypedefun

@c

@c gpgme_op_adduid

@c

@deftypefun gpgme_error_t

```

gpgme_op_adduid @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{const char *@var{userid}}, @
   @w{unsigned int @var{flags}});

```

@since{1.7.0}

The function @code{gpgme_op_adduid} adds a new user ID to the OpenPGP key given by @var{KEY}. Adding additional user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context @var{ctx} must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to add to the key. A user ID is commonly the mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

@var{flags} are currently not used and must be set to zero.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```

@deftypefun gpgme_error_t gpgme_op_adduid_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{const char *@var{userid}}, @
   @w{unsigned int @var{flags}});

```

@since{1.7.0}

The function @code{gpgme_op_adduid_start} initiates a @code{gpgme_op_adduid} operation; see there for details. It must be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

```

@c
@c gpgme_op_revuid
@c
@deftypefun gpgme_error_t gpgme_op_revuid @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{const char *@var{userid}}, @
   @w{unsigned int @var{flags}});

```

```
@since{1.7.0}
```

The function `@code{gpgme_op_revuid}` revokes a user ID from the OpenPGP key given by `@var{KEY}`. Revoking user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `@var{ctx}` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`@var{key}` specifies the key to operate on.

`@var{userid}` is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `@code{uid}` field from the user ID object (`@code{gpgme_user_id_t}`) is to be used. This is a required parameter.

`@var{flags}` are currently not used and must be set to zero.

Note that the engine won't allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, `@code{GPG_ERR_NOT_SUPPORTED}` if the engine does not support the command, or a bunch of other error codes.

```
@end deftypefun
```

```

@deftypefun gpgme_error_t gpgme_op_revuid_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{const char *@var{userid}},
  @
   @w{unsigned int @var{flags}});

```

```
@since{1.7.0}
```

The function `@code{gpgme_op_revuid_start}` initiates a `@code{gpgme_op_revuid}` operation; see there for details. It must

be completed by calling `gpgme_wait` on the context.
`Waiting For Completion`.

`@end deftypefun`

`@c`

`@c gpgme_op_set_uid_flag`

`@c`

```
@deftypefun gpgme_error_t gpgme_op_set_ui_flag @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{const char * @var{userid}}, @
   @w{cons char * @var{name}}, @
   @w{cons char * @var{value}});
```

`@since{1.8.0}`

The function `gpgme_op_set_uid_flag` is used to set flags on a user ID from the OpenPGP key given by `KEY`. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `ctx` must be set to OpenPGP.

`key` specifies the key to operate on. This parameter is required.

`userid` is the user ID of the key to be manipulated. This user ID must

be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. This is a required parameter.

`name` names the flag which is to be changed. The only currently supported flag is:

`@table @code`

`@item primary`

This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. `value` must be given as NULL. For technical reasons this function bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

`@end table`

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_set_uid_flag_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{const char *@var{userid}}, @
   @w{cons char * @var{name}},
  @
   @w{cons char * @var{value}});
```

@since{1.8.0}

The function @code{gpgme_op_set_uid_flag_start} initiates a @code{gpgme_op_set_uid_flag} operation; see there for details. It must be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

@c

@c gpgme_op_genkey

@c

```
@deftypefun gpgme_error_t gpgme_op_genkey @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{const char *@var{parms}}, @
   @w{gpgme_data_t @var{public}}, @
   @w{gpgme_data_t @var{secret}})
```

The function @code{gpgme_op_genkey} generates a new key pair in the context @var{ctx}. The meaning of @var{public} and @var{secret} depends on the crypto backend.

GPG does not support @var{public} and @var{secret}, they should be @code{NULL}. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with @code{gpgme_op_genkey_result}.

GpgSM requires @var{public} to be a writable data object. GpgSM will generate

a secret key (which will be stored by @command{gpg-agent}, and return a certificate request in @var{public}, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument @var{parms} specifies parameters for the key in a string that looks something like XML. The details about the format of @var{parms} are specific to the crypto engine used by @var{ctx}. The first line of the parameters must be @code{<GnupgKeyParams

format="internal">} and the last line must be
@code{</GnupgKeyParams>}. Every line in between the first and last
lines is treated as a Header: Value pair. In particular, no XML
escaping is necessary if you need to include the characters @code{<},
@code{>}, or @code{&}.

Here is an example for GnuPG as the crypto engine (all parameters of
OpenPGP key generation are documented in the GPG manual):

```
@example
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real:
  Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
@end example
```

Here is an example for GpgSM as the crypto engine (all parameters of
OpenPGP key generation are documented in the GPGSM manual):

```
@example
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@@foo.bar
</GnupgKeyParms>
@end example
```

Strings should be given in UTF-8 encoding. The only format supported
for now is ``internal''. The content of the @code{GnupgKeyParms}
container is passed verbatim to the crypto backend. Control
statements are not allowed.

After the operation completed successfully, the result can be
retrieved with @code{gpgme_op_genkey_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{parms} is not a well-formed string (e.g. does not have the
expected

tag-like headers and footers), @code{GPG_ERR_NOT_SUPPORTED}
if @var{public} or @var{secret} is not valid, and

@code{GPG_ERR_GENERAL} if no key was created by the backend.

@end dectypedefun

```
@dectypedefun gpgme_error_t gpgme_op_genkey_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{parms}}, @w{gpgme_data_t @var{public}}, @w{gpgme_data_t @var{secret}})
```

The function @code{gpgme_op_genkey_start} initiates a
@code{gpgme_op_genkey} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{parms} is not a valid XML string, and
@code{GPG_ERR_NOT_SUPPORTED} if @var{public} or @var{secret} is not
@code{NULL}.

@end dectypedefun

@c

@c gpgme_op_genkey_result

@c

@deftp {Data type} {gpgme_genkey_result_t}

This is a pointer to a structure used to store the result of a
@code{gpgme_op_genkey} operation.

After successfully generating a
key, you can retrieve the pointer to the result with
@code{gpgme_op_genkey_result}. The structure contains the following
members:

@table @code

@item unsigned int primary : 1

This flag is set to 1 if a primary key was created and to 0
if not.

@item unsigned int sub : 1

This flag is set to 1 if a subkey was created and to 0 if not.

@item unsigned int uid : 1

This flag is set to 1 if a user ID was created and to 0 if not.

@item char *fpr

This is the fingerprint of the key that was created. If both a
primary and a subkey were generated, the fingerprint of the primary
key will be returned. If the crypto engine does not provide the
fingerprint, @code{fpr} will be a null pointer.

@item gpgme_data_t pubkey

@since{1.7.0}

This will eventually be used to return the public key. It is currently not used.

@item gpgme_data_t seckey

@since{1.7.0}

This will eventually be used to return the secret key. It is currently not used.

@end table

@end deftp

@deftypefun

gpgme_genkey_result_t gpgme_op_genkey_result (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_genkey_result} returns a @code{gpgme_genkey_result_t} pointer to a structure holding the result of a @code{gpgme_op_genkey} operation. The pointer is only valid if the last operation on the context was a @code{gpgme_op_genkey} or @code{gpgme_op_genkey_start} operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@c

@c SIGNING KEYS

@c

@node Signing Keys

@subsection Signing Keys

@cindex key, signing

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the @code{gpgme_op_interact} function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

@c

@c gpgme_op_keysign

@c

@deftypefun

```

gpgme_error_t gpgme_op_keysign @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{const char *@var{userid}}, @
@w{unsigned long @var{expires}}, @
@w{unsigned int @var{flags}});

```

@since{1.7.0}

The function @code{gpgme_op_keysign} adds a new key signature to the public key @var{KEY}. This function requires at least version 2.1.12 of GnuPG.

@var{CTX} is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, @code{gpgme_signers_add} can be used. @xref{Selecting Signers}.

@var{key} specifies the key to operate on.

@var{userid} selects the user ID or user IDs to be signed. If @var{userid} is set to @code{NULL} all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the @code{uid} field from the user ID object (@code{gpgme_user_id_t}) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (@code{\n}) and set the flag @code{GPGME_KEYSIGN_LFSEP}.

@var{expires} specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag @code{GPGME_KEYSIGN_NOEXPIRE} is used. Note that this parameter takes an unsigned long value and not a @code{time_t} to avoid problems on systems which use a signed 32 bit @code{time_t}. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

@var{flags} can be set to the bit-wise OR of the following flags:

```

@table @code
@item GPGME_KEYSIGN_LOCAL
@since{1.7.0}

```

Instead of creating an exportable

key signature, create a key
signature which is marked as non-exportable.

```
@item GPGME_KEYSIGN_LFSEP  
@since{1.7.0}
```

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that `@var{userid}` may contain several linefeed separated user IDs.

```
@item GPGME_KEYSIGN_NOEXPIRE  
Force the creation of a key signature without an expiration date. This overrides @var{expire} and any local configuration of the engine.
```

```
@end table
```

The function returns zero on success, `@code{GPG_ERR_NOT_SUPPORTED}` if the engine does not support the command, or a bunch of other error codes.

```
@end dectypedefun
```

```
@deftypedefun gpgme_error_t gpgme_op_keysign_start @  
  (@w{gpgme_ctx_t @var{ctx}}, @  
   @w{gpgme_key_t @var{key}}, @  
   @w{const char *@var{userid}}, @  
   @w{unsigned long @var{expires}}, @  
   @w{unsigned int @var{flags}});
```

```
@since{1.7.0}
```

The function `@code{gpgme_op_keysign_start}` initiates a `@code{gpgme_op_keysign}` operation; see there for details. It must be completed by calling `@code{gpgme_wait}` on the context. [@xref{Waiting For Completion}](#).

```
@end dectypedefun
```

```
@c
```

```
@c gpgme_op_revsign
```

```
@c
```

```
@deftypedefun gpgme_error_t gpgme_op_revsign @  
  (@w{gpgme_ctx_t @var{ctx}}, @  
   @w{gpgme_key_t @var{key}}, @  
   @w{gpgme_key_t @var{signing_key}}, @
```

```
@w{const char *@var{userid}}, @  
@w{unsigned int @var{flags}});
```

@since{1.14.1}

The function @code{gpgme_op_revsig} revokes key signatures of the public key @var{key} made with the key @var{signing_key}. This function requires at least version 2.2.24 of GnuPG.

@var{key} specifies the key to operate on.

@var{signing_key} specifies the key whose signatures shall be revoked.

@var{userid} selects the user ID or user IDs whose signatures shall be revoked. If @var{userid} is set to @code{NULL} the signatures on all user IDs are revoked. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the @code{uid} field from the user ID object (@code{gpgme_user_id_t}) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (@code{\n}) and set the flag @code{GPGME_REVSIG_LFSEP}.

@var{flags} can be set to the bit-wise OR of the following flags:

```
@table @code  
@item GPGME_REVSIG_LFSEP  
@since{1.14.1}
```

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that @var{userid} may contain several linefeed separated user IDs.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_revsig_start @  
(@w{gpgme_ctx_t @var{ctx}}, @  
@w{gpgme_key_t @var{key}}, @  
@w{gpgme_key_t @var{signing_key}}, @  
@w{const char *@var{userid}}, @  
@w{unsigned int @var{flags}});
```

@since{1.14.1}

The function @code{gpgme_op_revsig_start} initiates a @code{gpgme_op_revsig} operation; see there for details. It must be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

@end dectypedefun

@c

@c EXPORTING KEYS

@c

@node Exporting Keys

@subsection Exporting Keys

@cindex key, export

@cindex key ring, export from

Exporting keys means the same as running @command{gpg} with the command @option{--export}. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

@table @code

@item GPGME_EXPORT_MODE_EXTERN

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the @var{keydata} argument of the export function is set to @code{NULL}.

@item GPGME_EXPORT_MODE_MINIMAL

@since{1.3.1}

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

@item GPGME_EXPORT_MODE_SSH

@since{1.4.0}

If this bit is set, the latest authentication key of the requested OpenPGP key is exported in the OpenSSH public key format. This accepts just a single key; to force the export of a specific subkey

a fingerprint pattern with an appended exclamation mark may be used.

@item GPGME_EXPORT_MODE_SECRET
@since{1.6.0}

Instead of exporting the public key, the secret key is exported. This may not be combined with @code{GPGME_EXPORT_MODE_EXTERN}. For X.509 the export format is PKCS#8.

@item GPGME_EXPORT_MODE_RAW
@since{1.6.0}

If this flag is used with @code{GPGME_EXPORT_MODE_SECRET} for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

@item GPGME_EXPORT_MODE_PKCS12
@since{1.6.0}

If this flag is used with @code{GPGME_EXPORT_MODE_SECRET} for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

@item GPGME_EXPORT_MODE_NOUID
@since{1.12.0 - experimental}
Do not export user ids. Works only with certain gpg version.

@end table

```
@deftypedefun gpgme_error_t gpgme_op_export (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}},  
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme_op_export} extracts public keys and returns them in the data buffer @var{keydata}. The output format of the key data returned is determined by the @acronym{ASCII} armor attribute set for the context @var{ctx}, or, if that is not set, by the encoding specified for @var{keydata}.

If @var{pattern} is @code{NULL}, all available keys are returned. Otherwise, @var{pattern} contains an engine specific expression that is used to limit the list to all keys matching the pattern.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the

operation

completed successfully, @code{GPG_ERR_INV_VALUE} if @var{keydata} is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_export_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme_op_export_start} initiates a @code{gpgme_op_export} operation. It can be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation could be started successfully, and @code{GPG_ERR_INV_VALUE} if @var{keydata} is not a valid empty data buffer.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_export_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}}[], @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme_op_export} extracts public keys and returns them in the data buffer @var{keydata}. The output format of the key data returned is determined by the @acronym{ASCII} armor attribute set for the context @var{ctx}, or, if that is not set, by the encoding specified for @var{keydata}.

If @var{pattern} or @var{*pattern} is @code{NULL}, all available keys are returned. Otherwise, @var{pattern} is a @code{NULL} terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation completed successfully, @code{GPG_ERR_INV_VALUE} if @var{keydata} is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_export_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}}[], @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t
@var{keydata}})
```

The function @code{gpgme_op_export_ext_start} initiates a @code{gpgme_op_export_ext} operation. It can be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation could be started successfully, and @code{GPG_ERR_INV_VALUE}

if @var{keydata} is not a valid empty data buffer.

@end dectyfefun

```
@dectyfefun gpgme_error_t gpgme_op_export_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t keys[]},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}
```

The function @code{gpgme_op_export_keys} extracts public keys and returns them in the data buffer @var{keydata}. The output format of the key data returned is determined by the @acronym{ASCII} armor attribute set for the context @var{ctx}, or, if that is not set, by the encoding specified for @var{keydata}.

The keys to export are taken from the @code{NULL} terminated array @var{keys}. Only keys of the currently selected protocol of @var{ctx} which do have a fingerprint set are considered for export. Other keys specified by the @var{keys} are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation completed successfully, @code{GPG_ERR_INV_VALUE} if @var{keydata} is not a valid empty data buffer, @code{GPG_ERR_NO_DATA} if no useful keys are in @var{keys} and passes through any errors that are reported by the crypto engine support routines.

@end dectyfefun

```
@dectyfefun gpgme_error_t gpgme_op_export_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{keys}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}
```

The function @code{gpgme_op_export_keys_start} initiates a @code{gpgme_op_export_ext} operation. It can be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation could be started successfully, and @code{GPG_ERR_INV_VALUE} if @var{keydata} is not a valid empty data buffer, @code{GPG_ERR_NO_DATA} if no useful keys are in @var{keys} and passes through any errors that are reported by the crypto engine support routines.

@end dectyfefun

@node Importing Keys

@subsection Importing Keys

@cindex key, import

@cindex key ring, import to

Importing keys means the same as running @command{gpg} with the command @option{--import}.

```
@deftypefun gpgme_error_t gpgme_op_import (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme_op_import} adds the keys in the data buffer

@var{keydata} to the key ring of the crypto engine used by @var{ctx}.

The format of @var{keydata} can be @acronym{ASCII} armored, for example, but the details are specific to the crypto engine.

After the operation completed successfully, the result can be

retrieved with @code{gpgme_op_import_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the import was completed successfully, @code{GPG_ERR_INV_VALUE} if @var{keydata} if @var{ctx} or @var{keydata} is not a valid pointer, and @code{GPG_ERR_NO_DATA} if @var{keydata} is an empty data buffer.
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_import_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme_op_import_start} initiates a

@code{gpgme_op_import} operation. It can be completed by calling

@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the import could be started successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or @var{keydata} is not a valid pointer, and @code{GPG_ERR_NO_DATA} if @var{keydata} is an empty data buffer.
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_import_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t *@var{keys}})
@since{1.2.0}
```

The

function @code{gpgme_op_import_keys} adds the keys described by the @code{NULL} terminated array @var{keys} to the key ring of the crypto engine used by @var{ctx}. It is used to actually import and make keys permanent which have been retrieved from an external source (i.e. using @code{GPGME_KEYLIST_MODE_EXTERN}) earlier. The external keylisting must have been made with the same context configuration (in

particular the same home directory). @footnote{Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.} Note that for OpenPGP this may require another access to the keyserver over the network.

Only keys of the currently selected protocol of @var{ctx} are considered for import. Other keys specified by the @var{keys} are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully, the result can be retrieved with @code{gpgme_op_import_result}.

To move keys from one home directory to another, export and import the keydata using @code{gpgme_op_export} and @code{gpgme_op_import}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the import was completed successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} is not a valid pointer, @code{GPG_ERR_CONFLICT} if the key listing mode does not match, and @code{GPG_ERR_NO_DATA} if no keys are considered for export.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_import_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
*@var{keys}})
@since{1.2.0}
```

The function @code{gpgme_op_import_keys_start} initiates a @code{gpgme_op_import_keys} operation. It can be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the import was completed successfully, @code{GPG_ERR_INV_VALUE} if @var{keydata} if @var{ctx} or @var{keydata} is not a valid pointer, @code{GPG_ERR_CONFLICT} if the key listing mode does not match, and @code{GPG_ERR_NO_DATA} if no keys are considered for export.

@end deftypefun

```
@deftp {Data type} {gpgme_import_status_t}
```

This is a pointer to a structure used to store a part of the result of a @code{gpgme_op_import} operation. For each considered key one status is added that contains information about the result of the import. The structure contains the following members:

```
@table @code
@item gpgme_import_status_t next
```

This is a pointer to the next status structure in the linked list, or `{NULL}` if this is the last element.

@item char *fpr

This is the fingerprint of the key that was considered.

@item gpgme_error_t result

If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is

`{GPG_ERR_NO_ERROR}`.

@item unsigned int status

This is a bit-wise OR of the following flags that give more information about what

part of the key was imported. If the key was already known, this might be 0.

@table @code

@item GPGME_IMPORT_NEW

The key was new.

@item GPGME_IMPORT_UID

The key contained new user IDs.

@item GPGME_IMPORT_SIG

The key contained new signatures.

@item GPGME_IMPORT_SUBKEY

The key contained new sub keys.

@item GPGME_IMPORT_SECRET

The key contained a secret key.

@end table

@end table

@end deftp

@deftp {Data type} {gpgme_import_result_t}

This is a pointer to a structure used to store the result of a

`{gpgme_op_import}` operation. After a successful import operation, you can retrieve the pointer to the result with

`{gpgme_op_import_result}`. The structure contains the following members:

@table @code

@item int considered

The total number of considered keys.

@item int no_user_id

The number of keys without user ID.

@item int imported

The total number of imported keys.

@item int imported_rsa

The number of imported RSA keys.

@item int unchanged

The number of unchanged keys.

@item

int new_user_ids

The number of new user IDs.

@item int new_sub_keys

The number of new sub keys.

@item int new_signatures

The number of new signatures.

@item int new_revocations

The number of new revocations.

@item int secret_read

The total number of secret keys read.

@item int secret_imported

The number of imported secret keys.

@item int secret_unchanged

The number of unchanged secret keys.

@item int not_imported

The number of keys not imported.

@item gpgme_import_status_t imports

A list of gpgme_import_status_t objects which contain more information about the keys for which an import was attempted.

@item int skipped_v3_keys

For security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP 2.x) and ignores them on import. This counter provides the number of such skipped v3 keys.

@end table

@end deftp

```
@deftypefun gpgme_import_result_t gpgme_op_import_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_import_result} returns a
@code{gpgme_import_result_t}
pointer to a structure holding the result
of a @code{gpgme_op_import} operation. The pointer is only valid if
the last operation on the context was a @code{gpgme_op_import} or
@code{gpgme_op_import_start} operation, and if this operation finished
successfully. The returned pointer is only valid until the next
operation is started on the context.
@end deftypefun
```

@node Deleting Keys

@subsection Deleting Keys

@cindex key, delete

@cindex key ring, delete from

```
@deftypefun gpgme_error_t gpgme_op_delete_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}
```

The function @code{gpgme_op_delete_ext} deletes the key @var{key} from the key ring of the crypto engine used by @var{ctx}.

@var{flags} can be set to the bit-wise OR of the following flags:

@table @code

@item GPGME_DELETE_ALLOW_SECRET

@since{1.9.1}

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

@item

GPGME_DELETE_FORCE

@since{1.9.1}

If set, the user is not asked to confirm the deletion.

@end table

The function returns the error code @code{GPG_ERR_NO_ERROR} if the key was deleted successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or @var{key} is not a valid pointer, @code{GPG_ERR_NO_PUBKEY} if @var{key} could not be found in the keyring, @code{GPG_ERR_AMBIGUOUS_NAME} if the key was not specified unambiguously, and @code{GPG_ERR_CONFLICT} if the secret key for @var{key} is available, but @var{allow_secret} is zero.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_delete_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}
```

The function `gpgme_op_delete_ext_start` initiates a `gpgme_op_delete` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `@var{ctx}` or `@var{key}` is not a valid pointer.

```
@end deftypefun
```

The following functions allow only to use one particular flag.

```
@deftypefun gpgme_error_t gpgme_op_delete (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{int @var{allow_secret}})
Similar to gpgme_op_delete_ext, but only the flag GPGME_DELETE_ALLOW_SECRET can be provided.
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_delete_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{int @var{allow_secret}})
Similar to gpgme_op_delete_ext_start, but only the flag GPGME_DELETE_ALLOW_SECRET can be provided.
@end deftypefun
```

```
@node Changing Passphrases
@subsection Changing Passphrases
@cindex passphrase, change
```

```
@deftypefun gpgme_error_t gpgme_op_passwd (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{unsigned int @var{flags}})
```

```
@since{1.3.0}
```

The function `gpgme_op_passwd` changes the passphrase of the private key associated with `@var{key}`. The only allowed value for `@var{flags}` is `0`. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old `gpg` engines (before version 2.0.15) do not support this command and will silently ignore it.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_passwd_start    @
    (@w{gpgme_ctx_t @var{ctx}},    @
    @w{const gpgme_key_t @var{key}}, @
    @w{unsigned int @var{flags}})
```

```
@since{1.3.0}
```

The function `gpgme_op_passwd_start` initiates a `gpgme_op_passwd` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns `0` if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

```
@end deftypefun
```

```
@c
```

```
@c CHANGING TOFU DATA
```

```
@c
```

```
@node Changing TOFU Data
```

```
@subsection Changing TOFU Data
```

```
@cindex validity, TOFU
```

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

```
@defstp {Data type} {enum gpgme_tofu_policy_t}
```

```
@since{1.7.0}
```

```
@tindex gpgme_tofu_policy_t
```

The `gpgme_tofu_policy_t` type specifies the set of possible policy values that are supported by [GPGME](#):

```
@table @code
```

```
@item GPGME_TOFU_POLICY_AUTO
```

Set the policy to `auto`.

```
@item GPGME_TOFU_POLICY_GOOD
```

Set the policy to `good`.

```
@item GPGME_TOFU_POLICY_BAD
```

Set the policy to `bad`.

```

@item GPGME_TOFU_POLICY_ASK
Set the policy to ``ask".
@item GPGME_TOFU_POLICY_UNKNOWN
Set the policy to ``unknown".
@end table

```

```
@end deftp
```

To change the policy for a key the following functions can be used:

```

@deftypefun gpgme_error_t
gpgme_op_tofu_policy @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{const gpgme_key_t @var{key}}, @
   @w{gpgme_tofu_policy_t @var{policy}})

```

```
@since{1.7.0}
```

The function `gpgme_op_tofu_policy` changes the TOFU policy of `@var{key}`. The valid values for `@var{policy}` are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
@end deftypefun
```

```

@deftypefun gpgme_error_t gpgme_op_tofu_policy_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{const gpgme_key_t @var{key}}, @
   @w{gpgme_tofu_policy_t @var{policy}})

```

```
@since{1.7.0}
```

The function `gpgme_op_tofu_policy_start` initiates a `gpgme_op_tofu_policy` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns `0` if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

```
@end deftypefun
```


@node Advanced Key Editing
@subsection Advanced Key Editing
@cindex key, edit

```
@deftp {Data type} {gpgme_error_t (*gpgme_interact_cb_t) @  
  (@w{void *@var{handle}}, @  
  @w{const char *@var{status}}, @  
  @w{const char *@var{args}}, @  
  @w{int @var{fd}})}
```

@since{1.7.0}

@tindex gpgme_interact_cb_t

The @code{gpgme_interact_cb_t} type is the type of functions which @acronym{GPGME} calls if it a key interact operation is on-going. The status keyword @var{status} and the argument line @var{args} are passed through by @acronym{GPGME} from the crypto engine. An empty string represents EOF. The file descriptor @var{fd} is -1 for normal status messages. If @var{status} indicates a command rather than a status message, the response to the command should be written to @var{fd}. The @var{handle} is provided by the user at start of operation.

The function should return @code{GPG_ERR_FALSE} if it did not handle the status code, @code{0} for success, or any other error value.

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_interact (@w{gpgme_ctx_t @var{ctx}}, @  
  @w{gpgme_key_t @var{key}}, @  
  @w{unsigned int @var{flags}}, @  
  @w{gpgme_interact_cb_t @var{fnc}}, @  
  @w{void *@var{handle}}, @  
  @w{gpgme_data_t @var{out}})
```

@since{1.7.0}

The function @code{gpgme_op_interact} processes the key @var{KEY} interactively, using the interact callback function @var{FNC} with the handle @var{HANDLE}. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by @acronym{GPGME}.

@var{flags} modifies the behaviour

of the function; the only defined
bit value is:

```
@table @code
@item GPGME_INTERACT_CARD
@since{1.7.0}
```

This is used for smartcard based keys and uses gpgs
@code{--card-edit} command.

```
@end table
```

The function returns @code{0} if the edit operation completes
successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or @var{key} is
not a valid pointer, and any error returned by the crypto engine or
the edit callback handler.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_interact_start (@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}}, @
@w{gpgme_interact_cb_t @var{fnc}}, @
@w{void *@var{handle}}, @
@w{gpgme_data_t @var{out}})
```

```
@since{1.7.0}
```

The function @code{gpgme_op_interact_start} initiates a
@code{gpgme_op_interact} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started
successfully, and @code{GPG_ERR_INV_VALUE}
if @var{ctx} or @var{key}
is not a valid pointer.

```
@end deftypefun
```

```
@node Crypto Operations
@section Crypto Operations
@cindex cryptographic operation
```

Sometimes, the result of a crypto operation returns a list of invalid
keys encountered in processing the request. The following structure
is used to hold information about such a key.

```
@defstp {Data type} {gpgme_invalid_key_t}
```

This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter. The structure contains the following members:

@table @code

@item gpgme_invalid_key_t next

This is a pointer to the next invalid key structure in the linked list, or @code{NULL} if this is the last element.

@item char *fpr

The fingerprint or key ID of the invalid key encountered.

@item gpgme_error_t reason

An error code describing the reason why the key was found invalid.

@end table

@end deftp

@menu

* Decrypt:: Decrypting a ciphertext.

* Verify::
 Verifying a signature.

* Decrypt and Verify:: Decrypting a signed ciphertext.

* Sign:: Creating a signature.

* Encrypt:: Encrypting a plaintext.

@end menu

@node Decrypt

@subsection Decrypt

@cindex decryption

@cindex cryptographic operation, decryption

@deftypefun gpgme_error_t gpgme_op_decrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})

The function @code{gpgme_op_decrypt} decrypts the ciphertext in the data object @var{cipher} and stores it into the data object @var{plain}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the ciphertext could be decrypted successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx}, @var{cipher} or @var{plain} is not a valid pointer, @code{GPG_ERR_NO_DATA} if @var{cipher} does not contain any data to decrypt, @code{GPG_ERR_DECRYPT_FAILED} if @var{cipher} is not a valid cipher text, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_decrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The function `gpgme_op_decrypt_start` initiates a `gpgme_op_decrypt` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `var{cipher}` or `var{plain}` is not a valid pointer.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_decrypt_ext ( @
    @w{gpgme_ctx_t @var{ctx}}, @
    @w{gpgme_decrypt_flags_t @var{flags}}, @
    @w{gpgme_data_t @var{cipher}}, @
    @w{gpgme_data_t @var{plain}})
```

@since{1.8.0}

The function `gpgme_op_decrypt_ext` is the same as `gpgme_op_decrypt` but has an additional argument `var{flags}`. If `var{flags}` is 0 both function behave identically.

The value in `var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

```
@table @code
@item GPGME_DECRYPT_VERIFY
@since{1.8.0}
```

The `GPGME_DECRYPT_VERIFY` symbol specifies that this function shall exactly act as `gpgme_op_decrypt_verify`.

```
@item GPGME_DECRYPT_UNWRAP
@since{1.8.0}
```

The `GPGME_DECRYPT_UNWRAP` symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to `GPGME_ENCRYPT_WRAP`.

@end table

The function returns the error codes as described for

```
@code{gpgme_op_decrypt}.
```

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_decrypt_ext_start ( @
```

```
  @w{gpgme_ctx_t @var{ctx}}, @
```

```
  @w{gpgme_decrypt_flags_t @var{flags}}, @
```

```
  @w{gpgme_data_t @var{cipher}}, @
```

```
  @w{gpgme_data_t @var{plain}})
```

```
@since{1.8.0}
```

The function `gpgme_op_decrypt_ext_start` initiates a `gpgme_op_decrypt_ext` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `@var{cipher}` or `@var{plain}` is not a valid pointer.

```
@end deftypefun
```

```
@deftp {Data type} {gpgme_recipient_t}
```

```
@since{1.1.0}
```

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a `gpgme_op_decrypt` operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

```
@table @code
```

```
@item gpgme_recipient_t next
```

This is a pointer to the next recipient structure in the linked list, or `NULL` if this is the last element.

```
@item gpgme_pubkey_algo_t
```

The public key algorithm used in the encryption.

```
@item char *keyid
```

This is the key ID of the key (in hexadecimal digits) used as recipient.

```
@item gpgme_error_t status
```

This is an error number with the error code `GPG_ERR_NO_SECKEY` if the secret key for this recipient is not available, and 0 otherwise.

@end table

@end deftp

@deftp {Data type} {gpgme_decrypt_result_t}

This is a pointer to a structure used to store the result of a `{gpgme_op_decrypt}` operation. After successfully decrypting data, you can retrieve the pointer to the result with `{gpgme_op_decrypt_result}`. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a structure on its own. The structure contains the following members:

@table @code

@item char *unsupported_algorithm

If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

@item unsigned int wrong_key_usage

: 1

@since{0.9.0}

This is true if the key was not used according to its policy.

@item unsigned int legacy_cipher_nomdc : 1

@since{1.11.2}

The message was made by a legacy algorithm without any integrity protection. This might be an old but legitimate message.

@item unsigned int is_mime : 1;

@since{1.11.0}

The message claims that the content is a MIME object.

@item unsigned int is_de_vs : 1;

@since{1.10.0}

The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

@item gpgme_recipient_t recipients

@since{1.1.0}

This is a linked list of recipients to which this message was encrypted.

@item char *file_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

@item char *session_key

@since{1.8.0}

A textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session keys (see `gpgme_set_ctx_flag`, "export-session-key"), and a session key was available for the most recent decryption operation. Otherwise, this is a null pointer.

You must not try to access this member of the struct unless `gpgme_set_ctx_flag` (ctx, "export-session-key") returns success or `gpgme_get_ctx_flag` (ctx, "export-session-key") returns true (non-empty string).

`char *symkey_algo`
@since{1.11.0}

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

@end table
@end deftp

@deftypefun `gpgme_decrypt_result_t gpgme_op_decrypt_result (@w{gpgme_ctx_t @var{ctx}})`

The function `gpgme_op_decrypt_result` returns a `gpgme_decrypt_result_t` pointer to a structure holding the result of a `gpgme_op_decrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_decrypt` or `gpgme_op_decrypt_start` operation.

If the operation failed this might be a `NULL` pointer. The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@node Verify
@subsection Verify
@cindex verification
@cindex signature, verification
@cindex cryptographic operation, verification
@cindex cryptographic operation, signature check
@cindex signature notation data
@cindex notation data

@deftypefun `gpgme_error_t gpgme_op_verify (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})`

The function `gpgme_op_verify` verifies that the signature in the data object `@var{sig}` is a valid signature. If `@var{sig}` is a

detached signature, then the signed text should be provided in `@var{signed_text}` and `@var{plain}` should be a null pointer. Otherwise, if `@var{sig}` is a normal (or cleartext) signature, `@var{signed_text}` should be a null pointer and `@var{plain}` should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with `@code{gpgme_op_verify_result}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{sig}` or `@var{plain}` is not a valid pointer, `@code{GPG_ERR_NO_DATA}` if `@var{sig}` does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
```

The function `@code{gpgme_op_verify_start}` initiates a `@code{gpgme_op_verify}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. @xref{Waiting For Completion}.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{sig}` or `@var{plain}` is not a valid pointer, and `@code{GPG_ERR_NO_DATA}` if `@var{sig}` or `@var{plain}` does not contain any data to verify.

```
@end deftypefun
```

```
@deftp {Data type} {gpgme_sig_notation_t}
```

This is a pointer to a structure used to store a part of the result of a `@code{gpgme_op_verify}` operation. The structure contains the following members:

```
@table @code
```

```
@item gpgme_sig_notation_t next
```

This is a pointer to the next new signature notation structure in the linked list, or `@code{NULL}` if this is the last element.

```
@item char *name
```

The name of the notation field. If this is `@code{NULL}`, then the member `@code{value}` will contain a policy URL.

```
@item int name_len
```


The length of the `{name}` field. For strings the length is counted without the trailing binary zero.

`@item char *value`

The value of the notation field. If `{name}` is `{NULL}`, then this is a policy URL.

`@item int value_len`

The length of the `{value}` field. For strings the length is counted without the trailing binary zero.

`@item gpgme_sig_notation_flags_t flags`

The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used as an argument to the function `{gpgme_sig_notation_add}`. The value `{flags}` is a bitwise-or combination of one or multiple of the following bit values:

`@table @code`

`@item GPGME_SIG_NOTATION_HUMAN_READABLE`

`@since{1.1.0}`

The `{GPGME_SIG_NOTATION_HUMAN_READABLE}` symbol specifies that the notation data is in human readable form

`@item GPGME_SIG_NOTATION_CRITICAL`

`@since{1.1.0}`

The `{GPGME_SIG_NOTATION_CRITICAL}` symbol specifies that the notation data is critical.

`@end table`

`@item unsigned int human_readable : 1`

This is true if the `{GPGME_SIG_NOTATION_HUMAN_READABLE}` flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

`@item unsigned int critical : 1`

This is true if the

`{GPGME_SIG_NOTATION_CRITICAL}` flag is set and false otherwise. This flag is valid for notation data and policy URLs.

`@end table`

`@end deftp`

`@deftp {Data type} {gpgme_signature_t}`

This is a pointer to a structure used to store a part of the result of a `{gpgme_op_verify}` operation. The structure contains the following members:

`@table @code`

`@item gpgme_signature_t next`

This is a pointer to the next new signature structure in the linked list, or `{NULL}` if this is the last element.

`@item gpgme_sigsum_t summary`

This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for `GPGME_SIGSUM_VALID` like this:

`@example`

```
if ((sig.summary & GPGME_SIGSUM_VALID))
```

```
@{
```

```
..do stuff if valid..
```

```
@}
```

```
else
```

```
@{
```

```
..do stuff if not fully valid..
```

```
@}
```

```
@end example
```

The defined bits are:

`@table @code`

`@item GPGME_SIGSUM_VALID`

The signature is fully valid.

`@item GPGME_SIGSUM_GREEN`

The signature is good but one might want to display some extra information. Check the other bits.

`@item GPGME_SIGSUM_RED`

The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

`@item GPGME_SIGSUM_KEY_REVOKED`

The key or at least one certificate has been revoked.

`@item GPGME_SIGSUM_KEY_EXPIRED`

The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

@item GPGME_SIGSUM_SIG_EXPIRED

The signature has expired.

@item GPGME_SIGSUM_KEY_MISSING

Can't verify due to a missing key or certificate.

@item GPGME_SIGSUM_CRL_MISSING

The CRL (or an equivalent mechanism) is not available.

@item GPGME_SIGSUM_CRL_TOO_OLD

Available CRL is too old.

@item GPGME_SIGSUM_BAD_POLICY

A policy requirement was not met.

@item GPGME_SIGSUM_SYS_ERROR

A system error occurred.

@item GPGME_SIGSUM_TOFU_CONFLICT

A TOFU conflict was detected.

@end table

@item char *fpr

This is the fingerprint or key ID of the signature.

@item gpgme_error_t status

This is the status of the signature. In particular, the following status codes are of interest:

@table @code

@item GPG_ERR_NO_ERROR

This status indicates that the signature could be verified or that there is no signature. For the combined result this status means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check the @code{summary} field for that.

For example a @code{gpgme_op_decrypt_verify} returns a verification result with GPG_ERR_NO_ERROR for encrypted but unsigned data.

@item GPG_ERR_SIG_EXPIRED

This status indicates that the signature is valid but expired. For the combined result this

status means that all signatures are valid and expired.

@item GPG_ERR_KEY_EXPIRED

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

@item GPG_ERR_CERT_REVOKED

This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures are valid and all keys are revoked.

@item GPG_ERR_BAD_SIGNATURE

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPG_ERR_NO_PUBKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPG_ERR_GENERAL

This status indicates that there was some other error which prevented the signature verification.

@end table

@item gpgme_sig_notation_t notations

This is a linked list with the notation data and policy URLs.

@item unsigned long timestamp

The creation timestamp of this signature.

@item unsigned long exp_timestamp

The expiration timestamp of this signature, or 0 if the signature does not expire.

@item unsigned int wrong_key_usage : 1

This is true if the key was not used according to its policy.

@item unsigned int pka_trust : 2

This is set to the trust information gained by means of the PKA system.

Values are:

@table @code

@item 0

No PKA information available or verification not possible.

@item 1

PKA verification failed.

@item 2

PKA verification succeeded.

@item 3

Reserved for future use.

@end table

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

@item unsigned int chain_model : 1

@since{1.1.6}

This is true if the

validity of the signature has been checked using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

@item gpgme_validity_t validity

The validity of the signature.

@item gpgme_error_t validity_reason

If a signature is not valid, this provides a reason why.

@item gpgme_pubkey_algo_t

The public key algorithm used to create this signature.

@item gpgme_hash_algo_t

The hash algorithm used to create this signature.

@item char *pka_address

The mailbox from the PKA information or @code{NULL}.

@item gpgme_key_t key

@since{1.7.0}

An object describing the key used to create the signature. This key object may be incomplete in that it only conveys information available directly with a signature. It may also be @code{NULL} if such information is not readily available.

@end table

@end deftp

@deftp {Data type} {gpgme_verify_result_t}

This is a pointer to a structure used to store the result of a

@code{gpgme_op_verify} operation. After verifying a signature, you can retrieve the pointer to the result with

@code{gpgme_op_verify_result}. If the operation failed this might be a @code{NULL} pointer. The structure contains the following member:

@table @code

@item gpgme_signature_t signatures

A linked list with information about all signatures for which a verification was attempted.

@item char *file_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

@item unsigned int is_mime : 1;

@since{1.11.0}

The message claims that the content is a MIME object. Warning: This flag is not covered by the signature.

@end table

@end deftp

@deftypefun

gpgme_verify_result_t gpgme_op_verify_result (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_verify_result} returns a

@code{gpgme_verify_result_t} pointer to a structure holding the result of a @code{gpgme_op_verify} operation. The pointer is only valid if the last operation on the context was a @code{gpgme_op_verify},

@code{gpgme_op_verify_start}, @code{gpgme_op_decrypt_verify} or

@code{gpgme_op_decrypt_verify_start} operation, and if this operation

finished successfully (for @code{gpgme_op_decrypt_verify} and

@code{gpgme_op_decrypt_verify_start}, the error code

@code{GPG_ERR_NO_DATA} counts as successful in this context). The

returned pointer is only valid until the next operation is started on

the context.

@end deftypefun

@node Decrypt and Verify

@subsection Decrypt and Verify

@cindex decryption and verification

@cindex verification and decryption

@cindex signature check

@cindex cryptographic operation, decryption and verification

```
@deftypefun gpgme_error_t gpgme_op_decrypt_verify
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The function `gpgme_op_decrypt_verify` decrypts the ciphertext in the data object `@var{cipher}` and stores it into the data object `@var{plain}`. If `@var{cipher}` contains signatures, they will be verified.

After the operation completed, `gpgme_op_decrypt_result` and `gpgme_op_verify_result` can be used to retrieve more information about the signatures.

If the error code `GPG_ERR_NO_DATA` is returned, `@var{cipher}` does not contain any data to decrypt. However, it might still be signed. The information about detected signatures is available with `gpgme_op_verify_result` in this case.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be decrypted successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{cipher}` or `@var{plain}` is not a valid pointer, `GPG_ERR_NO_DATA` if `@var{cipher}` does not contain any data to decrypt, `GPG_ERR_DECRYPT_FAILED` if `@var{cipher}` is not a valid cipher text, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_decrypt_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The function `gpgme_op_decrypt_verify_start` initiates a `gpgme_op_decrypt_verify` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{cipher}`, `@var{plain}` or `@var{r_stat}` is not a valid pointer, and `GPG_ERR_NO_DATA` if `@var{cipher}` does not contain any data to decrypt.

```
@end deftypefun
```

When processing mails it is sometimes useful to extract the actual mail address (the `addr-spec`) from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

@deftypefun @w{char *} gpgme_addrspec_from_uid (@w{const char *}@var{uid})

@since{1.7.1}

Return the mail address (called ``addr-spec" in RFC-5322) from the string @var{uid} which is assumed to be a user id (called ``address" in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must free the result using @code{gpgme_free}. Returns @code{NULL} if no valid address was found (in which case @code{ERRNO} is set to @code{EINVAL}) or for other errors.

@end deftypefun

@node Sign

@subsection Sign

@cindex signature, creation

@cindex sign

@cindex cryptographic operation, signing

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

@menu

* Selecting Signers:: How to choose the keys to sign with.

* Creating a Signature:: How to create a signature.

* Signature Notation Data:: How to add notation data to a signature.

@end menu

@node Selecting Signers

@subsubsection Selecting Signers

@cindex signature, selecting signers

@cindex signers, selecting

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list. If no signer has been set into the context a default key is used for signing.

@deftypefun void gpgme_signers_clear (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_signers_clear} releases a reference for each key on the signers list and removes the list of signers from the context @var{ctx}.

Every context starts with an empty list.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_signers_add (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}})
```

The function

`gpgme_signers_add` adds the key `@var{key}` to the list of signers in the context `@var{ctx}`.

Calling this function acquires an additional reference for the key.

```
@end deftypefun
```

```
@deftypefun @w{unsigned int} gpgme_signers_count (@w{const gpgme_ctx_t @var{ctx}}) @since{1.4.3}
```

The function `gpgme_signers_count` returns the number of signer keys in the context `@var{ctx}`.

```
@end deftypefun
```

```
@deftypefun gpgme_key_t gpgme_signers_enum (@w{const gpgme_ctx_t @var{ctx}}, @w{int @var{seq}})
```

The function `gpgme_signers_enum` returns the `@var{seq}`th key in the list of signers in the context `@var{ctx}`. An additional reference is acquired for the user.

If `@var{seq}` is out of range, `NULL` is returned.

```
@end deftypefun
```

```
@node Creating a Signature
```

```
@subsubsection Creating a Signature
```

```
@deftp {Data type} {enum gpgme_sig_mode_t}
```

```
@tindex gpgme_sig_mode_t
```

The `gpgme_sig_mode_t` type is used to specify the desired type of a signature. The following modes are available:

```
@table @code
```

```
@item
```

GPGME_SIG_MODE_NORMAL

A normal signature is made, the output includes the plaintext and the signature.

```
@item GPGME_SIG_MODE_DETACH
```

A detached signature is made.

```
@item GPGME_SIG_MODE_CLEAR
```

A clear text signature is made. The `ASCII` armor and text

mode settings of the context are ignored.

@end table

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{plain}},  
@w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
```

The function `gpgme_op_sign` creates a signature for the text in the data object `@var{plain}` and returns it in the data object

`@var{sig}`. The type of the signature created is determined by the `@acronym{ASCII} armor` (or, if that is not set, by the encoding specified for `@var{sig}`), the text mode attributes set for the context `@var{ctx}` and the requested signature mode `@var{mode}`.

After the operation completed successfully, the result can be retrieved with `gpgme_op_sign_result`.

If an S/MIME

signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with `gpgme_set_include_certs`. [Included Certificates](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the signature could be created successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{plain}` or `@var{sig}` is not a valid pointer, `GPG_ERR_NO_DATA` if the signature could not be created, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, `GPG_ERR_UNUSABLE_SECKEY` if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t  
@var{plain}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
```

The function `gpgme_op_sign_start` initiates a `gpgme_op_sign` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{plain}` or `@var{sig}` is not a valid pointer.

@end deftypefun

```
@deftp {Data type} {gpgme_new_signature_t}
```

This is a pointer to a structure used to store a part of the result of a `gpgme_op_sign` operation. The structure contains the following members:

@table @code
@item gpgme_new_signature_t next
This is a pointer to the next new signature structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme_sig_mode_t type
The type of this signature.

@item gpgme_pubkey_algo_t pubkey_algo
The public key algorithm used to create this signature.

@item gpgme_hash_algo_t hash_algo
The hash algorithm used to create this signature.

@item unsigned int sig_class
The signature class of this signature.

@item long int timestamp
The creation timestamp of this signature.

@item
char *fpr
The fingerprint of the key which was used to create this signature.
@end table
@end deftp

@deftp {Data type} {gpgme_sign_result_t}
This is a pointer to a structure used to store the result of a @code{gpgme_op_sign} operation. After successfully generating a signature, you can retrieve the pointer to the result with @code{gpgme_op_sign_result}. The structure contains the following members:

@table @code
@item gpgme_invalid_key_t invalid_signers
A linked list with information about all invalid keys for which a signature could not be created.

@item gpgme_new_signature_t signatures
A linked list with information about all signatures created.
@end table
@end deftp

@deftypedefun gpgme_sign_result_t gpgme_op_sign_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_sign_result} returns a @code{gpgme_sign_result_t} pointer to a structure holding the result of a @code{gpgme_op_sign} operation. The pointer is only valid if the last operation on the context was

a `{gpgme_op_sign}`,
`{gpgme_op_sign_start}`, `{gpgme_op_encrypt_sign}` or
`{gpgme_op_encrypt_sign_start}` operation. If that operation
failed, the function might return a `{NULL}` pointer. The returned
pointer is only valid until the next operation is started on the
context.
`{end dectyfefun}`

`{node Signature Notation Data}`
`{subsubsection Signature Notation Data}`
`{cindex notation data}`
`{cindex signature notation data}`
`{cindex policy URL}`

Using the following functions, you can attach arbitrary notation data
to a signature. This information is then available to the user when
the signature is verified.

```
{dectyfefun void gpgme_sig_notation_clear (@w{gpgme_ctx_t @var{ctx}})  
{since{1.1.0}}
```

The function `{gpgme_sig_notation_clear}` removes the notation data
from the context `{ctx}`. Subsequent signing operations from this
context will not include any notation data.

Every context starts with an empty notation data list.
`{end dectyfefun}`

```
{dectyfefun gpgme_error_t gpgme_sig_notation_add  
{ @w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{name}}, @w{const char *@var{value}},  
{ @w{gpgme_sig_notation_flags_t @var{flags}}}  
{since{1.1.0}}
```

The function `{gpgme_sig_notation_add}` adds the notation data with
the name `{name}` and the value `{value}` to the context
`{ctx}`.

Subsequent signing operations will include this notation data, as well
as any other notation data that was added since the creation of the
context or the last `{gpgme_sig_notation_clear}` operation.

The arguments `{name}` and `{value}` must be `{NUL}`-terminated
strings in human-readable form. The flag
`{GPGME_SIG_NOTATION_HUMAN_READABLE}` is implied
(non-human-readable notation data is currently not supported). The
strings must be in UTF-8 encoding.

If `@var{name}` is `@code{NULL}`, then `@var{value}` should be a policy URL.

The function `@code{gpgme_sig_notation_add}` returns the error code `@code{GPG_ERR_NO_ERROR}` if the notation data could be added successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, or if `@var{name}`, `@var{value}` and `@var{flags}` are an invalid combination. The function also passes through any errors that are reported by the crypto engine support routines.

```
@end deftypefun
```

```
@deftypefun gpgme_sig_notation_t gpgme_sig_notation_get (@w{const gpgme_ctx_t @var{ctx}})
@since{1.1.0}
```

The function `@code{gpgme_sig_notation_get}` returns the linked list of notation data structures that are contained in the context `@var{ctx}`.

If `@var{ctx}` is not a valid pointer, or there is no notation data added for this context, `@code{NULL}` is returned.

```
@end deftypefun
```

```
@node Encrypt
@subsection Encrypt
@cindex encryption
@cindex cryptographic operation, encryption
```

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then passed to the encryption operation.

```
@menu
* Encrypting a Plaintext:: How to encrypt a plaintext.
@end menu
```

```
@node Encrypting a
Plaintext
@subsubsection Encrypting a Plaintext
```

```
@deftypefun gpgme_error_t gpgme_op_encrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t
@var{cipher}})
```

The function `@code{gpgme_op_encrypt}` encrypts the plaintext in the data object `@var{plain}` for the recipients `@var{recp}` and stores the ciphertext in the data object `@var{cipher}`. The type of the ciphertext created is determined by the `@acronym{ASCII}` armor (or, if that is not set, by the encoding specified for `@var{cipher}`) and the

text mode attributes set for the context `@var{ctx}`.

`@var{recp}` must be a `@code{NULL}`-terminated array of keys. The user must keep references for all keys during the whole duration of the call (but see `@code{gpgme_op_encrypt_start}` for the requirements with the asynchronous variant).

The value in `@var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

`@table @code`

`@item GPGME_ENCRYPT_ALWAYS_TRUST`

The

`@code{GPGME_ENCRYPT_ALWAYS_TRUST}` symbol specifies that all the recipients in `@var{recp}` should be trusted, even if the keys do not have a high enough validity in the keyring. This flag should be used with care; in general it is not a good idea to use any untrusted keys.

`@item GPGME_ENCRYPT_NO_ENCRYPT_TO`

`@since{1.2.0}`

The `@code{GPGME_ENCRYPT_NO_ENCRYPT_TO}` symbol specifies that no default or hidden default recipients as configured in the crypto backend should be included. This can be useful for managing different user profiles.

`@item GPGME_ENCRYPT_NO_COMPRESS`

`@since{1.5.0}`

The `@code{GPGME_ENCRYPT_NO_COMPRESS}` symbol specifies that the plaintext shall not be compressed before it is encrypted. This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

`@item GPGME_ENCRYPT_PREPARE`

`@itemx GPGME_ENCRYPT_EXPECT_SIGN`

The `@code{GPGME_ENCRYPT_PREPARE}` symbol is used with the UI Server protocol to prepare an encryption

(i.e. sending the

`@code{PREP_ENCRYPT}` command). With the

`@code{GPGME_ENCRYPT_EXPECT_SIGN}` symbol the UI Server is advised to also expect a sign command.

`@item GPGME_ENCRYPT_SYMMETRIC`

`@since{1.7.0}`

The `@code{GPGME_ENCRYPT_SYMMETRIC}` symbol specifies that the output should be additionally encrypted symmetrically even

if recipients are provided. This feature is only supported for the OpenPGP crypto engine.

@item GPGME_ENCRYPT_THROW_KEYIDS
@since{1.8.0}

The @code{GPGME_ENCRYPT_THROW_KEYIDS} symbol requests that the identifiers for the decryption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

@item GPGME_ENCRYPT_WRAP
@since{1.8.0}

The @code{GPGME_ENCRYPT_WRAP} symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to @code{GPGME_DECRYPT_UNWRAP}.

@item GPGME_ENCRYPT_WANT_ADDRESS
@since{1.11.0}

The @code{GPGME_ENCRYPT_WANT_ADDRESS} symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code @code{GPG_ERR_INV_USER_ID} is returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the @var{recpstring} argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

@end table

If @code{GPG_ERR_UNUSABLE_PUBKEY} is returned, some recipients in @var{recp} are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in @var{cipher} (if this happens depends on the crypto engine). More information about the invalid recipients is available with @code{gpgme_op_encrypt_result}.

If @var{recp} is @code{NULL}, symmetric rather than public key encryption is performed.

Symmetrically encrypted cipher text can be deciphered with @code{gpgme_op_decrypt}. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption is currently only supported for the OpenPGP crypto backend.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be created successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{recp}`, `@var{plain}` or `@var{cipher}` is not a valid pointer, `GPG_ERR_UNUSABLE_PUBKEY` if `@var{recp}` contains some invalid recipients, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

The function `gpgme_op_encrypt_start` initiates

a

`gpgme_op_encrypt` operation. It can be completed by calling `gpgme_wait` on the context. @xref{Waiting For Completion}.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even if the operation is not yet finished.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{rset}`, `@var{plain}` or `@var{cipher}` is not a valid pointer, and `GPG_ERR_UNUSABLE_PUBKEY` if `@var{rset}` does not contain any valid recipients.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_ext @
  (@w{gpgme_ctx_t @var{ctx}}, @
  @w{gpgme_key_t @var{recp}}[], @
  @w{const char *@var{recpstring}}, @
  @w{gpgme_encrypt_flags_t @var{flags}}, @
  @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

@since{1.11.0}

This is an extended version of `gpgme_op_encrypt` with `@var{recpstring}` as additional parameter. If `@var{recp}` is NULL and `@var{recpstring}` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `@var{recp}` the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is remove from each line in `@var{recpstring}`. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

```
@table @code
@item --hidden
@itemx --no-hidden
```

These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the gpg option `@option{-R}` (or `@option{-F}` in file mode) is used instead of `@option{-r}` (`@option{-f}` in file mode).

```
@item --file
@itemx
--no-file
```

These keywords toggle between regular and file mode for all following key specification. In file mode the option `@option{-f}` or `@option{-F}` is passed to gpg. At least GnuPG version 2.1.14 is required to handle these options. The `@code{GPGME_ENCRYPT_WANT_ADDRESS}` flag is ignored in file mode.

```
@item --
```

This keyword disables all keyword detection up to the end of the string. All keywords are treated as verbatim arguments.

```
@end table
```

To create a `@var{recpstring}` it is often useful to employ a `strconcat` style function. For example this function creates a string to encrypt to two keys:

```
@example
char *
xbuild_recpsring (const char *key1, const char *key2)
@ {
char *result = gpgmt_strconcat ("--\n", key1, "\n", key2, NULL);
if (!result)
    @ { perror ("strconcat failed"); exit (2); @ }
return result;
@ }
@end example
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used `strconcat` function is available in `Libgpg-error` 1.28 and later; `Libgpg-error` (aka `Gpgmt`) is a dependency of `GPGME`. The number of arguments to

@code{gpgrt_strconcat} is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```
@example
char *
xbuild_long_recpstring (void)
@{
gpgrt_stream_t memfp;
const char *s;
void *result;

memfp = gpgrt_fopenmem (0, "w+b");
if (!memfp)
  @ { perror ("fopenmem failed"); exit (2); @ }
gpgrt_fputs ("--", memfp);
while ((s = get_next_keyspec ()))
  @ {
    gpgrt_fputc ('\n', memfp);
    gpgrt_fputs (s, memfp);
  @ }
gpgrt_fputc (0, memfp);
if (gpgrt_ferror (memfp))
  @ { perror ("writing to memstream failed"); exit (2); @ }
if (gpgrt_fclose_snatch (memfp, &result, NULL))
  @ { perror ("fclose_snatch failed"); exit (2); @ }
return result;
@ }
@end example
```

In this example @code{get_next_keyspec} is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to @command{gpg} which has as a platform specific length limitation.

@end deftypefun

```
@deftypefun gpgrt_error_t gpgrt_op_encrypt_ext_start @
  (@w{gpgrt_ctx_t @var{ctx}}, @
  @w{gpgrt_key_t @var{recp}[]}, @
  @w{const char *@var{recpstring}}, @
  @w{gpgrt_encrypt_flags_t @var{flags}}, @
  @w{gpgrt_data_t @var{plain}}, @w{gpgrt_data_t @var{cipher}})
```

@since{1.11.0}

This is an extended version of `gpgme_op_encrypt_start` with `recpstring` as additional parameter. If `recp` is NULL and `recpstring` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `recp` the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

`@end deftypefun`

`@deftp {Data type} {gpgme_encrypt_result_t}`

This is a pointer to a structure used to store the result of a `gpgme_op_encrypt` operation. After successfully encrypting data, you can retrieve the pointer to the result with `gpgme_op_encrypt_result`. The structure contains the following members:

`@table @code`

`@item gpgme_invalid_key_t invalid_recipients`

A linked list with information about all invalid keys for which the data could not be encrypted.

`@end table`

`@end deftp`

`@deftypefun gpgme_encrypt_result_t gpgme_op_encrypt_result (@w{gpgme_ctx_t @var{ctx}})`

The function `gpgme_op_encrypt_result` returns a `gpgme_encrypt_result_t` pointer to a structure holding the result of a `gpgme_op_encrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_encrypt`, `gpgme_op_encrypt_start`, `gpgme_op_sign` or `gpgme_op_sign_start` operation. If this operation failed, this might be a `NULL` pointer. The returned pointer is only valid until the next operation is started on the context.

`@end deftypefun`

`@deftypefun gpgme_error_t gpgme_op_encrypt_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})`

The function `gpgme_op_encrypt_sign` does a combined encrypt and sign operation. It is used like `gpgme_op_encrypt`, but the ciphertext also contains signatures for the signers listed in `ctx`.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

The function @code{gpgme_op_encrypt_sign_start} initiates a @code{gpgme_op_encrypt_sign} operation. It can be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation could be started successfully, and @code{GPG_ERR_INV_VALUE} if @var{ctx}, @var{rset}, @var{plain} or @var{cipher} is not a valid pointer.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{recp}}[], @
   @w{const char *@var{recpstring}}, @
   @w{gpgme_encrypt_flags_t @var{flags}}, @
   @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_sign} with @var{recpstring} as additional parameter. If @var{recp} is NULL and @var{recpstring} is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to @var{recp} the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{recp}}[], @
   @w{const char *@var{recpstring}}, @
   @w{gpgme_encrypt_flags_t @var{flags}}, @
   @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

@since{1.11.0}

This is an extended version of `gpgme_op_encrypt_sign_start` with `recpstring` as additional parameter. If `recp` is NULL and `recpstring` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `recp` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

`@end deftypefun`

`@node Miscellaneous`

`@section Miscellaneous`
operations

Here are some support functions which are sometimes useful.

`@menu`

- * Running other Programs:: Running other Programs
 - * Using the Assuan protocol:: Using the Assuan protocol
 - * Checking for updates:: How to check for software updates
- `@end menu`

`@node Running other Programs`

`@subsection Running other Programs`

GPGME features an internal subsystem to run the actual backend engines. Along with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

`@deftypefun gpgme_error_t gpgme_op_spawn @`

`(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @`
`@w{const char **@var{argv}}, @w{gpgme_data_t @var{datain}}, @`
`@w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @`
`@w{unsigned int @var{flags}})`

`@since{1.5.0}`

The

function `gpgme_op_spawn` runs the program `file` with the arguments taken from the NULL terminated array `argv`. If no arguments are required `argv` may be given as `NULL`. In the latter case or if `argv[0]` is the empty string, GPGME uses the

basename of `@var{file}` for `@code{argv[0]}`. The file descriptors `@code{stdin}`, `@code{stdout}`, and `@code{stderr}` are connected to the data objects `@var{datain}`, `@var{dataout}`, and `@var{dataerr}`. If NULL is passed for one of these data objects the corresponding file descriptor is connected to `@file{/dev/null}`.

The value in `@var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

```
@table @code
@item GPGME_SPAWN_DETACHED
@since{1.5.0}
```

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

```
@item GPGME_SPAWN_ALLOW_SET_FG
@since{1.5.0}
```

Under Windows
this flag allows the called program to put itself into the foreground.

```
@end table
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_spawn_start @
  (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
   @w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
   @w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
   @w{unsigned int @var{flags}})
```

```
@since{1.5.0}
```

This is the asynchronous variant of `@code{gpgme_op_spawn}`.

```
@end deftypefun
```

```
@node Using the Assuan protocol
@subsection Using the Assuan protocol
```

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using `@code{gpgme_ctx_set_engine_info}`, passing the location of the servers socket as `@var{file_name}` argument, and an empty string as `@var{home_dir}` argument.

The Assuan protocol functions use three kinds of callbacks to transfer

data:

```
@deftp {Data type}
{ gpgme_error_t (*gpgme_assuan_data_cb_t) @
  (@w{void *@var{opaque}}, @w{const void *@var{data}}, @
  @w{size_t @var{datalen}})}
```

@since{1.2.0}

This callback receives any data sent by the server. @var{opaque} is the pointer passed to @code{gpgme_op_assuan_transact_start}, @var{data} of length @var{datalen} refers to the data sent.

@end deftp

```
@deftp {Data type} { gpgme_error_t (*gpgme_assuan_inquire_cb_t) @
  (@w{void *@var{opaque}}, @w{const char *@var{name}}, @
  @w{const char *@var{args}}, @w{gpgme_data_t *@var{r_data}})}
```

@since{1.2.0}

This callback is used to provide additional data to the Assuan server.

@var{opaque} is the pointer passed to

@code{gpgme_op_assuan_transact_start}, @var{name} and @var{args}

specify what kind of data the server requested, and @var{r_data} is

used to return the actual data.

Note: Returning data is currently not implemented in @acronym{GPGME}.

@end deftp

```
@deftp {Data type} { gpgme_error_t (*gpgme_assuan_status_cb_t) @
  (@w{void *@var{opaque}}, @w{const char *@var{status}}, @
  @w{const char *@var{args}})}
```

@since{1.2.0}

This callback receives any status lines sent by the server.

@var{opaque} is the pointer passed to

@code{gpgme_op_assuan_transact_start}, @var{status} and @var{args}

denote the status update sent.

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_assuan_transact_start @
  (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
  @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
  @w{void * @var{data_cb_value}}, @
  @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
  @w{void * @var{inquire_cb_value}}, @
```

```
@w{gpgme_assuan_status_cb_t @var{status_cb}}, @  
@w{void * @var{status_cb_value}})
```

```
@since{1.2.0}
```

Send the Assuan @var{command} and return results via the callbacks.
Any callback may be @code{NULL}. The result of the operation may be
retrieved using @code{gpgme_wait_ext}.

Asynchronous variant.

```
@end dectyepfun
```

```
@dectyepfun
```

```
gpgme_error_t gpgme_op_assuan_transact_ext @  
  (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @  
   @w{gpgme_assuan_data_cb_t @var{data_cb}}, @  
   @w{void * @var{data_cb_value}}, @  
   @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @  
   @w{void * @var{inquire_cb_value}}, @  
   @w{gpgme_assuan_status_cb_t @var{status_cb}}, @  
   @w{void * @var{status_cb_value}}, @  
   @w{gpgme_error_t *@var{op_err}})
```

Send the Assuan @var{command} and return results via the callbacks.
The result of the operation is returned in @var{op_err}.

Synchronous variant.

```
@end dectyepfun
```

```
@node Checking for updates
```

```
@subsection How to check for software updates
```

The GnuPG Project operates a server to query the current versions of
software packages related to GnuPG. GPGME can be used to
access this online database and check whether a new version of a
software package is available.

```
@deftp {Data type} {gpgme_query_swdb_result_t}  
@since{1.8.0}
```

This

is a pointer to a structure used to store the result of a
@code{gpgme_op_query_swdb} operation. After success full call to that
function, you can retrieve the pointer to the result with
@code{gpgme_op_query_swdb_result}. The structure contains the
following member:

@table @code

@item name

This is the name of the package.

@item iversion

The currently installed version or an empty string. This value is either a copy of the argument given to @code{gpgme_op_query_swdb} or the version of the installed software as figured out by GPGME or GnuPG.

@item created

This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

@item retrieved

This gives the date the file was downloaded.

@item warning

If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could not be figured out, the

@code{update} flag may not reflect a required update status.

@item update

If this flag is set an update of the software is available.

@item urgent

If this flag is set an available update is important.

@item noinfo

If this flag is set, no valid information could be retrieved.

@item unknown

If this flag is set the given @code{name} is not known.

@item toold

If this flag is set the available information is not fresh enough.

@item error

If this flag is set some other error has occurred.

@item version

The version string of the latest released version.

@item reldate

The release date of the latest released version.

@end table

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_query_swdb @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{const char *@var{name}}, @
   @w{const char *@var{iversion}}, @
   @w{gpgme_data_t @var{reserved}})
```

@since{1.8.0}

Query the software version database for software package @var{name} and check against the installed version given by @var{iversion}. If @var{iversion} is given as @code{NULL} a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If @code{NULL} is used for @var{name} the current gpgme version is checked. @var{reserved} must be set to 0.

@end deftypefun

```
@deftypefun gpgme_query_swdb_result_t gpgme_op_query_swdb_result @
  (@w{gpgme_ctx_t @var{ctx}})
```

@since{1.8.0}

The function @code{gpgme_op_query_swdb_result} returns a @code{gpgme_query_swdb_result_t} pointer to a structure holding the result of a @code{gpgme_op_query_swdb} operation. The pointer is only valid if the last operation on the context was a successful call to @code{gpgme_op_query_swdb}. If that call failed, the result might be a @code{NULL} pointer. The returned pointer is only valid until the next operation is started on the context @var{ctx}.

@end deftypefun

@noindent

Here is an example on how to check whether GnuPG is current:

@example

```
#include
```

```
<gpgme.h>
```

```
int
```

```
main (void)
```

```
@{
```

```
gpg_error_t err;
```

```
gpgme_ctx_t ctx;
```

```
gpgme_query_swdb_result_t result;
```

```

gpgme_check_version (NULL);
err = gpgme_new (&ctx);
if (err)
    fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
else
    @{
        gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

        err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
        if (err)
            fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
        else
            @{
                result = gpgme_op_query_swdb_result (ctx);
                if (!result)
                    fprintf (stderr, "error querying swdb\n");
                if (!result->warning && !result->update)
                    printf ("GnuPG version %s is current\n",
                        result->iversion);
                else if (!result->warning && result->update)
                    printf ("GnuPG version %s can be updated to %s\n",
                        result->iversion, result->version);
                else
                    fprintf (stderr, "error finding the
update status\n");
            @}
        gpgme_release (ctx);
    @}
return 0;
@}
@end example

```

@node Run Control

@section Run Control

@cindex run control

@cindex cryptographic operation, running

@acronym{GPGME} supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when @acronym{GPGME} runs. This ensures that @acronym{GPGME} only runs when necessary and also prevents it from blocking for a long time.

@menu

- * **Waiting For Completion::** Waiting until an operation is completed.
- * **Using External Event Loops::** Advanced control over what happens when.
- * **Cancellation::** How to end pending operations prematurely.

@end menu

@node Waiting For Completion

@subsection Waiting For Completion

@cindex cryptographic operation, wait for

@cindex wait for completion

@deftypefun

```
gpgme_ctx_t gpgme_wait (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_error_t *@var{status}}, @w{int @var{hang}})
```

The function `gpgme_wait` continues the pending operation within the context `@var{ctx}`. In particular, it ensures the data exchange between `GPGME` and the crypto backend and watches over the run time status of the backend process.

If `@var{hang}` is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in `@var{status}` if `gpgme_wait` does not return `NULL`.

The `@var{ctx}` argument can be `NULL`. In that case, `gpgme_wait` waits for any context to complete its operation.

`gpgme_wait` can be used only in conjunction with any context that has a pending operation initiated with one of the `gpgme_op_*_start` functions except `gpgme_op_keylist_start` and `gpgme_op_trustlist_start` (for which you should use the corresponding `gpgme_op_*_next` functions). If `@var{ctx}` is `NULL`, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect `gpgme_wait`.

In a multi-threaded environment, only one thread should ever call `gpgme_wait` at any time, regardless of whether `@var{ctx}` is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

The function returns the `@var{ctx}` of the context which has finished the operation. If `@var{hang}` is false, and the timeout expires,

```
@code{NULL} is returned and @code{*status} will be set to 0. If an
error occurs, @code{NULL} is returned and the error is returned in
@code{*status}.
@end deftypefun
```

```
@node Using External Event Loops
```

```
@subsection Using External Event
```

```
Loops
```

```
@cindex event loop, external
```

@acronym{GPGME} hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrarily long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if @code{gpgme_wait} is used without the @var{hang} option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. @acronym{GPGME} will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading or writing. It is then the user's responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, @acronym{GPGME} will never block. This gives the user more control over the program flow, and allows to perform other tasks when @acronym{GPGME} would block otherwise.

By using this advanced mechanism, @acronym{GPGME} can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

```
@menu
```

- * I/O Callback Interface:: How I/O callbacks are registered.
- * Registering I/O Callbacks:: How to use I/O callbacks for a context.
- * I/O Callback Example:: An example how to use I/O callbacks.
- * I/O Callback Example GTK+:: How to use @acronym{GPGME} with GTK+.
- * I/O Callback Example GDK:: How to use @acronym{GPGME} with GDK.
- * I/O Callback Example Qt:: How to use @acronym{GPGME} with Qt.

```
@end menu
```

@node I/O Callback Interface

@subsubsection I/O Callback Interface

```
@deftp {Data type} {gpgme_error_t
(*gpgme_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}})}
@tindex gpgme_io_cb_t
```

The @code{gpgme_io_cb_t} type is the type of functions which @acronym{GPGME} wants to register as I/O callback handlers using the @code{gpgme_register_io_cb_t} functions provided by the user.

@var{data} and @var{fd} are provided by @acronym{GPGME} when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor @var{fd}.

The callback handler always returns @code{0}, but you should consider the return value to be reserved for later use.

```
@end deftp
```

```
@deftp {Data type} {gpgme_error_t (*gpgme_register_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}},
@w{int @var{dir}}, @w{gpgme_io_cb_t @var{fnc}}, @w{void *@var{fnc_data}}, @w{void **@var{tag}})}
@tindex gpgme_register_io_cb_t
```

The @code{gpgme_register_io_cb_t} type is the type of functions which can be called by @acronym{GPGME} to register an I/O callback function

@var{fnc} for the file descriptor @var{fd} with the user.

@var{fnc_data} should be passed as the first argument to @var{fnc} when the handler is invoked (the second argument should be @var{fd}).

If @var{dir} is 0, @var{fnc} should be called by the user when @var{fd} is ready for writing. If @var{dir} is 1, @var{fnc} should be called when @var{fd} is ready for reading.

@var{data} was provided by the user when registering the @code{gpgme_register_io_cb_t} function with @acronym{GPGME} and will always be passed as the first argument when registering a callback function.

For example, the user can use this to determine the event loop to which the file descriptor should be added.

@acronym{GPGME} will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with @code{gpgme_set_io_cbs}. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The

user should return a unique handle in @var{tag} identifying this I/O callback registration, which will be passed to the @code{gpgme_register_io_cb_t} function without interpretation when the file

descriptor should not be monitored anymore.

@end deftp

```
@deftp {Data type} {void (*gpgme_remove_io_cb_t) (@w{void *@var{tag}})}
```

The @code{gpgme_remove_io_cb_t} type is the type of functions which can be called by @acronym{GPGME} to remove an I/O callback handler that was registered before. @var{tag} is the handle that was returned by the @code{gpgme_register_io_cb_t} for this I/O callback.

@acronym{GPGME} can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

@end deftp

```
@deftp {Data type} {enum gpgme_event_io_t}
```

```
@tindex gpgme_event_io_t
```

The @code{gpgme_event_io_t} type specifies the type of an event that is reported to the user by @acronym{GPGME} as a consequence of an I/O operation.

The following events are defined:

```
@table @code
```

```
@item GPGME_EVENT_START
```

The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled.

@var{type_data} is @code{NULL} and reserved for later use.

```
@item GPGME_EVENT_DONE
```

The operation is finished, the last I/O callback for this operation was removed. The accompanying @var{type_data} points to a @code{struct gpgme_io_event_done_data} variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

```
@item GPGME_EVENT_NEXT_KEY
```

In a @code{gpgme_op_keylist_start} operation, the next key was received from the crypto engine. The accompanying @var{type_data} is a @code{gpgme_key_t} variable that contains the key with one reference for the user.

```
@end table
```

```
@end deftp
```

```
@deftp {Data type} {void (*gpgme_event_io_cb_t) (@w{void *@var{data}},
```

```
@w{gpgme_event_io_t @var{type}}, @w{void *@var{type_data}})}
```

The @code{gpgme_event_io_cb_t} type is the type of functions which can be called by @acronym{GPGME} to signal an event for an operation running

in a context which has I/O callback functions registered by the user.

`@var{data}` was provided by the user when registering the `@code{gpgme_event_io_cb_t}` function with `@acronym{GPGME}` and will always be passed as the first argument when registering a callback function.

For example, the user can use this to determine the context in which this event has occurred.

`@var{type}` will specify the type of event that has occurred.

`@var{type_data}` specifies the event further, as described in the above list of possible `@code{gpgme_event_io_t}` types.

`@acronym{GPGME}` can call this function in an I/O callback handler.

`@end deftp`

`@node` Registering I/O Callbacks

`@subsubsection` Registering I/O Callbacks

`@deftp {Data type} {struct gpgme_io_cbs}`

`@tindex gpgme_event_io_t`

This structure

is used to store the I/O callback interface functions

described in the previous section. It has the following members:

`@table @code`

`@item gpgme_register_io_cb_t add`

This is the function called by `@acronym{GPGME}` to register an I/O callback handler. It must be specified.

`@item void *add_priv`

This is passed as the first argument to the `@code{add}` function when it is called by `@acronym{GPGME}`. For example, it can be used to determine the event loop to which the file descriptor should be added.

`@item gpgme_remove_io_cb_t remove`

This is the function called by `@acronym{GPGME}` to remove an I/O callback handler. It must be specified.

`@item gpgme_event_io_cb_t event`

This is the function called by `@acronym{GPGME}` to signal an event for an operation. It must be specified, because at least the start event must be processed.

`@item void *event_priv`

This is passed as the first argument to the `@code{event}` function when it is called by `@acronym{GPGME}`. For example, it can be used to determine

the context in which the event has occurred.

@end table

@end deftp

```
@deftypefun void gpgme_set_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
```

The function @code{gpgme_set_io_cbs} enables the I/O callback interface for the context @var{ctx}. The I/O callback functions are specified by @var{io_cbs}.

If @var{io_cbs}->@code{add} is @code{NULL}, the I/O callback interface is disabled for the context, and normal operation is restored.

@end deftypefun

```
@deftypefun void gpgme_get_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
```

The function @code{gpgme_get_io_cbs} returns the I/O callback functions set with @code{gpgme_set_io_cbs} in @var{io_cbs}.

@end deftypefun

@node I/O Callback Example

@subsubsection I/O Callback Example

To actually use an external event loop, you have to implement the I/O callback functions that are used by @acronym{GPGME} to register and unregister file descriptors. Furthermore, you have to actually monitor these

file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in @acronym{GPGME} is not predictable.

@example

```
#include <assert.h>
```

```
#include <errno.h>
```

```
#include <stdlib.h>
```

```
#include <pthread.h>
```

```
#include <sys/types.h>
```

```
#include <gpgme.h>
```

```
/* The following structure holds the result of a crypto operation. */
```

```
struct op_result
```

```
@{
```

```
int done;
```

```

gpgme_error_t err;
@};

/* The following structure holds the data associated with one I/O
callback. */
struct one_fd
@{
int fd;
int dir;
gpgme_io_cb_t fnc;
void *fnc_data;
void *loop;
@};

struct event_loop
@{
pthread_mutex_t lock;
#define MAX_FDS 32
/* Unused slots are marked with FD being
-1. */
struct one_fd fds[MAX_FDS];
@};
@end example

```

The following functions implement the I/O callback interface.

```

@example
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
          void **r_tag)
@{
struct event_loop *loop = data;
struct one_fd *fds = loop->fds;
int i;

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS; i++)
  @{
    if (fds[i].fd == -1)
  @{
    fds[i].fd = fd;
    fds[i].dir = dir;
    fds[i].fnc = fnc;
    fds[i].fnc_data = fnc_data;
    fds[i].loop = loop;
    break;
  @}
  @}
@}

```

```

pthread_mutex_unlock (&loop->lock);
if (i == MAX_FDS)
    return gpg_error (GPG_ERR_GENERAL);
*r_tag = &fds[i];
return 0;
@}

void
remove_io_cb (void *tag)
@{
    struct one_fd *fd = tag;
    struct event_loop *loop = fd->loop;

    pthread_mutex_lock (&loop->lock);
    fd->fd = -1;
    pthread_mutex_unlock (&loop->lock);
@}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
@{
    struct op_result *result = data;

    /* We
    don't support list operations here. */
    if (type == GPGME_EVENT_DONE)
        @{
            result->done = 1;
            result->err = *type_data;
        @}
@}
@end example

```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```

@example
int
do_select (struct event_loop *loop)
@{
    fd_set rfd;
    fd_set wfd;
    int i, n;
    int any = 0;
    struct timeval tv;
    struct one_fd *fdlist = loop->fds;

    pthread_mutex_lock (&loop->lock);

```

```

FD_ZERO (&rfds);
FD_ZERO (&wfds);
for (i = 0; i < MAX_FDS; i++)
    if (fdlist[i].fd != -1)
        FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds);
pthread_mutex_unlock (&loop->lock);

tv.tv_sec = 0;
tv.tv_usec = 1000;

do
    @{
        n = select (FD_SETSIZE, &rfds, &wfds, NULL, &tv);
    @}
while (n < 0 && errno == EINTR);

if (n < 0)
    return n; /* Error or timeout. */

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS && n; i++)
    @{
        if (fdlist[i].fd
            != -1)
            @{
                if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds))
                    @{
                        assert (n);
                        n--;
                        any = 1;
                        /* The I/O callback handler can register/remove callbacks,
                           so we have to unlock the file descriptor list. */
                        pthread_mutex_unlock (&loop->lock);
                        (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
                        pthread_mutex_lock (&loop->lock);
                    @}
                @}
            @}
        pthread_mutex_unlock (&loop->lock);
        return any;
    @}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
@{
    int ret;

do

```

```

    @ {
        ret = do_select (loop);
    @ }
while (ret >= 0 && !result->done);
@ }
@end example

```

The main function shows how to put it all together.

```

@example
int
main (int argc, char *argv[])
@ {
    struct event_loop loop;
    struct op_result result;
    gpgme_ctx_t ctx;
    gpgme_error_t err;
    gpgme_data_t sig, text;
    int i;
    pthread_mutexattr_t attr;
    struct gpgme_io_cbs io_cbs =
    @ {
        add_io_cb,
        &loop,
        remove_io_cb,
        event_io_cb,
        &result
    @ };

    init_gpgme ();

    /* Initialize the loop structure. */

    /* The mutex must be recursive, since remove_io_cb (which acquires a
       lock) can be called while holding a lock acquired in do_select. */
    pthread_mutexattr_init (&attr);
    pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
    pthread_mutex_init (&loop.lock, &attr);
    pthread_mutexattr_destroy (&attr);

    for (i = 0; i < MAX_FDS; i++)
        loop.fds[i].fd = -1;

    /* Initialize the result structure. */
    result.done = 0;

    err = gpgme_data_new_from_file (&sig, "signature", 1);
    if (!err)

```

```

err = gpgme_data_new_from_file (&text, "text", 1);
if (!err)
err = gpgme_new (&ctx);
if (!err)
@{
gpgme_set_io_cbs (ctx, &io_cbs);
err = gpgme_op_verify_start (ctx, sig, text, NULL);
@}
if (err)
@{
fprintf (stderr, "gpgme error: %s: %s\n",
gpgme_strerror (err), gpgme_strerror (err));
exit (1);

@}

wait_for_op (&loop, &result);
if (!result.done)
@{
fprintf (stderr, "select error\n");
exit (1);
@}
if (!result.err)
@{
fprintf (stderr, "verification failed: %s: %s\n",
gpgme_strerror (result.err), gpgme_strerror (result.err));
exit (1);
@}
/* Evaluate verify result. */
@dots{}
return 0;
@}
@end example

```

```

@node I/O Callback Example GTK+
@subsection I/O Callback Example GTK+
@cindex GTK+, using @acronym{GPGME} with

```

The I/O callback interface can be used to integrate @acronym{GPGME} with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific setup.

```

@example
#include <gtk/gtk.h>

```

```

struct my_gpgme_io_cb
@{
gpgme_io_cb_t fnc;
void *fnc_data;
guint input_handler_id
@};

void
my_gpgme_io_cb
(gpointer data, gint source, GdkInputCondition condition)
@{
struct my_gpgme_io_cb *iocb = data;
(*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
struct my_gpgme_io_cb *iocb = data;
gtk_input_remove (data->input_handler_id);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
void *fnc_data, void **tag)
@{
struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
iocb->fnc = fnc;
iocb->data = fnc_data;
iocb->input_handler_id = gtk_input_add_full (fd, dir
? GDK_INPUT_READ
: GDK_INPUT_WRITE,
my_gpgme_io_callback,
0, iocb, NULL);

*tag = iocb;
return 0;
@}
@end example

```

```

@node I/O Callback Example GDK
@subsection I/O Callback Example
GDK
@cindex GDK, using @acronym{GPGME} with

```

The I/O callback interface can also be used to integrate @acronym{GPGME} with the GDK event loop. The following code snippets

shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```
@example
#include <gdk/gdk.h>

struct my_gpgme_io_cb
@{
    gpgme_io_cb_t fnc;
    void *fnc_data;
    gint tag;
@};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
@{
    struct my_gpgme_io_cb *iocb = data;
    (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
    struct my_gpgme_io_cb *iocb = data;
    gdk_input_remove (data->tag);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
@{
    struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
    iocb->fnc = fnc;
    iocb->data = fnc_data;
    iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
                                   my_gpgme_io_callback, iocb, NULL);
    *tag = iocb;
    return 0;
@}
@end example
```

@node I/O Callback Example Qt

@subsection I/O Callback Example Qt
@cindex Qt, using @acronym{GPGME} with

The I/O callback interface can also be used to integrate @acronym{GPGME} with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any Qt specific setup.

@example

```
#include <qsocketnotifier.h>
#include <qapplication.h>
```

```
struct IOCB @ {
    IOCB( GpgmeIOCb f, void * d, QSocketNotifier * n )
        : func(
            f ), data( d ), notifier( n ) @ { @ }
    GpgmeIOCb func;
    void * data;
    QSocketNotifier * notifier;
    @ }

class MyApp : public QApplication @ {

    // ...

    static void registerGpgmeIOCallback( void * data, int fd, int dir,
                                         GpgmeIOCb func, void * func_data,
                                         void ** tag ) @ {
        QSocketNotifier * n =
            new QSocketNotifier( fd, dir ? QSocketNotifier::Read
                               : QSocketNotifier::Write );
        connect( n, SIGNAL(activated(int)),
                qApp, SLOT(slotGpgmeIOCallback(int)) );
        qApp->mIOCBs.push_back( IOCB( func, func_data, n ) );
        *tag = (void*)n;
    } @ }

    static void removeGpgmeIOCallback( void * tag ) @ {
        if ( !tag ) return;
        QSocketNotifier * n = static_cast<QSocketNotifier*>( tag );
        for ( QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
              it != qApp->mIOCBs.end() ; ++it )
            if ( it->notifier == n ) @ {
                delete it->notifier;
                qApp->mIOCBs.erase(
```

```

it );
    return;
    @ }
    @ }

public slots:
void slotGpgmeIOCallback( int fd ) @ {
    for ( QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
          it != mIOCBs.end() ; ++it )
        if ( it->notifier && it->notifier->socket() == fd )
            (*(it->func)) ( it->func_data, fd );
    @ }

// ...

private:
QValueList<IOCB> mIOCBs;
// ...
@ };
@end example

```

```

@node Cancellation
@subsection Cancellation
@cindex cryptographic operation, aborting
@cindex cryptographic operation, cancelling
@cindex aborting operations
@cindex cancelling operations

```

Sometimes you do not want to wait for an operation to finish. `@acronym{GPGME}` provides two different functions to achieve that. The function `@code{gpgme_cancel}` takes effect immediately. When it returns, the operation is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function `@code{gpgme_cancel_async}` can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

```

@deftypedefun gpgme_ctx_t gpgme_cancel (@w{gpgme_ctx_t @var{ctx}})
@since{0.4.5}

```

The function `@code{gpgme_cancel}` attempts to cancel a pending operation in the context `@var{ctx}`. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call `@code{gpgme_wait}`

during cancellation. After successful cancellation, you can call `gpgme_wait` (optionally waiting on `ctx`), and the context `ctx` will appear as if it had finished with the error code `GPG_ERR_CANCEL`.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a `GPGME_EVENT_DONE` event with the error code `GPG_ERR_CANCEL` will be signalled.

The function returns an error code if the cancellation failed (in this case the state of `ctx` is not modified).

`@end deftypefun`

```
@deftypefun gpgme_ctx_t gpgme_cancel_async (@w{gpgme_ctx_t} ctx)
@since{1.1.7}
```

The function `gpgme_cancel_async` attempts to cancel a pending operation in the context `ctx`. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of `ctx` is not modified).

`@end deftypefun`

```
@c *****
@c ***** Appendices *****
@c *****
```

`@include uiserver.texi`

```
@node Debugging
@appendix How to solve problems
@cindex
debug
@cindex GPGME_DEBUG
```

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like `GPGME` and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using `@command{gpg}` or `@command{gpgsm}` on the command line. If you can't figure out why things don't work, you may use `@acronym{GPGME}`'s built in trace feature. This feature is either enabled using the environment variable `@code{GPGME_DEBUG}` or, if this is not possible, by calling the function `@code{gpgme_set_global_flag}`. The value is the trace level and an optional file name. If no file name is given the trace output is printed to `@code{stderr}`.

```
@noindent
```

```
For example
```

```
@smallexample
```

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

```
@end
```

```
smallexample
```

```
@noindent
```

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

```
@node Deprecated Functions
```

```
@appendix Deprecated Functions
```

```
@cindex deprecated
```

For backward compatibility `@acronym{GPGME}` has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

Warning: These interfaces will be removed in a future version of `@acronym{GPGME}`.

```
@deftypedef void gpgme_key_release (@w{gpgme_key_t @var{key}})
```

The function `@code{gpgme_key_release}` is equivalent to

```
@code{gpgme_key_unref}.
```

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_import_ext (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}}, @w{int *@var{nr}})
@since{0.3.9}
```

The function @code{gpgme_op_import_ext} is equivalent to:

```
@example
gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
  @ {
    gpgme_import_result_t result = gpgme_op_import_result (ctx);
    *nr = result->considered;
  @ }
@end example
@end deftypefun
```

```
@defftp {Data type} {gpgme_error_t (*gpgme_edit_cb_t) @
(@w{void *@var{handle}}, @
@w{gpgme_status_code_t @var{status}}, @
@w{const char *@var{args}}, @
@w{int @var{fd}})}
```

@tindex gpgme_edit_cb_t

The @code{gpgme_edit_cb_t} type is the type of functions which

@acronym{GPGME} calls

if it a key edit operation is on-going. The

status code @var{status} and the argument line @var{args} are passed

through by @acronym{GPGME} from the crypto engine. The file

descriptor @var{fd} is -1 for normal status messages. If @var{status}

indicates a command rather than a status message, the response to the

command should be written to @var{fd}. The @var{handle} is provided

by the user at start of operation.

The function should return @code{GPG_ERR_FALSE} if it did not handle
the status code, @code{0} for success, or any other error value.

@end defftp

```
@deftypefun gpgme_error_t gpgme_op_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}},
@w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
@since{0.3.9}
```

Note: This function is deprecated, please use

@code{gpgme_op_interact} instead.

The function @code{gpgme_op_edit} processes the key @var{KEY}

interactively, using the edit callback function @var{FNC} with the

handle @var{HANDLE}. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by @acronym{GPGME}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the edit operation completes successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or @var{key} is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
```

@since{0.3.9}

Note: This function is deprecated, please use @code{gpgme_op_interact_start} instead.

The function @code{gpgme_op_edit_start} initiates a @code{gpgme_op_edit} operation.

It can be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation was started successfully, and @code{GPG_ERR_INV_VALUE} if @var{ctx} or @var{key} is not a valid pointer.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_card_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
```

Note: This function is deprecated, please use @code{gpgme_op_interact} with the flag @code{GPGME_INTERACT_CARD} instead.

The function @code{gpgme_op_card_edit} is analogous to @code{gpgme_op_edit}, but should be used to process the smart card corresponding to the key @var{key}.

```
@deftypefun gpgme_error_t gpgme_op_card_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
```

Note: This function is deprecated, please use @code{gpgme_op_interact_start} with the flag @code{GPGME_INTERACT_CARD} instead.

The function `gpgme_op_card_edit_start` initiates a `gpgme_op_card_edit` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `ctx` or `key` is not a valid pointer.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_data_new_with_read_cb (@w{gpgme_data_t *@var{dh}}, @w{int (*@var{readfunc})} (@w{void *@var{hook}}, @w{char *@var{buffer}}, @w{size_t @var{count}}, @w{size_t *@var{nread}}), @w{void *@var{hook_value}})
```

The function `gpgme_data_new_with_read_cb` creates a new `gpgme_data_t` object and uses the callback function `readfunc` to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type

[GPGME](#)

provides. However, it can not be used to write data.

The callback function receives `hook_value` as its first argument whenever it is invoked. It should return up to `count` bytes in `buffer`, and return the number of bytes actually read in `nread`. It may return `0` in `nread` if no data is currently available. To indicate `EOF` the function should return with an error code of `-1` and set `nread` to `0`. The callback function may support to reset its internal read pointer if it is invoked with `buffer` and `nread` being `NULL` and `count` being `0`.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `dh` or `readfunc` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_data_rewind (@w{gpgme_data_t @var{dh}})
```

The function `gpgme_data_rewind` is equivalent to:

`@example`

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
? gpgme_error_from_errno (errno) : 0;
```

`@end example`

`@end deftypefun`

@def`tp` {Data type} `gpgme_attr_t`

The @code{gpgme_attr_t} type is used to specify a key or trust item attribute. The following attributes are defined:

@table @code

@item GPGME_ATTR_KEYID

This is the key ID of a sub key. It is representable as a string.

@item GPGME_ATTR_FPR

This is the fingerprint of a sub key. It is representable as a string.

@item GPGME_ATTR_ALGO

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the @code{enum gcry_pk_algos} values in the gcrypt library.

@item GPGME_ATTR_LEN

This is the key length of a sub key. It is representable as a number.

@item GPGME_ATTR_CREATED

This is the timestamp at creation time of a sub key. It is representable as a number.

@item GPGME_ATTR_EXPIRE

This is the expiration time of a sub key. It is representable as a number.

@item GPGME_ATTR_USERID

This is a user ID. There can be more than one user IDs in a @var{gpgme_key_t} object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

@item GPGME_ATTR_NAME

This is the name belonging to a user ID. It is representable as a string.

@item GPGME_ATTR_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

@item GPGME_ATTR_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

@item GPGME_ATTR_VALIDITY

This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

@item GPGME_ATTR_UID_REVOKED

This specifies if a user ID is revoked. It is representable as a number, and is @code{1} if the user ID is revoked, and @code{0} otherwise.

@item GPGME_ATTR_UID_INVALID

This specifies if a user ID is invalid. It is representable as a number, and is @code{1} if the user ID is invalid, and @code{0} otherwise.

@item GPGME_ATTR_TYPE

This returns information about the type of key. For the string function this will either be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509.

@item GPGME_ATTR_IS_SECRET

This specifies if the key is a secret key. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME_ATTR_KEY_REVOKED

This specifies if a sub key is revoked. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME_ATTR_KEY_INVALID

This specifies if a sub key is invalid. It is representable as a number, and is @code{1} if the key is invalid, and @code{0} otherwise.

@item GPGME_ATTR_KEY_EXPIRED

This specifies if a sub key is expired. It is representable as a number, and is @code{1} if the key is expired, and @code{0} otherwise.

@item GPGME_ATTR_KEY_DISABLED

This specifies if a sub key is disabled.
It is representable as a number, and is @code{1} if the key is disabled, and @code{0} otherwise.

@item GPGME_ATTR_KEY_CAPS

This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter "e" if the key can be used for encryption, "s" if the key can be used for signatures, and "c" if the key can be used for certifications.

@item GPGME_ATTR_CAN_ENCRYPT

This specifies if a sub key can be used for encryption. It is

representable as a number, and is `{1}` if the sub key can be used for encryption, and `{0}` otherwise.

@item GPGME_ATTR_CAN_SIGN

This specifies if a sub key can be used to create data signatures. It is representable as a number, and is `{1}` if the sub key can be used for signatures, and `{0}` otherwise.

@item GPGME_ATTR_CAN_CERTIFY

This specifies if a sub key can be used to create key certificates. It is representable as a number, and is `{1}` if the sub key can be used for certifications, and `{0}` otherwise.

@item GPGME_ATTR_SERIAL

The X.509 issuer serial attribute of the key. It is representable as a string.

@item GPGME_ATTR_ISSUE

The X.509 issuer name attribute of the key. It is representable as a string.

@item GPGME_ATTR_CHAINID

The X.509 chain ID can be used to build the certification chain. It is representable as a string.

@end table

@end deftp

```
@deftypefun {const char *} gpgme_key_get_string_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function `{gpgme_key_get_string_attr}` returns the value of the string-representable attribute `{what}` of key `{key}`. If the attribute is an attribute of a sub key or an user ID, `{idx}` specifies the sub key or user ID of which the attribute value is returned. The argument `{reserved}` is reserved for later use and should be `{NULL}`.

The string returned is only valid as long as the key is valid.

The function returns `{0}`

if an attribute can't be returned as a string, `{key}` is not a valid pointer, `{idx}` out of range, or `{reserved}` not `{NULL}`.

@end deftypefun

```
@deftypefun {unsigned long} gpgme_key_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function `{gpgme_key_get_ulong_attr}` returns the value of the

number-representable attribute `@var{what}` of key `@var{key}`. If the attribute is an attribute of a sub key or an user ID, `@var{idx}` specifies the sub key or user ID of which the attribute value is returned. The argument `@var{reserved}` is reserved for later use and should be `@code{NULL}`.

The function returns `@code{0}` if the attribute can't be returned as a number, `@var{key}` is not a valid pointer, `@var{idx}` out of range, or `@var{reserved}` not `@code{NULL}`.
`@end deftypefun`

`@c`

`@c Key Signatures`

`@c`

The signatures on a key are only available if the key was retrieved via a listing operation with the `@code{GPGME_KEYLIST_MODE_SIGS}` mode enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function `@code{gpgme_get_key}`.

`@defcp {Data type} gpgme_attr_t`

The `@code{gpgme_attr_t}` type is used to specify a key signature attribute. The following attributes are defined:

`@table @code`

`@item GPGME_ATTR_KEYID`

This is the key ID of the key which was used for the signature. It is representable as a string.

`@item GPGME_ATTR_ALGO`

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the `@code{enum gcry_pk_algos}` values in the gcrypt library.

`@item GPGME_ATTR_CREATED`

This is the timestamp at creation time of the signature. It is representable as a number.

`@item GPGME_ATTR_EXPIRE`

This is the expiration time of the signature. It is representable as a number.

@item GPGME_ATTR_USERID

This is the user ID associated with the signing key. The user ID is representable as a number.

@item GPGME_ATTR_NAME

This is the name belonging to a user ID. It is representable as a string.

@item GPGME_ATTR_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

@item GPGME_ATTR_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

@item GPGME_ATTR_KEY_REVOKED

This specifies if a key signature is a revocation signature. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@c @item GPGME_ATTR_KEY_EXPIRED

@c This specifies if a key signature is expired. It is representable as @c a number, and is @code{1} if the key is revoked, and @code{0} @c otherwise.

@c

@item GPGME_ATTR_SIG_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

@item GPGME_ATTR_SIG_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

@item GPGME_ATTR_SIG_STATUS

This is the same value as returned by @code{gpgme_get_sig_status}.

@end table

@end deftp

@deftypedefun {const char *} gpgme_key_sig_get_string_attr (@w{gpgme_key_t @var{key}}, @w{int @var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void * @var{reserved}}, @w{int @var{idx}})

The function @code{gpgme_key_sig_get_string_attr} returns the value of the string-representable attribute @var{what} of the signature

@var{idx} on the user ID @var{uid_idx} in the key @var{key}. The

argument @var{reserved} is reserved for later use and should be

@code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0} if an attribute can't be returned as a string, @var{key} is not a valid pointer, @var{uid_idx} or @var{idx} out of range, or @var{reserved} not @code{NULL}.

```
@end deftypefun
```

```
@deftypefun {unsigned long} gpgme_key_sig_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{int @var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function @code{gpgme_key_sig_get_ulong_attr} returns the value of the number-representable attribute @var{what} of the signature @var{idx} on the user ID @var{uid_idx} in the key @var{key}. The argument @var{reserved} is reserved for later use and should be @code{NULL}.

The function returns @code{0} if an attribute can't be returned as a string, @var{key} is not a valid pointer, @var{uid_idx} or @var{idx} out of range, or @var{reserved} not @code{NULL}.

```
@end deftypefun
```

```
@defpt {Data type} {enum gpgme_sig_stat_t}
@tindex gpgme_sig_stat_t
```

The @code{gpgme_sig_stat_t} type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

```
@table @code
@item GPGME_SIG_STAT_NONE
This status should not occur
in normal operation.
```

```
@item GPGME_SIG_STAT_GOOD
This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.
```

```
@item GPGME_SIG_STAT_GOOD_EXP
This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.
```

```
@item GPGME_SIG_STAT_GOOD_EXPKEY
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.
```

@item GPGME_SIG_STAT_BAD

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPGME_SIG_STAT_NOKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPGME_SIG_STAT_NOSIG

This status indicates that the signature data provided was not a real signature.

@item GPGME_SIG_STAT_ERROR

This status indicates that there was some other error which prevented the signature verification.

@item GPGME_SIG_STAT_DIFF

For the combined result this status means that at least two signatures have a different status. You can get each key's status with

@code{gpgme_get_sig_status}.

@end table

@end deftp

@deftypefun {const char *} gpgme_get_sig_status (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}}, @w{gpgme_sig_stat_t *@var{r_stat}}, @w{time_t *@var{r_created}})

The function @code{gpgme_get_sig_status} is equivalent to:

@example

```
gpgme_verify_result_t result;  
gpgme_signature_t sig;
```

```
result = gpgme_op_verify_result (ctx);  
sig = result->signatures;
```

```
while (sig && idx)
```

```
  @ {  
    sig = sig->next;  
    idx--;  
  @ }
```

```
if (!sig || idx)  
  return NULL;
```

```
if (r_stat)
```

```
  @ {  
    switch (gpg_err_code (sig->status))  
  @ {
```

```

case GPG_ERR_NO_ERROR:
    *r_stat = GPGME_SIG_STAT_GOOD;

    break;

case GPG_ERR_BAD_SIGNATURE:
    *r_stat = GPGME_SIG_STAT_BAD;
    break;

case GPG_ERR_NO_PUBKEY:
    *r_stat = GPGME_SIG_STAT_NOKEY;
    break;

case GPG_ERR_NO_DATA:
    *r_stat = GPGME_SIG_STAT_NOSIG;
    break;

case GPG_ERR_SIG_EXPIRED:
    *r_stat = GPGME_SIG_STAT_GOOD_EXP;
    break;

case GPG_ERR_KEY_EXPIRED:
    *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
    break;

default:
    *r_stat = GPGME_SIG_STAT_ERROR;
    break;
@ }
@ }
if (r_created)
    *r_created = sig->timestamp;
return sig->fpr;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_string_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
The function @code{gpgme_get_sig_string_attr} is equivalent to:

@example
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)

```

```

    @ {
        sig = sig->next;
        idx--;
    }
    if (!sig || idx)
        return
    NULL;

    switch (what)
    @ {
    case GPGME_ATTR_FPR:
        return sig->fpr;

    case GPGME_ATTR_ERRTOK:
        if (whatidx == 1)
            return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
        else
            return "";
        default:
            break;
    }

    return NULL;
@end example
@end deftypefun

```

```

@deftypefun {const char *} gpgme_get_sig_ulong_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})

```

The function @code{gpgme_get_sig_ulong_attr} is equivalent to:

```

@example
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
    @ {
        sig = sig->next;
        idx--;
    }
    if (!sig || idx)
        return 0;

    switch (what)
    @ {
    case GPGME_ATTR_CREATED:

```



```

return sig->timestamp;

case GPGME_ATTR_EXPIRE:
return sig->exp_timestamp;

case GPGME_ATTR_VALIDITY:
return (unsigned long) sig->validity;

case GPGME_ATTR_SIG_STATUS:
switch (sig->status)
@{
case GPG_ERR_NO_ERROR:
return GPGME_SIG_STAT_GOOD;

case GPG_ERR_BAD_SIGNATURE:
return GPGME_SIG_STAT_BAD;

case GPG_ERR_NO_PUBKEY:
return GPGME_SIG_STAT_NOKEY;

case GPG_ERR_NO_DATA:
return GPGME_SIG_STAT_NOSIG;

case GPG_ERR_SIG_EXPIRED:
return GPGME_SIG_STAT_GOOD_EXP;

case GPG_ERR_KEY_EXPIRED:
return GPGME_SIG_STAT_GOOD_EXPKEY;

default:
return GPGME_SIG_STAT_ERROR;
@}

case GPGME_ATTR_SIG_SUMMARY:
return sig->summary;

default:
break;
@}
return 0;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_key (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_key_t *@var{r_key}})
The function @code{gpgme_get_sig_key} is equivalent to:

@example

```

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
  @ {
    sig = sig->next;
    idx--;
  @ }
if (!sig || idx)
  return gpg_error
(GPG_ERR_EOF);

return gpgme_get_key (ctx, sig->fpr, r_key, 0);
@end example
@end dectyfefun

```

@include lesser.texi

@include gpl.texi

@node Concept Index

@unnumbered Concept Index

@printindex cp

@node Function and Data Index

@unnumbered Function and Data Index

@printindex fn

@bye

```

(21:protected-private-key(3:elg(1:p193:5*n^f"Q'R0_6<y mec \=c7S8u[5
ZF'xf5yi9F@T=KhZdU0(k5nZEI/ R]njVITPU$W<xs-Yx)(1:g1:)(1:y192:O9GNR{?}Y_W[FD*zuRmk%'R'\>>e9pe
eU)uS% VJ!5F)yH*O
]l'7{ @wJmQP^jurx'V2H2j[G{q_"8()(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:o"%7:5242880)16:Hs*}u
)256:Gzk3%\Kb2=ooO@, )eBBI3F|OQP3eD%n,;~L-6UH^=64i);l
e+sG"(mlH_2sn_BBO7hRcZUt(p6,{5|37C3m8EY9=gQ )(12:protected-at15:20101008T070148)))
-----BEGIN PGP PUBLIC KEY BLOCK-----

```

```

mQENBFsMHecBCACqdJgqa+CeNYwPCK+MpOwAV6uFVjDyO2LmOs6+XfDWRBU/Zjtz

```

```
8zdYNKSbLjkWN4ujV5aiyA7MtEofszszYLEoKUt1wiDScHMPW8qmEFDv19g26MeAV
rTno9D5KodHvEIs8wnrqBs8ix0WLbh6J1Dtt8HQglbN+v3gaRQrgBF6z2ZYpHHx
ZfOu3iFKlM2WE/NekRkvvFio3ApGvRhGIYw6JmmugBlo7s5xosJK0I9dkPGIEett
aF1RkcMj8sWG9vHAXcjlGgfXSN9YLppydXpkuZGm4+gjlB2a3rbQCZVFnxCyG4O
ybjkP8Jw6Udm89bK2ucYFfdrmYn/nJqRxeNABEBAAG0I1Rlc3QgTm9Qcm12S2V5
IDxub2JvZHIAZXhvbXBsZS5vcmc+iQFOBBMBCAA4FiEE4Fmh4IZtMa4TEXCITZou
EzBBU9EFAIsMHecCGwMFCwkIBwIGFQoJCAwCBBIYCAwECHgECF4AAACgkQTZouEzBB
U9F+qwf/SHj4uRnTWgyJ71FBxQDYCBq3jbi6e7hMkRpbj4JdnPIMAb2p0PjBjW
0pp4+kDPZans3UDHbma1u/SFI4/y6isJiK94Bk5xp5YliLGNuUceTjgDFe6lBhfQ1
zVWZC/NF3tPgbziIzXQTNt34nS+9dbV/QFDLW0POcN7C0jR/hgkBjMEH2PezWhSj
mL/yLflFYUAXvPxpXjC5aPJKqw0tR7m5ibznjCphE+FUMRG8EOmJc6soeJ5QspU
k2dPN3+Y0zCTNRgAHEI+yIQbM6pio6v2c+UCtT1QhW4xSI38/kcEG8QiM55r1TUy
FcWAY5n5t1nNZtMxxse3LqEon3rKiLkBDQRbDB3nAQgAqfAjSjncgERTM+ZYOWn0
QF2v2FuEuMe8mhju7Met7SN2zGv1LnjhTNshEa9IABEjZirE2Tqx4xCWDwDedK4
u1ToFvcnuAMnq2047Sh+eTypsf6WPFtPBWf6ctKY31hFXjgoyDBULBv143XU/D9C
Mt7nsKDPYHVrrnge/qWpYVcb+c00sSwNImMcwQsdTQ3VBq7MeNS9ZeBcXi+XCjhN
kjNum2AQqpkHHDQV7871yQ8RIILvZSSfklB0/SNDU+bGaw2G3lcyKdIfzi2EWWZT
oCbH38l+LV7nAEe4zFpHwW8X0Dkx2aLgxe6UszDH9L3eGhTLpJhOSiaanG+zZKm
+QARAQABiQE2BBgBCAAgFiEE4Fmh4IZtMa4TEXCITZouEzBBU9EFAIsMHecCGwA
CgkQTZouEzBBU9H5TQgAolWvIsez/WW8N2tmZEnX0LOFNb+1S4L4X983njwNdoVI
w19pbj+8RIHF/H9kcPGi7jK96gvlykQn3uez/95D2AiRFW5KYdOouFisKgHpv8Ay
BrhelHv11yK+X/0iTD0scYaG7np5162xLkaxSO9hsz2fGv20RkaXCWki69fWw0BR
XII5pZh2YFei2ZhH/tIMIW65h3w0gtgaZBBdpZTOOW4zvghyN+0MSObqkl1BvUJu
caDFI4d6ZTmP5SY+pZyktZ4bg/vMH5VFXdIKgbLx9uVeTvOupvbAW0TNUYGUBQE
nm+S0zr3W18t64e4sS3oHse8zCqo1iiImpba6F1Oaw==
```

=y6DD

-----END PGP PUBLIC KEY BLOCK-----

;;; gpgme.lisp

;;; Copyright (C) 2006 g10 Code GmbH

;;;

;;; This file is part of GPGME-CL.

;;;

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;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

```

;;; TODO

;;; Set up the library.

(in-package :gpgme)

(deftype byte-array ()
  '(simple-array (unsigned-byte 8) (*)))

(deftype character-array ()
  '(simple-array character (*)))

;;;
Debugging.

(defvar *debug* nil "If debugging output should be given or not.")

;;; Load the foreign library.

(define-foreign-library libgpgme
  (:unix "libgpgme.so")
  (t (:default "libgpgme")))

(use-foreign-library libgpgme)

;;; System dependencies.

; Access to ERRNO.
(defun ("strerror" c-strerror) :string
  (err :int))

(defun get-errno ()
  *errno*)

(defun set-errno (errno)
  (setf *errno* errno))

(define-condition system-error (error)
  ((:errno :initarg :errno :reader system-error-errno))
  (:report (lambda (c stream)
    (format stream "System error: ~A: ~A"
      (system-error-errno c)
      (c-strerror (system-error-errno c))))))
  (:documentation "Signalled when an errno is encountered.))

; Needed to write passphrases.
(defun ("write" c-write) ssize-t
  (fd :int)

```

(buffer :string) ; Actually :pointer, but we only need string.

(size size-t))

```
(defun system-write (fd buffer size)
  (let ((res (c-write fd buffer size)))
    (when (< res 0) (error 'system-error
      :errno (get-errno)))
    res))
```

;;;

;;; C Interface Definitions

;;;

;;; Data Type Interface

;;; Some new data types used for easier translation.

;;; The number of include certs. Translates to NIL for default.

```
(defctype cert-int-t
  (:wrapper :int
   :from-c translate-cert-int-t-from-foreign
   :to-c translate-cert-int-t-to-foreign))
```

;;; A string that may be NIL to indicate a null pointer.

```
(defctype string-or-nil-t
  (:wrapper :string
   :to-c translate-string-or-nil-t-to-foreign))
```

;;; Some opaque data types used by GPGME.

```
(defctype gpgme-ctx-t
  (:wrapper :pointer
   :to-c translate-gpgme-ctx-t-to-foreign)
  "The GPGME context type.")
```

```
(defctype gpgme-data-t
  (:wrapper :pointer
   :to-c translate-gpgme-data-t-to-foreign)
  "The GPGME data object type.")
```

;;; Wrappers for the libpgp-error library.

```
(defctype gpgme-error-t
  (:wrapper gpg-error::gpg-error-t
   :from-c translate-gpgme-error-t-from-foreign
   :to-c translate-gpgme-error-t-to-foreign)
  "The
```

```

GPGME error type.")

(defctype gpgme-error-no-signal-t
  (:wrapper gpg-error::gpg-error-t
   :from-c translate-gpgme-error-no-signal-t-from-foreign)
  "The GPGME error type (this version does not signal conditions in translation.")

(defctype gpgme-err-code-t gpg-error::gpg-err-code-t
  "The GPGME error code type.")

(defctype gpgme-err-source-t gpg-error::gpg-err-source-t
  "The GPGME error source type.")

(defun gpgme-err-make (source code)
  "Construct an error value from an error code and source."
  (gpg-err-make source code))

(defun gpgme-error (code)
  "Construct an error value from an error code."
  (gpgme-err-make :gpg-err-source-gpgme code))

(defun gpgme-err-code (err)
  "Retrieve an error code from the error value ERR."
  (gpg-err-code err))

(defun gpgme-err-source (err)
  "Retrieve an error source from the error value ERR."
  (gpg-err-source err))

(defun gpgme-strerror (err)
  "Return a string containing a description of the error code."
  (gpg-strerror err))

(defun
  gpgme-strsource (err)
  "Return a string containing a description of the error source."
  (gpg-strsource err))

(defun gpgme-err-code-from-errno (err)
  "Retrieve the error code for the system error. If the system error
  is not mapped, :gpg-err-unknown-errno is returned."
  (gpg-err-code-from-errno err))

(defun gpgme-err-code-to-errno (code)
  "Retrieve the system error for the error code. If this is not a
  system error, 0 is returned."
  (gpg-err-code-to-errno code))

```

```
(defun gpgme-err-make-from-errno (source err)
  (gpg-err-make-from-errno source err))

(defun gpgme-error-from-errno (err)
  (gpg-error-from-errno err))

;;;

(defcenum gpgme-data-encoding-t
  "The possible encoding mode of gpgme-data-t objects."
  (:none 0)
  (:binary 1)
  (:base64 2)
  (:armor 3)
  (:url 4)
  (:urlesc 5)
  (:url0 6)
  (:mime 7))

;;;

(defcenum gpgme-pubkey-algo-t
  "Public key algorithms from libgcrypt."
  (:rsa 1)
  (:rsa-e 2)
  (:rsa-s 3)
  (:elg-e 16)
  (:dsa 17)
  (:ecc 18)
  (:elg 20)
  (:ecdsa 301)
  (:ecdh 302)
  (:eddsa 303))

(defcenum gpgme-hash-algo-t
  "Hash algorithms from libgcrypt."
  (:none 0)
  (:md5 1)
  (:sha1 2)
  (:rmd160 3)
  (:md2 5)
  (:tiger 6)
  (:haval 7)
  (:sha256 8)
  (:sha384 9)
  (:sha512 10)
  (:sha224 11)
  (:md4 301))
```

(:crc32 302)
(:crc32-rfc1510 303)
(:crc24-rfc2440 304))

;;;

(defcenum gpgme-sig-mode-t
"The available signature modes."

(:none 0)
(:detach 1)
(:clear 2))

;;;

(defcenum gpgme-validity-t
"The available validities for a trust item or key."

(:unknown 0)
(:undefined 1)
(:never 2)
(:marginal 3)
(:full 4)
(:ultimate 5))

;;;

(defcenum gpgme-protocol-t
"The available protocols."

(:openpgp 0)
(:cms 1)
(:gpgconf 2)
(:assuan 3)
(:g13 4)
(:uiserver 5)
(:spawn 6)
(:default 254)
(:unknown 255))

;;;

(defbitfield (gpgme-keylist-mode-t :unsigned-int)
"The available keylist mode flags."

(:local 1)
(:extern 2)
(:sigs 4)
(:sig-notations)
(:with-secret 16)
(:with-tofu 32)
(:ephemeral


```
128)
(:validate 256))
```

```
;;
```

```
(defbitfield (gpgme-sig-notation-flags-t :unsigned-int)
  "The available signature notation flags."
  (:human-readable 1)
  (:critical 2))
```

```
(defctype gpgme-sig-notation-t
  (:wrapper :pointer
   :from-c translate-gpgme-sig-notation-t-from-foreign)
  "Signature notation pointer type.")
```

```
;; FIXME: Doesn't this depend on endianness?
```

```
(defbitfield (gpgme-sig-notation-bitfield :unsigned-int)
  (:human-readable 1)
  (:critical 2))
```

```
(defcstruct gpgme-sig-notation
  "Signature notations."
  (next gpgme-sig-notation-t)
  (name :pointer)
  (value :pointer)
  (name-len :int)
  (value-len :int)
  (flags gpgme-sig-notation-flags-t)
  (bitfield gpgme-sig-notation-bitfield))
```

```
;;
```

```
(defcenum gpgme-status-code-t
  "The possible status codes for the edit operation."
  (:eof 0)
  (:enter 1)
  (:leave 2)
  (:abort 3)
  (:goodsig 4)
  (:badsig 5)
  (:errsig 6)
  (:badarmor 7)
  (:rsa-or-idea 8)
  (:keyexpired 9)
  (:keyrevoked 10)
  (:trust-undefined 11)
  (:trust-never
```

12)
(:trust-marginal 13)
(:trust-fully 14)
(:trust-ultimate 15)
(:shm-info 16)
(:shm-get 17)
(:shm-get-bool 18)
(:shm-get-hidden 19)
(:need-passphrase 20)
(:validsig 21)
(:sig-id 22)
(:enc-to 23)
(:nodata 24)
(:bad-passphrase 25)
(:no-pubkey 26)
(:no-seckey 27)
(:need-passphrase-sym 28)
(:decryption-failed 29)
(:decryption-okay 30)
(:missing-passphrase 31)
(:good-passphrase 32)
(:goodmdc 33)
(:badmdc 34)
(:errmdc 35)
(:imported 36)
(:import-ok 37)
(:import-problem 38)
(:import-res 39)
(:file-start 40)
(:file-done 41)
(:file-error 42)
(:begin-decryption 43)
(:end-decryption 44)
(:begin-encryption 45)
(:end-encryption 46)
(:delete-problem 47)
(:get-bool 48)
(:get-line 49)
(:get-hidden 50)
(:got-it 51)
(:progress 52)
(:sig-created 53)
(:session-key 54)
(:notation-name 55)
(:notation-data 56)
(:policy-url 57)
(:begin-stream 58)
(:end-stream 59)

(:key-created 60)
(:userid-hint 61)
(:unexpected
62)
(:inv-recp 63)
(:no-recp 64)
(:already-signed 65)
(:sigexpired 66)
(:expsig 67)
(:expkeysig 68)
(:truncated 69)
(:error 70)
(:newsig 71)
(:revkeysig 72)
(:sig-subpacket 73)
(:need-passphrase-pin 74)
(:sc-op-failure 75)
(:sc-op-success 76)
(:cardctrl 77)
(:backup-key-created 78)
(:pka-trust-bad 79)
(:pka-trust-good 80)
(:plaintext 81)
(:inv-sgnr 82)
(:no-sgnr 83)
(:success 84)
(:decryption-info 85)
(:plaintext-length 86)
(:mountpoint 87)
(:pinentry-launched 88)
(:attribute 89)
(:begin-signing 90)
(:key-not-created 91)
(:inquire-maxlen 92)
(:failure 93)
(:key-considered 94)
(:tofu-user 95)
(:tofu-stats 96)
(:tofu-stats-long 97)
(:notation-flags 98)
(:decryption-compliance-mode 99)
(:verification-compliance-mode 100))

;;

(defctype gpgme-engine-info-t
 (:wrapper :pointer
 :from-c translate-gpgme-engine-info-t-to-foreign))

"The engine information structure pointer type.")

```
(defcstruct gpgme-engine-info
  "Engine information."
  (next gpgme-engine-info-t)
  (protocol gpgme-protocol-t)
  (file-name :string)
  (version :string)
  (req-version :string)
  (home-dir :string))
```

:::

```
(defctype gpgme-subkey-t
  (:wrapper :pointer
   :from-c translate-gpgme-subkey-t-from-foreign)
  "A subkey from a key.")
```

::: FIXME: Doesn't this depend on endianness?

```
(defbitfield (gpgme-subkey-bitfield :unsigned-int)
  "The subkey bitfield."
  (:revoked 1)
  (:expired 2)
  (:disabled 4)
  (:invalid 8)
  (:can-encrypt 16)
  (:can-sign 32)
  (:can-certify 64)
  (:secret 128)
  (:can-authenticate 256)
  (:is-qualified 512)
  (:is-cardkey 1024)
  (:is-de-vs 2048))
```

```
(defcstruct gpgme-subkey
  "Subkey from a key."
  (next gpgme-subkey-t)
  (bitfield gpgme-subkey-bitfield)
  (pubkey-algo gpgme-pubkey-algo-t)
  (length :unsigned-int)
  (keyid :string)
  (-keyid :char :count 17)
  (fpr :string)
  (timestamp :long)
  (expires :long))
```

```
(defctype gpgme-key-sig-t
```

```
(:wrapper :pointer
 :from-c translate-gpgme-key-sig-t-from-foreign)
"A signature on a user ID.")
```

```
:: FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-sig-bitfield :unsigned-int)
 "The key signature bitfield."
 (:revoked 1)
 (:expired 2)
 (:invalid 4)
 (:exportable 16))
```

```
(defcstruct gpgme-key-sig
 "A signature on a user ID."
 (next gpgme-key-sig-t)
 (bitfield gpgme-key-sig-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (keyid :string)
 (-keyid :char :count 17)
 (timestamp :long)
 (expires :long)
 (status gpgme-error-no-signal-t)
 (-class :unsigned-int)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (sig-class :unsigned-int))
```

```
(defctype gpgme-user-id-t
 (:wrapper :pointer
 :from-c translate-gpgme-user-id-t-from-foreign)
 "A user ID from a key.")
```

```
:: FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-user-id-bitfield :unsigned-int)
 "The user ID bitfield."
 (:revoked 1)
 (:invalid 2))
```

```
(defcstruct gpgme-user-id
 "A user ID from a key."
 (next
 gpgme-user-id-t)
 (bitfield gpgme-user-id-bitfield)
 (validity gpgme-validity-t)
 (uid :string))
```

```
(name :string)
(email :string)
(comment :string)
(signatures gpgme-key-sig-t)
(-last-keysig gpgme-key-sig-t))
```

```
(defctype gpgme-key-t
  (:wrapper :pointer
   :from-c translate-gpgme-key-t-from-foreign
   :to-c translate-gpgme-key-t-to-foreign)
  "A key from the keyring.")
```

```
;; FIXME: Doesn't this depend on endianness?
```

```
(defbitfield (gpgme-key-bitfield :unsigned-int)
  "The key bitfield."
  (:revoked 1)
  (:expired 2)
  (:disabled 4)
  (:invalid 8)
  (:can-encrypt 16)
  (:can-sign 32)
  (:can-certify 64)
  (:secret 128)
  (:can-authenticate 256)
  (:is-qualified 512))
```

```
(defcstruct gpgme-key
  "A signature on a user ID."
  (-refs :unsigned-int)
  (bitfield gpgme-key-bitfield)
  (protocol gpgme-protocol-t)
  (issuer-serial :string)
  (issuer-name :string)
  (chain-id :string)
  (owner-trust gpgme-validity-t)
  (subkeys gpgme-subkey-t)
  (uids gpgme-user-id-t)
  (-last-subkey gpgme-subkey-t)
  (-last-uid gpgme-user-id-t)
  (keylist-mode gpgme-keylist-mode-t))
```

```
;;;
```

```
;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.
```

```
(defctype gpgme-passphrase-cb-t :pointer)
```

```

(defctype gpgme-progress-cb-t :pointer)

(defctype gpgme-edit-cb-t :pointer)

;;;
;;; Function Interface
;;;

;;; Context management functions.

(defcfun ("gpgme_new" c-gpgme-new) gpgme-error-t
  (ctx :pointer))

(defcfun ("gpgme_release" c-gpgme-release) :void
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_protocol" c-gpgme-set-protocol) gpgme-error-t
  (ctx gpgme-ctx-t)
  (proto gpgme-protocol-t))

(defcfun ("gpgme_get_protocol" c-gpgme-get-protocol) gpgme-protocol-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_get_protocol_name" c-gpgme-get-protocol-name) :string
  (proto gpgme-protocol-t))

(defcfun ("gpgme_set_armor" c-gpgme-set-armor) :void
  (ctx gpgme-ctx-t)
  (yes :boolean))

(defcfun ("gpgme_get_armor" c-gpgme-get-armor) :boolean
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_textmode" c-gpgme-set-textmode) :void
  (ctx gpgme-ctx-t)
  (yes :boolean))

(defcfun ("gpgme_get_textmode" c-gpgme-get-textmode) :boolean
  (ctx gpgme-ctx-t))

(defconstant +include-certs-default+ -256)

(defcfun ("gpgme_set_include_certs" c-gpgme-set-include-certs) :void
  (ctx gpgme-ctx-t)
  (nr-of-certs cert-int-t))

```

```

(defcfun ("gpgme_get_include_certs" c-gpgme-get-include-certs) cert-int-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_keylist_mode" c-gpgme-set-keylist-mode) gpgme-error-t
  (ctx gpgme-ctx-t)
  (mode gpgme-keylist-mode-t))

(defcfun ("gpgme_get_keylist_mode" c-gpgme-get-keylist-mode)
  gpgme-keylist-mode-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_passphrase_cb" c-gpgme-set-passphrase-cb) :void
  (ctx gpgme-ctx-t)
  (cb gpgme-passphrase-cb-t)
  (hook-value :pointer))

(defcfun ("gpgme_get_passphrase_cb" c-gpgme-get-passphrase-cb) :void
  (ctx gpgme-ctx-t)
  (cb-p :pointer)
  (hook-value-p :pointer))

(defcfun ("gpgme_set_progress_cb"
  c-gpgme-set-progress-cb) :void
  (ctx gpgme-ctx-t)
  (cb gpgme-progress-cb-t)
  (hook-value :pointer))

(defcfun ("gpgme_get_progress_cb" c-gpgme-get-progress-cb) :void
  (ctx gpgme-ctx-t)
  (cb-p :pointer)
  (hook-value-p :pointer))

(defcfun ("gpgme_set_locale" c-gpgme-set-locale) gpgme-error-t
  (ctx gpgme-ctx-t)
  (category :int)
  (value string-or-nil-t))

(defcfun ("gpgme_ctx_get_engine_info" c-gpgme-ctx-get-engine-info)
  gpgme-engine-info-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_ctx_set_engine_info" c-gpgme-ctx-set-engine-info)
  gpgme-error-t
  (ctx gpgme-ctx-t)
  (proto gpgme-protocol-t)
  (file-name string-or-nil-t)
  (home-dir string-or-nil-t))

```



```

;;;

(defcfun ("gpgme_pubkey_algo_name" c-gpgme-pubkey-algo-name) :string
  (algo gpgme-pubkey-algo-t))

(defcfun ("gpgme_hash_algo_name" c-gpgme-hash-algo-name) :string
  (algo gpgme-hash-algo-t))

;;;

(defcfun ("gpgme_signers_clear" c-gpgme-signers-clear) :void
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_signers_add" c-gpgme-signers-add)
  gpgme-error-t
  (ctx gpgme-ctx-t)
  (key gpgme-key-t))

(defcfun ("gpgme_signers_enum" c-gpgme-signers-enum) gpgme-key-t
  (ctx gpgme-ctx-t)
  (seq :int))

;;;

(defcfun ("gpgme_sig_notation_clear" c-gpgme-sig-notation-clear) :void
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_sig_notation_add" c-gpgme-sig-notation-add) gpgme-error-t
  (ctx gpgme-ctx-t)
  (name :string)
  (value string-or-nil-t)
  (flags gpgme-sig-notation-flags-t))

(defcfun ("gpgme_sig_notation_get" c-gpgme-sig-notation-get)
  gpgme-sig-notation-t
  (ctx gpgme-ctx-t))

;;; Run Control.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-io-cb-t :pointer)

(defctype gpgme-register-io-cb-t :pointer)

(defctype gpgme-remove-io-cb-t :pointer)

```

```
(defcenum gpgme-event-io-t
  "The possible events on I/O event callbacks."
  (:start 0)
  (:done 1)
  (:next-key 2)
  (:next-trustitem 3))
```

```
(defctype gpgme-event-io-cb-t :pointer)
```

```
(defcstruct
  gpgme-io-cbs
  "I/O callbacks."
  (add gpgme-register-io-cb-t)
  (add-priv :pointer)
  (remove gpgme-remove-io-cb-t)
  (event gpgme-event-io-cb-t)
  (event-priv :pointer))
```

```
(defctype gpgme-io-cbs-t :pointer)
```

```
(defcfun ("gpgme_set_io_cbs" c-gpgme-set-io-cbs) :void
  (ctx gpgme-ctx-t)
  (io-cbs gpgme-io-cbs-t))
```

```
(defcfun ("gpgme_get_io_cbs" c-gpgme-get-io-cbs) :void
  (ctx gpgme-ctx-t)
  (io-cbs gpgme-io-cbs-t))
```

```
(defcfun ("gpgme_wait" c-gpgme-wait) gpgme-ctx-t
  (ctx gpgme-ctx-t)
  (status-p :pointer)
  (hang :int))
```

;;; Functions to handle data objects.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

```
(defctype gpgme-data-read-cb-t :pointer)
(defctype gpgme-data-write-cb-t :pointer)
(defctype gpgme-data-seek-cb-t :pointer)
(defctype gpgme-data-release-cb-t :pointer)
```

```
(defcstruct gpgme-data-cbs
  "Data callbacks."
  (read gpgme-data-read-cb-t)
  (write gpgme-data-write-cb-t)
  (seek gpgme-data-seek-cb-t))
```

```

(release gpgme-data-release-cb-t))

(defctype gpgme-data-cbs-t :pointer
  "Data callbacks pointer.")

(defcfun ("gpgme_data_read" c-gpgme-data-read) ssize-t
  (dh gpgme-data-t)
  (buffer :pointer)
  (size size-t))

(defcfun ("gpgme_data_write" c-gpgme-data-write) ssize-t
  (dh gpgme-data-t)
  (buffer :pointer)
  (size size-t))

(defcfun ("gpgme_data_seek" c-gpgme-data-seek) off-t
  (dh gpgme-data-t)
  (offset off-t)
  (whence :int))

(defcfun ("gpgme_data_new" c-gpgme-data-new) gpgme-error-t
  (dh-p :pointer))

(defcfun ("gpgme_data_release" c-gpgme-data-release) :void
  (dh gpgme-data-t))

(defcfun ("gpgme_data_new_from_mem" c-gpgme-data-new-from-mem) gpgme-error-t
  (dh-p :pointer)
  (buffer :pointer)
  (size size-t)
  (copy :int))

(defcfun ("gpgme_data_release_and_get_mem" c-gpgme-data-release-and-get-mem)
  :pointer
  (dh gpgme-data-t)
  (len-p :pointer))

(defcfun ("gpgme_data_new_from_cbs" c-gpgme-data-new-from-cbs) gpgme-error-t
  (dh-p :pointer)
  (cbs gpgme-data-cbs-t)
  (handle :pointer))

(defcfun ("gpgme_data_new_from_fd" c-gpgme-data-new-from-fd) gpgme-error-t
  (dh-p :pointer)
  (fd :int))

(defcfun ("gpgme_data_new_from_stream" c-gpgme-data-new-from-stream)
  gpgme-error-t

```

```

(dh-p :pointer)
(stream :pointer))

(defcfun ("gpgme_data_get_encoding" c-gpgme-data-get-encoding)
  gpgme-data-encoding-t
  (dh gpgme-data-t))

(defcfun ("gpgme_data_set_encoding" c-gpgme-data-set-encoding)
  gpgme-error-t
  (dh gpgme-data-t)
  (enc gpgme-data-encoding-t))

(defcfun ("gpgme_data_get_file_name" c-gpgme-data-get-file-name) :string
  (dh gpgme-data-t))

(defcfun ("gpgme_data_set_file_name" c-gpgme-data-set-file-name) gpgme-error-t
  (dh gpgme-data-t)
  (file-name string-or-nil-t))

(defcfun ("gpgme_data_new_from_file" c-gpgme-data-new-from-file) gpgme-error-t
  (dh-p :pointer)
  (fname :string)
  (copy :int))

(defcfun ("gpgme_data_new_from_filepart" c-gpgme-data-new-from-filepart)
  gpgme-error-t
  (dh-p :pointer)
  (fname :string)
  (fp
  :pointer)
  (offset off-t)
  (length size-t))

;;; Key and trust functions.

(defcfun ("gpgme_get_key" c-gpgme-get-key) gpgme-error-t
  (ctx gpgme-ctx-t)
  (fpr :string)
  (key-p :pointer)
  (secret :boolean))

(defcfun ("gpgme_key_ref" c-gpgme-key-ref) :void
  (key gpgme-key-t))

(defcfun ("gpgme_key_unref" c-gpgme-key-unref) :void
  (key gpgme-key-t))

;;; Crypto operations.

```

```

(defcfun ("gpgme_cancel" c-gpgme-cancel) gpgme-error-t
  (ctx gpgme-ctx-t))

;;;

(defctype gpgme-invalid-key-t
  (:wrapper :pointer
   :from-c translate-gpgme-invalid-key-t-from-foreign)
  "An invalid key structure.")

(defcstruct gpgme-invalid-key
  "An invalid key structure."
  (next gpgme-invalid-key-t)
  (fpr :string)
  (reason gpgme-error-no-signal-t))

;;; Encryption.

(defcstruct gpgme-op-encrypt-result
  "Encryption result structure."
  (invalid-recipients gpgme-invalid-key-t))

(defctype gpgme-op-encrypt-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-encrypt-result-t-from-foreign)
  "An encryption result structure.")

(defcfun ("gpgme_op_encrypt_result" c-gpgme-op-encrypt-result)
  gpgme-op-encrypt-result-t
  (ctx gpgme-ctx-t))

(defbitfield gpgme-encrypt-flags-t
  (:always-trust 1)
  (:no-encrypt-to 2)
  (:prepare 4)
  (:expect-sign 8)
  (:no-compress 16)
  (:symmetric 32)
  (:throw-keyids 64)
  (:wrap 128)
  (:want-address 256))

(defcfun ("gpgme_op_encrypt_start" c-gpgme-op-encrypt-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (recp :pointer) ; Key array.
  (flags gpgme-encrypt-flags-t)
  (plain gpgme-data-t))

```

```

(cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt" c-gpgme-op-encrypt) gpgme-error-t
  (ctx gpgme-ctx-t)
  (recp :pointer) ; Key array.
  (flags gpgme-encrypt-flags-t)
  (plain gpgme-data-t)
  (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign_start" c-gpgme-op-encrypt-sign-start)
  gpgme-error-t
  (ctx gpgme-ctx-t)
  (recp :pointer) ; Key array.
  (flags gpgme-encrypt-flags-t)
  (plain gpgme-data-t)
  (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign"
  c-gpgme-op-encrypt-sign) gpgme-error-t
  (ctx gpgme-ctx-t)
  (recp :pointer) ; Key array.
  (flags gpgme-encrypt-flags-t)
  (plain gpgme-data-t)
  (cipher gpgme-data-t))

;;; Decryption.

(defctype gpgme-recipient-t
  (:wrapper :pointer
  :from-c translate-gpgme-recipient-t-from-foreign)
  "A recipient structure.")

(defcstruct gpgme-recipient
  "Recipient structure."
  (next gpgme-recipient-t)
  (keyid :string)
  (-keyid :char :count 17)
  (pubkey-algo gpgme-pubkey-algo-t)
  (status gpgme-error-no-signal-t))

(defbitfield gpgme-op-decrypt-result-bitfield
  "Decryption result structure bitfield."
  (:wrong-key-usage 1)
  (:is-de-vs 2)
  (:is-mine 4))

(defcstruct gpgme-op-decrypt-result
  "Decryption result structure."

```

```

(unsupported-algorithm :string)
(bitfield gpgme-op-decrypt-result-bitfield)
(recipients gpgme-recipient-t)
(file-name :string))

(defctype gpgme-op-decrypt-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-decrypt-result-t-from-foreign)
  "A decryption result structure.")

(defcfun ("gpgme_op_decrypt_result" c-gpgme-op-decrypt-result)
  gpgme-op-decrypt-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_decrypt_start" c-gpgme-op-decrypt-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (cipher gpgme-data-t)
  (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt" c-gpgme-op-decrypt) gpgme-error-t
  (ctx gpgme-ctx-t)
  (cipher gpgme-data-t)
  (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify_start" c-gpgme-op-decrypt-verify-start)
  gpgme-error-t
  (ctx gpgme-ctx-t)
  (cipher gpgme-data-t)
  (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify" c-gpgme-op-decrypt-verify) gpgme-error-t
  (ctx gpgme-ctx-t)
  (cipher gpgme-data-t)
  (plain gpgme-data-t))

```

::: Signing.

```

(defctype gpgme-new-signature-t
  (:wrapper :pointer
   :from-c translate-gpgme-new-signature-t-from-foreign)
  "A new signature structure.")

(defcstruct gpgme-new-signature
  "New signature structure."
  (next gpgme-new-signature-t)
  (type gpgme-sig-mode-t)
  (pubkey-algo gpgme-pubkey-algo-t)
  (hash-algo gpgme-hash-algo-t))

```

```

(-obsolete-class :unsigned-long)
(timestamp :long)
(fpr :string)
(-obsolete-class-2 :unsigned-int)
(sig-class :unsigned-int))

(defcstruct gpgme-op-sign-result
  "Signing result structure."
  (invalid-signers gpgme-invalid-key-t)
  (signatures gpgme-new-signature-t))

(defctype gpgme-op-sign-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-sign-result-t-from-foreign)
  "A signing result structure.")

(defcfun ("gpgme_op_sign_result" c-gpgme-op-sign-result)
  gpgme-op-sign-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_sign_start" c-gpgme-op-sign-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (plain gpgme-data-t)
  (sig gpgme-data-t)
  (mode gpgme-sig-mode-t))

(defcfun ("gpgme_op_sign" c-gpgme-op-sign) gpgme-error-t
  (ctx gpgme-ctx-t)
  (plain gpgme-data-t)
  (sig gpgme-data-t)
  (mode gpgme-sig-mode-t))

;;; Verify.

(defbitfield (gpgme-sigsum-t :unsigned-int)
  "Flags
used for the summary field in a gpgme-signature-t."
  (:valid #x0001)
  (:green #x0002)
  (:red #x0004)
  (:key-revoked #x0010)
  (:key-expired #x0020)
  (:sig-expired #x0040)
  (:key-missing #x0080)
  (:crl-missing #x0100)
  (:crl-too-old #x0200)
  (:bad-policy #x0400)
  (:sys-error #x0800))

```



```

(:tofu-conflict #x1000))

(defctype gpgme-signature-t
  (:wrapper :pointer
   :from-c translate-gpgme-signature-t-from-foreign)
  "A signature structure.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-signature-bitfield :unsigned-int)
  "The signature bitfield."
  (:wrong-key-usage 1)
  (:pka-trust 2)
  (:chain-model 4)
  (:is-de-vs 8))

(defcstruct gpgme-signature
  "Signature structure."
  (next gpgme-signature-t)
  (summary gpgme-sigsum-t)
  (fpr :string)
  (status gpgme-error-no-signal-t)
  (notations gpgme-sig-notation-t)
  (timestamp :unsigned-long)
  (exp-timestamp :unsigned-long)
  (bitfield gpgme-signature-bitfield)
  (validity gpgme-validity-t)
  (validity-reason
   gpgme-error-no-signal-t)
  (pubkey-algo gpgme-pubkey-algo-t)
  (hash-algo gpgme-hash-algo-t))

(defcstruct gpgme-op-verify-result
  "Verify result structure."
  (signatures gpgme-signature-t)
  (file-name :string))

(defctype gpgme-op-verify-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-verify-result-t-from-foreign)
  "A verify result structure.")

(defcfun ("gpgme_op_verify_result" c-gpgme-op-verify-result)
  gpgme-op-verify-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_verify_start" c-gpgme-op-verify-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (sig gpgme-data-t))

```

```
(signed-text gpgme-data-t)
(plaintext gpgme-data-t))

(defcfun ("gpgme_op_verify" c-gpgme-op-verify) gpgme-error-t
  (ctx gpgme-ctx-t)
  (sig gpgme-data-t)
  (signed-text gpgme-data-t)
  (plaintext gpgme-data-t))
```

::: Import.

```
(defbitfield (gpgme-import-flags-t :unsigned-int)
  "Flags used for the import status field."
  (:new #x0001)
  (:uid #x0002)
  (:sig #x0004)
  (:subkey #x0008)
  (:secret
   #x0010))
```

```
(defctype gpgme-import-status-t
  (:wrapper :pointer
   :from-c translate-gpgme-import-status-t-from-foreign)
  "An import status structure.")
```

```
(defcstruct gpgme-import-status
  "New import status structure."
  (next gpgme-import-status-t)
  (fpr :string)
  (result gpgme-error-no-signal-t)
  (status :unsigned-int))
```

```
(defcstruct gpgme-op-import-result
  "Import result structure."
  (considered :int)
  (no-user-id :int)
  (imported :int)
  (imported-rsa :int)
  (unchanged :int)
  (new-user-ids :int)
  (new-sub-keys :int)
  (new-signatures :int)
  (new-revocations :int)
  (secret-read :int)
  (secret-imported :int)
  (secret-unchanged :int)
  (skipped-new-keys :int)
  (not-imported :int))
```

```

(imports gpgme-import-status-t))

(defctype gpgme-op-import-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-import-result-t-from-foreign)
  "An import status result structure.")

(defcfun ("gpgme_op_import_result" c-gpgme-op-import-result)
  gpgme-op-import-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_import_start" c-gpgme-op-import-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (keydata gpgme-data-t))

(defcfun ("gpgme_op_import" c-gpgme-op-import) gpgme-error-t
  (ctx gpgme-ctx-t)
  (keydata gpgme-data-t))

;;; Export.

(defcfun ("gpgme_op_export_start" c-gpgme-op-export-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (pattern :string)
  (reserved :unsigned-int)
  (keydata gpgme-data-t))

(defcfun ("gpgme_op_export" c-gpgme-op-export) gpgme-error-t
  (ctx gpgme-ctx-t)
  (pattern :string)
  (reserved :unsigned-int)
  (keydata gpgme-data-t))

;;; FIXME: Extended export interfaces require array handling.

;;; Key generation.

(defbitfield (gpgme-genkey-flags-t :unsigned-int)
  "Flags used for the key generation result bitfield."
  (:primary #x0001)
  (:sub #x0002)
  (:uid #x0004))

(defcstruct gpgme-op-genkey-result
  "Key generation result structure."
  (bitfield gpgme-genkey-flags-t)
  (fpr :string))

```

```

(defctype gpgme-op-genkey-result-t :pointer
 "A
 key generation result structure.")

(defcfun ("gpgme_op_genkey_result" c-gpgme-op-genkey-result)
 gpgme-op-genkey-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_genkey_start" c-gpgme-op-genkey-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

(defcfun ("gpgme_op_genkey" c-gpgme-op-genkey) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

;;; Key deletion.

(defcfun ("gpgme_op_delete_start" c-gpgme-op-delete-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

(defcfun ("gpgme_op_delete" c-gpgme-op-delete) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

;;; FIXME: Add edit interfaces.

;;; Keylist interface.

(defbitfield (gpgme-keylist-flags-t :unsigned-int)
 "Flags used for the key listing result bitfield."
 (:truncated #x0001))

(defcstruct gpgme-op-keylist-result
 "Key listing result structure."
 (bitfield
 gpgme-keylist-flags-t))

(defctype gpgme-op-keylist-result-t :pointer
 "A key listing result structure.")

```

```

(defun ("gpgme_op_keylist_result" c-gpgme-op-keylist-result)
  gpgme-op-keylist-result-t
  (ctx gpgme-ctx-t))

(defun ("gpgme_op_keylist_start" c-gpgme-op-keylist-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (pattern :string)
  (secret_only :boolean))

;;; FIXME: Extended keylisting requires array handling.

(defun ("gpgme_op_keylist_next" c-gpgme-op-keylist-next) gpgme-error-t
  (ctx gpgme-ctx-t)
  (r-key :pointer))

(defun ("gpgme_op_keylist_end" c-gpgme-op-keylist-end) gpgme-error-t
  (ctx gpgme-ctx-t))

;;; Various functions.

(defun ("gpgme_check_version" c-gpgme-check-version) :string
  (req-version string-or-nil-t))

(defun ("gpgme_get_engine_info" c-gpgme-get-engine-info) gpgme-error-t
  (engine-info-p :pointer))

(defun ("gpgme_set_engine_info" c-gpgme-set-engine-info) gpgme-error-t
  (proto gpgme-protocol-t)
  (file-name string-or-nil-t)
  (home-dir
  string-or-nil-t))

(defun ("gpgme_engine_check_version" c-gpgme-engine-check-version)
  gpgme-error-t
  (proto gpgme-protocol-t))

;;;
;;; L I S P   I N T E R F A C E
;;;

;;;
;;; Lisp type translators.
;;;

;;; Both directions.

;;; cert-int-t is a helper type that takes care of representing the
;;; default number of certs as NIL.

```

```
(defun translate-cert-int-t-from-foreign (value)
  (cond
    ((eql value +include-certs-default+) nil)
    (t value)))
```

```
(defun translate-cert-int-t-to-foreign (value)
  (cond
    (value value)
    (t +include-certs-default+)))
```

```
::: string-or-nil-t translates a null pointer to NIL and vice versa.
::: Translation from foreign null pointer already works as expected.
```

```
(defun translate-string-or-nil-t-to-foreign (value)
  (cond
    (value value)
    (t (null-pointer))))
```

```
::: Output only.
```

```
::: These type translators only convert from foreign type, because we
::: never use these types in the other direction.
```

```
::: Convert gpgme-engine-info-t linked lists into a
list of property
::: lists. Note that this converter will automatically be invoked
::: recursively.
:::
::: FIXME: Should we use a hash table (or struct, or clos) instead of
::: property list, as recommended by the Lisp FAQ?
```

```
(defun translate-gpgme-engine-info-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next protocol file-name version req-version home-dir)
         value (:struct gpgme-engine-info))
        (append (list protocol (list
            :file-name file-name
            :version version
            :req-version req-version
            :home-dir home-dir))
            next))))))
```

```
(defun translate-gpgme-invalid-key-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
```

```
(t (with-foreign-slots
  ((next fpr reason)
   value (:struct gpgme-invalid-key))
  (append (list (list :fpr fpr
    :reason reason))
    next))))
```

```
(defun translate-gpgme-op-encrypt-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
      ((invalid-recipients)
       value (:struct gpgme-op-encrypt-result))
      (list :encrypt
        (list :invalid-recipients invalid-recipients))))))
```

```
(defun translate-gpgme-recipient-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
      ((next keyid pubkey-algo status)
       value (:struct gpgme-recipient))
      (append (list (list :keyid keyid
        :pubkey-algo pubkey-algo
        :status status))
        next))))
```

```
(defun translate-gpgme-op-decrypt-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
      ((unsupported-algorithm bitfield recipients file-name)
       value (:struct gpgme-op-decrypt-result))
      (list :decrypt (list :unsupported-algorithm unsupported-algorithm
        :bitfield bitfield
        :recipients recipients
        :file-name file-name))))))
```

```
(defun translate-gpgme-new-signature-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
      ((next
        type pubkey-algo hash-algo timestamp fpr sig-class)
       value (:struct gpgme-new-signature))
      (append (list (list :type type
        :pubkey-algo pubkey-algo
```

```

      :hash-algo hash-algo
      :timestamp timestamp
      :fpr fpr
      :sig-class sig-class))
next))))))

(defun translate-gpgme-op-sign-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((invalid-signers signatures)
         value (:struct gpgme-op-sign-result))
        (list :sign (list :invalid-signers invalid-signers
            :signatures signatures))))))

(defun translate-gpgme-signature-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next summary fpr status notations timestamp
         exp-timestamp bitfield validity validity-reason
         pubkey-algo hash-algo)
         value (:struct gpgme-signature))
        (append (list (list :summary summary
            :fpr fpr
            :status status
            :notations notations
            :timestamp timestamp

            :exp-timestamp exp-timestamp
            :bitfield bitfield
            :validity validity
            :validity-reason validity-reason
            :pubkey-algo pubkey-algo))
            next))))))

(defun translate-gpgme-op-verify-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((signatures file-name)
         value (:struct gpgme-op-verify-result))
        (list :verify (list :signatures signatures
            :file-name file-name))))))

(defun translate-gpgme-import-status-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)

```



```

(t (with-foreign-slots
  ((next fpr result status)
   value (:struct gpgme-import-status))
  (append (list (list :fpr fpr
    :result result
    :status status))
    next))))))

(defun translate-gpgme-op-import-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
      ((considered no-user-id imported imported-rsa unchanged
        new-user-ids new-sub-keys new-signatures
        new-revocations
        secret-read secret-imported
        secret-unchanged skipped-new-keys not-imported
        imports)
       value (:struct gpgme-op-import-result))
      (list :verify (list :considered considered
        :no-user-id no-user-id
        :imported imported
        :imported-rsa imported-rsa
        :unchanged unchanged
        :new-user-ids new-user-ids
        :new-sub-keys new-sub-keys
        :new-signatures new-signatures
        :new-revocations new-revocations
        :secret-read secret-read
        :secret-imported secret-imported
        :secret-unchanged secret-unchanged
        :skipped-new-keys skipped-new-keys
        :not-imported not-imported
        :imports imports))))))

```

;;; Error handling.

;;; Use gpgme-error-no-signal-t to suppress automatic error handling

;;; at translation time.

;;;

;;; FIXME: Part of this probably should be in gpg-error!

```

(define-condition gpgme-error (error)
  ((value :initarg :gpgme-error :reader gpgme-error-value))
  (:report (lambda (c stream)

```

```

  (format stream "GPGME returned error: ~A (~A)"

```

```

    (gpgme-strerror (gpgme-error-value c))

```

```
(gpgme-strsource (gpgme-error-value c))))
(:documentation "Signalled when a GPGME function returns an error."))
```

```
(defun translate-gpgme-error-t-from-foreign (value)
  "Raise a GPGME-ERROR if VALUE is non-zero."
  (when (not (eql (gpgme-err-code value) :gpg-err-no-error))
    (error 'gpgme-error :gpgme-error value))
  (gpg-err-canonicalize value))
```

```
(defun translate-gpgme-error-t-to-foreign (value)
  "Canonicalize the error value."
  (if (eql (gpgme-err-code value) :gpg-err-no-error)
      0
      (gpg-err-as-value value)))
```

```
(defun translate-gpgme-error-no-signal-t-from-foreign (value)
  "Canonicalize the error value."
  (gpg-err-canonicalize value))
```

```
;;; *INTERNAL* Lispy Function Interface that is still close to the C
;;; interface.
```

```
;;; Passphrase callback management.
```

```
;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.
```

```
(defvar
  *passphrase-handles* (make-hash-table)
  "Hash table with GPGME context address as key and the corresponding
  passphrase callback object as value.")
```

```
(defcallback passphrase-cb gpgme-error-t ((handle :pointer)
  (uid-hint :string)
  (passphrase-info :string)
  (prev-was-bad :boolean)
  (fd :int))
  (handler-case
    (let* ((passphrase-cb
      (gethash (pointer-address handle) *passphrase-handles*))
      (passphrase
      (cond
        ((functionp passphrase-cb)
         (concatenate 'string
           (funcall passphrase-cb uid-hint passphrase-info
             prev-was-bad)
           '#\Newline)))
```

```

(t (concatenate 'string passphrase-cb '(#\Newline))))
  (passphrase-len (length passphrase))
  ;; FIXME: Could be more robust.
  (res (system-write fd passphrase passphrase-len)))
(cond
 ((< res passphrase-len) ; FIXME: Blech. A weak attempt to be robust.
  (gpgme-error :gpg-err-ival))
 (t (gpgme-error :gpg-err-no-error))))
(gpgme-error (err)
 (gpgme-error-value err))
(system-error (err) (gpgme-error-from-errno (system-error-errno err)))
;; FIXME: The original error gets lost here.
(condition (err) (progn
  (when *debug*
    (format t "DEBUG: passphrase-cb: Unexpressable: ~A~%"
      err))
  (gpgme-error :gpg-err-general))))))

```

;;; CTX is a C-pointer to the context.

```

(defun gpgme-set-passphrase-cb (ctx cb)
 "Set the passphrase callback for CTX."
 (let ((handle (pointer-address ctx)))
  (cond
   (cb (setf (gethash handle *passphrase-handles*) cb)
    (c-gpgme-set-passphrase-cb ctx (callback passphrase-cb) ctx)
    (t (c-gpgme-set-passphrase-cb ctx (null-pointer) (null-pointer))
     (remhash handle *passphrase-handles*))))))

```

;;; Progress callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
 ;;; default implementation for ease-of-use.

```

(defvar *progress-handles* (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
 progress callback
 object as value.")

```

```

(defcallback progress-cb :void ((handle :pointer)
  (what :string)
  (type :int)
  (current :int)
  (total :int))
(handler-case
  (let* ((progress-cb
    (gethash (pointer-address handle) *progress-handles*)))
    (funcall progress-cb what type current total))
  ;; FIXME: The original error gets lost here.

```

```

(condition (err) (when *debug*
  (format t "DEBUG: progress-cb: Unexpressable: ~A~%"
    err))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-progress-cb (ctx cb)
  "Set the progress callback for CTX."
  (let ((handle (pointer-address ctx)))
    (cond
      (cb (setf (gethash handle *progress-handles*) cb)
        (c-gpgme-set-progress-cb ctx (callback progress-cb) ctx))
      (t (c-gpgme-set-progress-cb ctx (null-pointer) (null-pointer))
        (remhash handle *progress-handles*))))))

;;; Context management.

(defun gpgme-new (&key (protocol :openpgp) armor textmode include-certs
  keylist-mode passphrase progress file-name
  home-dir)
  "Allocate a new GPGME context."
  (with-foreign-object (ctx-p 'gpgme-ctx-t)
    (c-gpgme-new ctx-p)
    (let ((ctx (mem-ref ctx-p 'gpgme-ctx-t)))
      ;; Set locale?
      (gpgme-set-protocol ctx protocol)
      (gpgme-set-armor ctx armor)
      (gpgme-set-textmode ctx textmode)
      (when include-certs (gpgme-set-include-certs ctx include-certs))
      (when keylist-mode (gpgme-set-keylist-mode ctx keylist-mode))
      (gpgme-set-passphrase-cb ctx passphrase)
      (gpgme-set-progress-cb ctx progress)
      (gpgme-set-engine-info ctx protocol
        :file-name file-name :home-dir home-dir)
      (when *debug* (format t "DEBUG: gpgme-new: ~A~%" ctx)
        ctx)))

(defun gpgme-release (ctx)
  "Release a GPGME context."
  (when *debug* (format t "DEBUG: gpgme-release: ~A~%" ctx))
  (c-gpgme-release ctx))

(defun gpgme-set-protocol (ctx proto)
  "Set the protocol to be used by CTX to PROTO."
  (c-gpgme-set-protocol ctx proto))

(defun gpgme-get-protocol (ctx)
  "Get

```

```

the protocol used with CTX."
(c-gpgme-get-protocol ctx))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme-get-protocol-name

(defun gpgme-set-armor (ctx armor)
  "If ARMOR is true, enable armor mode in CTX, disable it otherwise."
  (c-gpgme-set-armor ctx armor))

(defun gpgme-armor-p (ctx)
  "Return true if armor mode is set for CTX."
  (c-gpgme-get-armor ctx))

(defun gpgme-set-textmode (ctx textmode)
  "If TEXTMODE is true, enable text mode mode in CTX, disable it otherwise."
  (c-gpgme-set-textmode ctx textmode))

(defun gpgme-textmode-p (ctx)
  "Return true if text mode mode is set for CTX."
  (c-gpgme-get-textmode ctx))

(defun gpgme-set-include-certs (ctx &optional certs)
  "Include up to CERTS certificates in an S/MIME message."
  (c-gpgme-set-include-certs ctx certs))

(defun gpgme-get-include-certs (ctx)
  "Return the number of certs to include in an S/MIME message,
or NIL if the default is used."
  (c-gpgme-get-include-certs ctx))

(defun gpgme-get-keylist-mode (ctx)
  "Get the keylist mode in CTX."
  (c-gpgme-get-keylist-mode ctx))

(defun gpgme-set-keylist-mode (ctx mode)
  "Set the keylist mode in CTX."
  (c-gpgme-set-keylist-mode ctx mode))

;;; FIXME: How to handle locale? cffi-grovel?

(defun gpgme-get-engine-info (&optional ctx)
  "Retrieve the engine info for CTX, or the default if CTX is omitted."
  (cond
   (ctx (c-gpgme-ctx-get-engine-info ctx))
   (t (with-foreign-object (info-p 'gpgme-engine-info-t)

```

```

(c-gpgme-get-engine-info info-p)
(mem-ref info-p 'gpgme-engine-info-t))))))

(defun gpgme-set-engine-info (ctx proto &key file-name home-dir)
  "Set the engine info for CTX, or the default if CTX is NIL."
  (cond
   (ctx (c-gpgme-ctx-set-engine-info ctx proto file-name home-dir))
   (t (c-gpgme-set-engine-info proto file-name home-dir))))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme_pubkey_algo_name, gpgme_hash_algo_name

(defun gpgme-set-signers (ctx keys)
  "Set the signers for the context CTX."
  (c-gpgme-signers-clear ctx)
  (dolist (key keys) (c-gpgme-signers-add ctx key)))

;;;

(defun gpgme-set-sig-notation (ctx notations)
  "Set the sig notation for the context CTX."
  (c-gpgme-sig-notation-clear ctx)
  (dolist (notation notations)
   (c-gpgme-sig-notation-add
    ctx (first notation) (second notation) (third notation))))

(defun gpgme-get-sig-notation (ctx)
  "Get the signature notation data for the context CTX."
  (c-gpgme-sig-notation-get ctx))

;;; FIXME: Add I/O callback interface, for integration with clg.

;;; FIXME: Add gpgme_wait?

;;; Streams
;;; -----
;;;
;;; GPGME uses standard streams. You can define your own streams, or
;;; use the existing file or string streams.
;;;
;;; A stream-spec is either a stream, or a list with a stream as its
;;; first argument followed by keyword parameters: encoding,
;;; file-name.
;;;
;;; FIXME: Eventually, we should provide a class that can be mixed
;;; into stream classes and which provides accessors for encoding and
;;; file-names. This interface

```

```

should be provided in addition to the
;;; above sleazy interface, because the sleazy interface is easier to
;;; use (less typing), and is quite sufficient in a number of cases.
;;;
;;; For best results, streams with element type (unsigned-byte 8)
;;; should be used. Character streams may work if armor mode is used.

;;; Do we need to provide access to GPGME data objects through streams
;;; as well? It seems to me that specific optimizations, like
;;; directly writing to file descriptors, is better done by extending
;;; the sleazy syntax (stream-spec) instead of customized streams.
;;; Customized streams do buffering, and this may mess up things. Mmh.

```

```

(defvar *data-handles* (make-hash-table)
  "Hash table with GPGME data user callback handle address as key
  and the corresponding stream as value.")

;;; The release callback removes the stream from the *data-handles*
;;; hash and releases the CBS structure that is used as the key in
;;; that hash. It is implicitly invoked (through
GPGME) by
;;; gpgme-data-release.
(defcallback data-release-cb :void ((handle :pointer))
  (unwind-protect (remhash (pointer-address handle) *data-handles*)
    (when (not (null-pointer-p handle)) (foreign-free handle))))

(defcallback data-read-cb ssize-t ((handle :pointer) (buffer :pointer)
  (size size-t))
  (when *debug* (format t "DEBUG: gpgme-data-read-cb: want ~A~%" size))
  (let ((stream (gethash (pointer-address handle) *data-handles*)))
    (cond
      (stream
        (let* ((stream-type (stream-element-type stream))
              (seq (make-array size :element-type stream-type))
              (read (read-sequence seq stream)))
          (cond
            ((equal stream-type '(unsigned-byte 8))
             (dotimes (i read)
              (setf (mem-aref buffer :unsigned-char i)
                    (aref (the byte-array seq) i))))
            ((eql stream-type 'character)
             (dotimes (i read)
              (setf (mem-aref buffer :unsigned-char
                                i)
                    (char-code (aref (the character-array seq) i))))))
          i)
          (t
           (dotimes (i read)
            (setf (mem-aref buffer :unsigned-char i)
                  (char-code (aref (the character-array seq) i))))))

```

```

        (coerce (aref seq i) '(unsigned-byte 8))))))
    (when *debug* (format t "DEBUG: gpgme-data-read-cb: read ~A~%" read)
      read))
  (t
   (set-errno +ebadf+
    -1))))

(defcallback data-write-cb ssize-t ((handle :pointer) (buffer :pointer)
                                   (size size-t))
  (when *debug* (format t "DEBUG: gpgme-data-write-cb: want ~A~%" size))
  (let ((stream (gethash (pointer-address handle) *data-handles*)))
    (cond
     (stream
      (let* ((stream-type (stream-element-type stream))
              (seq (make-array size :element-type stream-type)))
        (cond
         ((equal stream-type '(unsigned-byte 8))
          (dotimes (i size)
           (setf (aref (the byte-array seq) i)
                 (mem-aref buffer :unsigned-char i))))
         ((eql stream-type 'character)
          (dotimes (i size)
           (setf (aref (the character-array seq) i)
                 (code-char (mem-aref buffer :unsigned-char i))))))
        (t
         (dotimes (i size)
          (setf (aref seq i)
                (coerce (mem-aref buffer :unsigned-char i) stream-type))))))
      (write-sequence seq stream)
      size))
    (t
     (set-errno +ebadf+
      -1))))

```

;;; This little helper macro allows us to swallow the cbs structure by
 ;;; simply setting it to a null pointer, but still protect against
 ;;; conditions.

```

(defmacro with-cbs-swallowed ((cbs) &body body)
  `(let ((,cbs (foreign-alloc '(struct gpgme-data-cbs))))
    (unwind-protect (progn ,@body)
      (when (not (null-pointer-p ,cbs)) (foreign-free ,cbs))))))

```

```

(defun gpgme-data-new (stream &key encoding file-name)
  "Allocate a new GPGME data object for STREAM."
  (with-foreign-object (dh-p 'gpgme-data-t)
    ;;; We allocate one CBS structure
    for each stream we wrap in a
    ;;; data object. Although we could also share all these

```



```

;;; structures, as they contain the very same callbacks, we need a
;;; unique C pointer as handle anyway to look up the stream in the
;;; callback. This is a convenient one to use.
(with-cbs-swallowed (cbs)
  (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'read)
        (callback data-read-cb))
  (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'write)
        (callback data-write-cb))
  (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'seek)
        (null-pointer))
  (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'release)
        (callback data-release-cb))
  (c-gpgme-data-new-from-cbs dh-p cbs cbs)
  (let ((dh (mem-ref dh-p 'gpgme-data-t)))
    (when encoding (gpgme-data-set-encoding dh encoding))
    (when file-name (gpgme-data-set-file-name dh file-name))
    ;;; Install the stream into the hash table and
    ;;; swallow the cbs
    ;;; structure while protecting against any errors.
    (unwind-protect
      (progn
        (setf (gethash (pointer-address cbs) *data-handles*) stream)
              (setf cbs (null-pointer)))
        (when (not (null-pointer-p cbs)) (c-gpgme-data-release dh)))
      (when *debug* (format t "DEBUG: gpgme-data-new: ~A~%" dh)
                dh))))

;;; This function releases a GPGME data object. It implicitly
;;; invokes the data-release-cb function to clean up associated junk.
(defun gpgme-data-release (dh)
  "Release a GPGME data object."
  (when *debug* (format t "DEBUG: gpgme-data-release: ~A~%" dh))
  (c-gpgme-data-release dh))

(defclass data ()
  (c-data) ; The C data object pointer
  (:documentation "The GPGME data type.))

(defmethod initialize-instance :after ((data data) &key streamspec
                                     &allow-other-keys)
  (let ((c-data (if (listp streamspec)
                    (apply #'gpgme-data-new streamspec)
                    (gpgme-data-new streamspec))))
    (cleanup t))
  (unwind-protect
    (progn
      (setf (slot-value data 'c-data) c-data)
      (finalize data (lambda () (gpgme-data-release c-data))))))

```

```

    (setf cleanup nil)
    (if cleanup (gpgme-data-release c-data))))))

(defun translate-gpgme-data-t-to-foreign (value)
  ;; Allow a pointer to be passed directly for the finalizer to work.
  (cond
   ((null value) (null-pointer))
   ((pointerp value) value)
   (t (slot-value value 'c-data))))

(defmacro with-gpgme-data ((dh streamspec) &body body)
  `(let ((,dh (make-instance 'data :streamspec ,streamspec)))
    ,@body))

(defun gpgme-data-get-encoding (dh)
  "Get the encoding associated with the data object DH."
  (c-gpgme-data-get-encoding dh))

(defun gpgme-data-set-encoding (dh encoding)
  "Set the encoding associated with the data object DH to ENCODING."
  (c-gpgme-data-set-encoding dh encoding))

(defun gpgme-data-get-file-name (dh)
  "Get the file name associated with the data object
  DH."
  (c-gpgme-data-get-file-name dh))

(defun gpgme-data-set-file-name (dh file-name)
  "Set the file name associated with the data object DH to FILE-NAME."
  (c-gpgme-data-set-file-name dh file-name))

;;; FIXME: Add key accessor interfaces.

(defun gpgme-get-key (ctx fpr &optional secret)
  "Get the key with the fingerprint FPR from the context CTX."
  (with-foreign-object (key-p 'gpgme-key-t)
    (c-gpgme-get-key ctx fpr key-p secret)
    (mem-ref key-p 'gpgme-key-t)))

(defun gpgme-key-ref (key)
  "Acquire an additional reference to the key KEY."
  (when *debug* (format t "DEBUG: gpgme-key-ref: ~A~%" key))
  (c-gpgme-key-ref key))

(defun gpgme-key-unref (key)
  "Release a reference to the key KEY."
  (when *debug* (format t "DEBUG: gpgme-key-unref: ~A~%" key))
  (c-gpgme-key-unref key))

```

```
;;; FIXME: We REALLY need pretty printing for keys and all the other
```

```
;;; big structs.
```

```
;;; Various interfaces.
```

```
(defun gpgme-check-version (&optional req-version)
  (c-gpgme-check-version req-version))
```

```
;;;
```

```
;;;
```

```
The *EXPORTED* CLOS interface.
```

```
;;;
```

```
;;; The context type.
```

```
;;; We wrap the C context pointer into a class object to be able to
```

```
;;; stick a finalizer on it.
```

```
(defclass context ()
  (c-ctx ; The C context object pointer.
    signers ; The list of signers.
    sig-notation) ; The list of signers.
  (:documentation "The GPGME context type."))
```

```
(defmethod initialize-instance :after ((ctx context) &rest rest
  &key &allow-other-keys)
  (let ((c-ctx (apply #'gpgme-new rest))
        (cleanup t))
    (unwind-protect
      (progn (setf (slot-value ctx 'c-ctx) c-ctx)
             (finalize ctx (lambda () (gpgme-release c-ctx))))
      (setf cleanup nil)
      (if cleanup (gpgme-release c-ctx))))))
```

```
(defun translate-gpgme-ctx-t-to-foreign (value)
  ;; Allow a pointer to be passed directly for the finalizer to work.
  (if (pointerp value) value (slot-value value 'c-ctx)))
```

```
(defmacro context (&rest rest)
  "Create a new GPGME context."
  `(make-instance 'context ,@rest))
```

```
;;; The context type: Accessor
functions.
```

```
;;; The context type: Accessor functions: Protocol.
```

```

(defgeneric protocol (ctx)
  (:documentation "Get the protocol of CONTEXT."))

(defmethod protocol ((ctx context))
  (gpgme-get-protocol ctx))

(defgeneric (setf protocol) (protocol ctx)
  (:documentation "Set the protocol of CONTEXT to PROTOCOL."))

;;; FIXME: Adjust translator to reject invalid protocols. Currently,
;;; specifying an invalid protocol throws a "NIL is not 32 signed int"
;;; error. This is suboptimal.
(defmethod (setf protocol) (protocol (ctx context))
  (gpgme-set-protocol ctx protocol))

;;; The context type: Accessor functions: Armor.
;;; FIXME: Is it good style to make foop setf-able? Or should it be
;;; foo/foop for set/get?

(defgeneric armorp (ctx)
  (:documentation "Get the armor flag of CONTEXT."))

(defmethod armorp ((ctx context))
  (gpgme-armor-p ctx))

(defgeneric (setf armorp) (armor ctx)
  (:documentation "Set the armor flag of CONTEXT to ARMOR."))

(defmethod (setf armorp) (armor (ctx
  context))
  (gpgme-set-armor ctx armor))

;;; The context type: Accessor functions: Textmode.
;;; FIXME: Is it good style to make foop setf-able? Or should it be
;;; foo/foop for set/get?

(defgeneric textmodep (ctx)
  (:documentation "Get the text mode flag of CONTEXT."))

(defmethod textmodep ((ctx context))
  (gpgme-textmode-p ctx))

(defgeneric (setf textmodep) (textmode ctx)
  (:documentation "Set the text mode flag of CONTEXT to TEXTMODE."))

(defmethod (setf textmodep) (textmode (ctx context))
  (gpgme-set-textmode ctx textmode))

```

::: The context type: Accessor functions: Include Certs.

```
(defgeneric include-certs (ctx)
  (:documentation "Get the number of included certificates in an
    S/MIME message, or NIL if the default is used."))

(defmethod include-certs ((ctx context))
  (gpgme-get-include-certs ctx))

(defgeneric (setf include-certs) (certs ctx)
  (:documentation "Return the number of certificates to include in an
    S/MIME message, or
    NIL if the default is used."))

(defmethod (setf include-certs) (certs (ctx context))
  (gpgme-set-include-certs ctx certs))
```

::: The context type: Accessor functions: Engine info.

```
(defgeneric engine-info (ctx)
  (:documentation "Retrieve the engine info for CTX."))

(defmethod engine-info ((ctx context))
  (gpgme-get-engine-info ctx))

(defgeneric (setf engine-info) (info ctx)
  (:documentation "Set the engine info for CTX."))

(defmethod (setf engine-info) (info (ctx context))
  (dolist (proto `(:openpgp :cms))
    (let ((pinfo (getf info proto)))
      (when pinfo
        (gpgme-set-engine-info ctx proto :file-name (getf pinfo :file-name)
          :home-dir (getf pinfo :home-dir))))))
```

::: The context type: Accessor functions: Keylist mode.

```
(defgeneric keylist-mode (ctx)
  (:documentation "Get the keylist mode of CTX."))

(defmethod keylist-mode ((ctx context))
  (gpgme-get-keylist-mode ctx))

(defgeneric (setf keylist-mode) (mode ctx)
  (:documentation "Set the keylist mode of CTX to MODE."))

(defmethod
```

```
(setf keylist-mode) (mode (ctx context))
(gpgme-set-keylist-mode ctx mode))
```

;;; The context type: Accessor functions: Signers.

```
(defgeneric signers (ctx)
 (:documentation "Get the signers of CTX."))
```

```
(defmethod signers ((ctx context))
 (slot-value ctx 'signers))
```

```
(defgeneric (setf signers) (signers ctx)
 (:documentation "Set the signers of CTX to SIGNERS."))
```

```
(defmethod (setf keylist-mode) (signers (ctx context))
 (gpgme-set-signers ctx signers)
 (setf (slot-value ctx 'signers) signers))
```

;;; The context type: Accessor functions: Sig notations.

```
(defgeneric sig-notations (ctx)
 (:documentation "Get the signature notations of CTX."))
```

```
(defmethod sig-notations ((ctx context))
 (slot-value ctx 'signers))
```

```
(defgeneric (setf sig-notations) (notations ctx)
 (:documentation "Set the signature notations of CTX to NOTATIONS."))
```

```
(defmethod (setf sig-notations) (notations (ctx context))
 (gpgme-set-signers ctx notations)
 (setf (slot-value ctx 'notations) notations))
```

;;;

The context type: Support macros.

```
(defmacro with-context ((ctx &rest rest) &body body)
 `(let ((,ctx (make-instance 'context ,@rest)))
 ,@body))
```

;;; The key type.

```
(defclass key ()
 (c-key) ; The C key object pointer.
 (:documentation "The GPGME key type."))
```

;;; In the initializer, we swallow the c-key argument.

```
(defmethod initialize-instance :after ((key key) &key c-key
```

```

    &allow-other-keys)
  (setf (slot-value key 'c-key) c-key)
  (finalize key (lambda () (gpgme-key-unref c-key))))

(defun translate-gpgme-key-t-from-foreign (value)
  (when *debug* (format t "DEBUG: import key: ~A~%" value))
  (make-instance 'key :c-key value))

(defun translate-gpgme-key-t-to-foreign (value)
  ;; Allow a pointer to be passed directly for the finalizer to work.
  (if (pointerp value) value (slot-value value 'c-key)))

(defmethod print-object ((key key) stream)
  (print-unreadable-object (key stream :type t :identity t)
    (format stream "~s" (fpr key))))

;;; The key type:
Accessor functions.

;;; FIXME: The bitfield and flags contain redundant information at
;;; this point.  FIXME: Deal nicer with zero-length name (policy url)
;;; and zero length value (omit?) and human-readable (convert to string).
;;; FIXME: Turn binary data into sequence or vector or what it should be.
;;; FIXME: Turn the whole thing into a hash?
(defun translate-gpgme-sig-notation-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next name value name-len value-len flags bitfield)
         value (:struct gpgme-sig-notation))
      (append (list (list
        :name name
        :value value
        :name-len name-len
        :value-len value-len
        :flags flags
        :bitfield bitfield))
        next))))))

;;; FIXME: Deal nicer with timestamps.  bitfield field name?
(defun translate-gpgme-subkey-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next bitfield pubkey-algo length keyid fpr timestamp expires)
         value (:struct gpgme-subkey))
      next))))

```

```
(append (list (list
  :bitfield bitfield
  :pubkey-algo pubkey-algo
  :length length
  :keyid keyid
  :fpr fpr
  :timestamp timestamp
  :expires expires))
next))))
```

```
(defun translate-gpgme-key-sig-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next bitfield pubkey-algo keyid timestamp expires status
          uid name email comment sig-class)
         value (:struct gpgme-key-sig))
      (append (list (list
        :bitfield bitfield
        :pubkey-algo pubkey-algo
        :keyid keyid
        :timestamp timestamp
        :expires expires
        :status status
        :uid uid
        :name name
        :email email
        :comment comment
        :sig-class sig-class))
      next))))))
```

```
(defun translate-gpgme-user-id-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next bitfield validity uid name email comment signatures)
         value (:struct gpgme-user-id))
      (append (list (list
        :bitfield bitfield
        :validity validity
        :uid uid
        :name
name
        :email email
        :comment comment
        :signatures signatures))
      next))))))
```



```

(defun key-data (key)
  (with-slots (c-key) key
    (with-foreign-slots
      ((bitfield protocol issuer-serial issuer-name chain-id
        owner-trust subkeys uids keylist-mode)
       c-key (:struct gpgme-key))
      (list
        :bitfield bitfield
        :protocol protocol
        :issuer-serial issuer-serial
        :issuer-name issuer-name
        :chain-id chain-id
        :owner-trust owner-trust
        :subkeys subkeys
        :uids uids
        :keylist-mode keylist-mode)
      ))

```

```

(defgeneric fpr (key)
  (:documentation "Get the primary fingerprint of the key."))

```

```

(defmethod fpr ((key key))
  (getf (car (getf (key-data key) :subkeys)) :fpr))

```

;;; The context type: Crypto-Operations.

```

(defgeneric get-key (ctx fpr &optional secret)
  (:documentation "Get the (secret) key FPR from CTX."))

```

```

(defmethod get-key ((ctx context) fpr &optional secret)
  (gpgme-get-key ctx fpr secret))

```

;;; Encrypt.

```

(defgeneric
  op-encrypt (ctx recp plain cipher &key always-trust sign)
  (:documentation "Encrypt."))

```

```

(defmethod op-encrypt ((ctx context) recp plain cipher
  &key always-trust sign)
  (with-foreign-object (c-recp :pointer (+ 1 (length recp)))
    (dotimes (i (length recp))
      (setf (mem-aref c-recp 'gpgme-key-t i) (elt recp i)))
    (setf (mem-aref c-recp :pointer (length recp)) (null-pointer))
    (with-gpgme-data (in plain)
      (with-gpgme-data (out cipher)

```

```

(let ((flags))
  (if always-trust (push :always-trust flags))
  (cond
    (sign
     (c-gpgme-op-encrypt-sign ctx c-recp flags in out)
     (append (c-gpgme-op-encrypt-result ctx)
              (c-gpgme-op-sign-result ctx))))
    (t
     (c-gpgme-op-encrypt ctx c-recp flags in out)
     (c-gpgme-op-encrypt-result ctx))))))

```

::: Decrypt.

```

(defgeneric op-decrypt (ctx cipher plain &key verify)
  (:documentation "Decrypt."))

```

```

(defmethod op-decrypt ((ctx context) cipher plain &key verify)
  (with-gpgme-data (in cipher)
    (with-gpgme-data
     (out plain)
     (cond
      (verify
       (c-gpgme-op-decrypt-verify ctx in out)
       (append (c-gpgme-op-decrypt-result ctx)
                (c-gpgme-op-verify-result ctx))))
      (t
       (c-gpgme-op-decrypt ctx in out)
       (c-gpgme-op-decrypt-result ctx))))))

```

::: Signing.

```

(defgeneric op-sign (ctx plain sig &optional mode)
  (:documentation "Sign."))

```

```

(defmethod op-sign ((ctx context) plain sig &optional (mode :none))
  (with-gpgme-data (in plain)
    (with-gpgme-data (out sig)
     (c-gpgme-op-sign ctx in out mode)
     (c-gpgme-op-sign-result ctx))))

```

::: Verify.

```

(defgeneric op-verify (ctx sig text &key detached)
  (:documentation "Verify."))

```

```

(defmethod op-verify ((ctx context) sig text &key detached)
  (with-gpgme-data (in sig)
    (with-gpgme-data (on text)

```

```

(c-gpgme-op-verify ctx in (if detached on nil)
(if detached nil on))
(c-gpgme-op-verify-result ctx)))

;;; Import.

(defgeneric op-import (ctx keydata)
(:documentation "Import."))

(defmethod op-import ((ctx context) keydata)
(with-gpgme-data (in keydata)
(c-gpgme-op-import ctx in)
(c-gpgme-op-import-result ctx)))

;;; Export.

(defgeneric op-export (ctx pattern keydata)
(:documentation "Export public key data matching PATTERN to the
stream KEYDATA."))

(defmethod op-export ((ctx context) pattern keydata)
(with-gpgme-data (dh keydata)
(c-gpgme-op-export ctx pattern 0 dh)))

;;; Key generation.

;;;
;;; Initialization
;;;

(defun check-version (&optional req-version)
"Check that the GPGME version requirement is satisfied."
(gpgme-check-version req-version))

(defparameter *version* (check-version)
"The version number of GPGME used.")
#-*- mode: org -*-
#+TITLE: A Short History of the GPGME bindings for Python
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

* Overview
:PROPERTIES:

```

:CUSTOM_ID: overview

:END:

```
| Version:      | 0.0.1                |
| GPGME Version: | 1.13.0              |
| Author:       | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:     | Australian English, British English |
| xml:lang:     | en-AU, en-GB, en    |
```

The GPGME Python bindings passed through many hands and numerous phases before, after a fifteen year journey, coming full circle to return to the source. This is a short explanation of that journey.

** In the beginning

:PROPERTIES:

:CUSTOM_ID: in-the-beginning

:END:

In 2002 John Goerzen released PyME; Python bindings for the GPGME module which utilised the current release of Python of the time and SWIG.^[fn:1] Shortly after creating it and ensuring it worked he stopped supporting it, though he left his work available on his Gopher site.

** Keeping the flame alive

:PROPERTIES:

:CUSTOM_ID: keeping-the-flame-alive

:END:

A couple of years later the project was picked up by Igor Belyi and actively developed and maintained by him from 2004 to 2008. Igor's whereabouts at the time of this document's creation are unknown, but the current authors do hope he is well. We're assuming (or hoping) that life did what life does and made continuing untenable.

** Passing the torch

:PROPERTIES:

:CUSTOM_ID: passing-the-torch

:END:

In 2014 Martin Albrecht wanted to patch a bug in the PyME code and discovered the absence of Igor. Following a discussion on the PyME mailing list he became the new maintainer for PyME, releasing version 0.9.0 in May of that year. He remains the maintainer of

the original PyME release in Python 2.6 and 2.7 (available via PyPI).

** Coming full circle

:PROPERTIES:

:CUSTOM_ID: ouroboros

:END:

In 2015 Ben McGinnes approached Martin about a Python 3 version, while investigating how complex a task this would be the task ended up being completed. A subsequent discussion with Werner Koch led to the decision to fold the Python 3 port back into the original GPGME release in the languages subdirectory for non-C bindings under the module name of =pyme3=.

In 2016 this PyME module was integrated back into the GPGME project by Justus Winter. During the course of this work Justus adjusted the port to restore limited support for Python 2, but not as many minor point releases as the original PyME package supports. During the course of this integration the package was renamed to more accurately reflect its status as a component of GPGME. The =pyme3= module was renamed to =gpg= and adopted by the upstream GnuPG team.

In 2017 Justus departed G10code and the GnuPG team. Following this Ben returned to maintain of gpgme Python bindings and continue building them from that point.

* Relics of the past

:PROPERTIES:

:CUSTOM_ID: relics-past

:END:

There are a few things, in addition to code specific factors, such as SWIG itself, which are worth noting here.

** The Annoyances of Git

:PROPERTIES:

:CUSTOM_ID: the-annoyances-of-git

:END:

As anyone who has ever worked with git knows, submodules are horrible way to deal with pretty much anything. In the interests of avoiding migraines, that was skipped with addition of the PyME code to GPGME.

Instead the files were added to a subdirectory of the `=lang/=` directory, along with a copy of the entire git log up to that point as a separate file within the `=lang/python/docs/=` directory.[fn:2] As the log for PyME is nearly 100KB and the log for GPGME is approximately 1MB, this would cause considerable bloat, as well as some confusion, should the two be merged.

Hence the unfortunate, but necessary, step to simply move the files. A regular repository version has been maintained should it be possible to implement this better in the future.

** The Perils of PyPI

```
:PROPERTIES:  
:CUSTOM_ID: the-perils-of-pypi  
:END:
```

The early port of the Python 2 `=pyme=` module as `=pyme3=` was never added to PyPI while the focus remained on development and testing during 2015 and early 2016. Later in 2016, however, when Justus completed his major integration work and subsequently renamed the module from `=pyme3=` to `=gpg=`, some prior releases were also provided through PyPI.

Since these bindings require a matching release of the GPGME libraries in order to function, it was determined that there was little benefit in also providing a copy through PyPI since anyone obtaining the GPGME source code would obtain the Python bindings source code at the same time. Whereas there was the potential to sew confusion amongst Python users installing the module from PyPI, only to discover that without the relevant C files, header files or SWIG compiled binaries, the Python module did them little good.

There are only two files on PyPI which might turn up in a search for this module or a sample of its content:

1. `gpg (1.8.0)` - Python bindings for GPGME GnuPG cryptography library
2. `pyme (0.9.0)` - Python support for GPGME GnuPG cryptography library

*** GPG 180 - Python bindings for GPGME GnuPG cryptography library

```
:PROPERTIES:  
:CUSTOM_ID: pypi-gpgme-180  
:END:
```

This is the most recent version to reach PyPI and is the version of the official Python bindings which shipped with GPGME 1.8.0. If you have GPGME 1.8.0 installed and `/only/ 1.8.0` installed, then it

is probably safe to use
this copy from PyPI.

As there have been a lot of changes since the release of GPGME 1.8.0, the GnuPG Project recommends not using this version of the module and instead installing the current version of GPGME along with the Python bindings included with that package.

```
*** PyME 090 - Python support for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-90
:END:
```

This is the last release of the PyME bindings maintained by Martin Albrecht and is only compatible with Python 2, it will not work with Python 3. This is the version of the software from which the port from Python 2 to Python 3 code was made in 2015.

Users of the more recent Python bindings will recognise numerous points of similarity, but also significant differences. It is likely that the more recent official bindings will feel "more pythonic."

For those using Python 2, there is essentially no harm in using this module, but it may lack a number of more recent features added to GPGME.

* Footnotes

[fn:1] In all likelihood this would have been Python 2.2 or possibly Python 2.3.

[fn:2] The entire PyME git log and other preceding VCS logs are located in the =gpgme/lang/python/docs/old-commits.log= file.

```
# HACKING                               -*- org -*-
#+TITLE: Hacking notes for GPGME
#+STARTUP: showall
```

* How to contribute

** No more ChangeLog files

Do not modify any of the ChangeLog files in GPGME. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist" time. As such, there are strict requirements on the

form of the commit log messages. The old ChangeLog files have all be renamed to ChangeLog-2011

** Commit log requirements

Your commit log should always start with a one-line summary, the second line should be blank, and the remaining lines are usually ChangeLog-style entries for all affected files. However, it's fine -- even recommended -- to write a few lines of prose describing the change, when the summary and ChangeLog entries don't give enough of the big picture. Omit the leading TABs that you're used to seeing in a "real" ChangeLog file, but keep the maximum line length at 72 or smaller, so that the generated ChangeLog lines, each with its leading TAB, will not exceed 80 columns. If you want to add text which shall not be copied to the ChangeLog, separate it by a line consisting of two dashes at the begin of a line.

Note that ./autogen.sh installs a git hook to do some basic syntax checking on the commit log message.

Typo fixes and documentation updates don't need a ChangeLog entry; thus you would use a commit message like

```
#+begin_example
Fix typo in a comment

--
#+end_example
```

The marker line here is important; without it the first line would appear in the ChangeLog.

If you exceptionally need to have longer lines in a commit log you may do this after this scissor line:

```
#+begin_example
# ----- >8 -----
#+end_example
```

(hash, blank, 24 dashes, blank, scissor, blank, 24 dashes).

Note that such a comment will be removed if the git commit option `--cleanup-scissor=` is used.

** License policy

GPGME is currently licensed under the LGPLv2.1+ with tools and the manual being under the GPLv3+. We may eventually update to a newer

version of the licenses or a combination of them. It is thus important, that all contributed code allows for an update of the license; for example we can't accept code under the LGPLv2(only).

If you want to contribute code or documentation to GPGME you are asked to assert that the contribution is in accordance to the "GPGME Developer's Certificate of Origin" as found in the file "DCO".

Except for a slight wording change, this DCO is identical to the one used by the Linux kernel. Please take these simple steps:

- Decide which mail address you want to use. Please have your real name in the address and not a pseudonym. Anonymous contributions can only be done if you find a proxy who certifies for you.
- If your employer or school might claim ownership of code written by you; you need to talk to them to make sure that you have the right to contribute under the DCO.
- Send an OpenPGP signed mail to the gnupg-devel@gnupg.org public mailing list from your mail address. Include a copy of the DCO as found in the official master branch. Insert your name and email address into the DCO in the same way you want to use it later.
Example:

Signed-off-by: Joe R. Hacker <joe@example.org>

If you need it, you may perform simple transformations on the mail address: Replacing "@" by " at " or "." by " dot ".)

- That's it. From now on you only need to add a "Signed-off-by:" line with your name and mail address to the GIT commit message. It is recommended to send the patches using a PGP/MIME signed mail.

** Coding standards

Please follow the GNU coding standards. If you are in doubt consult the existing code as an example. Do no re-indent code without a need. If you really need to do it, use a separate commit for such a change.

- C99 syntax should not be used; stick to C90.
- Please do not use C++ `///
//` style comments.
- Try to fit lines into 80 columns.
- Ignore signed/unsigned pointer mismatches
- No arithmetic on void pointers; cast to `char*` first.

** Commit log keywords

- GnuPG-bug-id :: Values are comma or space delimited bug numbers from bug.gnupg.org pertaining to this commit.
- Debian-bug-id :: Same as above but from the Debian bug tracker.
- CVE-id :: CVE id number pertaining to this commit.
- Regression-due-to :: Commit id of the regression fixed by this commit.
- Fixes-commit :: Commit id this commit fixes.
- Reported-by :: Value is a name or mail address of a bug reporter.
- Suggested-by :: Value is a name or mail address of someone who suggested this change.
- Co-authored-by :: Name or mail address of a co-author
- Some-comments-by :: Name or mail address of the author of additional comments (commit log or code).
- Proofread-by :: Sometimes used by translation commits.
- Signed-off-by :: Name or mail address of the developer

* Debug hints

- Use gpgme-tool for manual tests.
- The envvar GPGME_DEBUG enables debugging; see debug.[ch] for details.

Configuration files may go here. Note that config.h.in is auto-generated so that this file is not in git.

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-04-06 Werner Koch <wk@g10code.com>

* gpg-error.m4: Update from current libgpg-error repo.

2010-05-07 Werner Koch <wk@g10code.com>

* libassuan.m4: Update from libassuan svn.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* libassuan.m4: Fix LIBASSUAN_VERSION.

2006-06-08 Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Add --all to pth-config invocation.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Fix code generation (required for Max OS X).
Submitted by Emanuele Giaquinta <exg@gentoo.org>.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* glib-2.0.m4: New file.

2004-12-28 Werner Koch <wk@g10code.com>

* pth.m4: Changed quoting for use with automake 1.9.

2004-09-14

Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Disable `_ac_pth_line`, and don't fail if Pth is not found.

* glibc21.m4: New file.

* gpg-error.m4: New file.

* pth.m4: New file.

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1.15.1

GPGME Developer's Certificate of Origin. Version 1.0

=====

By making a contribution to the GPGME project, I certify that:

(a) The contribution was created in whole or in part by me and I have the right to submit it under the free software license indicated in the file; or

(b) The contribution is based upon previous work that, to the best of my knowledge, is covered under an appropriate free software license and I have the right under that license to submit that work with modifications, whether created in whole

or in part by me, under the same free software license
(unless I am permitted to submit under a different license),
as indicated in the file; or

(c) The contribution was provided directly to me by some other
person who certified (a), (b) or (c) and I have not modified
it.

(d) I understand and agree that this project and the contribution
are public and that a record of the contribution
(including
all personal information I submit with it, including my
sign-off) is maintained indefinitely and may be redistributed
consistent with this project or the free software license(s)
involved.

Signed-off-by: [Your name and mail address]

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist". See doc/HACKING for details.

2008-11-08 Moritz <moritz@gnu.org>

* gpgme.lisp (size-t): Wrong call to defctype: function accepts
optional, not keyword argument.

(ssize-t): Likewise.

(off-t): Likewise.

(gpgme-data-t, gpgme-ctx-t): Likewise.

(gpgme-error-t): Likewise.

(gpgme-error-no-signal-t): Likewise.

(gpgme-err-code-t): Likewise.

(gpgme-err-source-t): Likewise.

(gpgme-sig-notation-t, gpgme-engine-info-t): Likewise.

(gpgme-subkey-t): Likewise.

(gpgme-key-sig-t): Likewise.

(gpgme-user-id-t): Likewise.

(gpgme-key-t): Likewise.

(gpgme-data-cbs-t): Likewise.

(gpgme-invalid-key-t): Likewise.

(gpgme-op-encrypt-result-t): Likewise.

(gpgme-recipient-t): Likewise.

(gpgme-op-decrypt-result-t): Likewise.

(gpgme-new-signature-t):

Likewise.

(gpgme-op-sign-result-t): Likewise.

(gpgme-signature-t): Likewise.
(gpgme-op-verify-result-t): Likewise.
(gpgme-import-status-t): Likewise.
(gpgme-op-import-result-t): Likewise.
(gpgme-op-genkey-result-t): Likewise.
(gpgme-op-keylist-result-t): Likewise.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

* Initial release.

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`HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html08 `HB

+)The DFN Top Level Certification Authority0! `HBcgi/check-rev.cgi?0 `HB

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/OF

*- mode: org *-

#+TITLE: What Was New in the GPGME Python Bindings and Documentation

#+AUTHOR: Ben McGinnes

#+LATEX_COMPILER: xelatex

#+LATEX_CLASS: article

#+LATEX_CLASS_OPTIONS: [12pt]

```
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

* What Was New

:PROPERTIES:

:CUSTOM_ID: new-stuff

:END:

```
| Version:      | 0.0.1                |
| GPGME Version: | 1.13.0              |
| Author:       | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:     | Australian English, British English |
| xml:lang:     | en-AU, en-GB, en    |
```

The following are all the past /What's New/ sections for the Python Bindings HOWTO and other documentation.

** What Was New in GPGME 1120

:PROPERTIES:

:CUSTOM_ID: gpgme-1-12-0

:END:

The most obviously new point for those reading this guide is this section on other new things, but that's hardly important. Not given all the other things which spurred the need for adding this section and its subsections.

*** New in GPGME 1120

:PROPERTIES:

:CUSTOM_ID: new-stuff-1-12-0

:END:

There have been quite a number of additions to GPGME and the Python bindings to it since the last release of GPGME with versions 1.11.0 and 1.11.1 in April, 2018.

The bullet points of new additions are:

- an expanded section on [\[\[file:gpgme-python-howto#installation\]\[installing\]\]](#) and [\[\[file:gpgme-python-howto#snafu\]\[troubleshooting\]\]](#) the Python bindings.

- The release of Python 3.7.0; which appears to be working just fine with our bindings, in spite of intermittent reports of problems for many other Python projects with that new release.
- Python 3.7 has been moved to the head of the specified python versions list in the build process.
- In order to fix some other issues, there are certain underlying functions which are more exposed through the `[[file:gpgme-python-howto#howto-get-context]][gpg.Context()]`, but ongoing documentation ought to clarify that or otherwise provide the best means of using the bindings. Some additions to `=gpg.core=` and the `=Context()=`, however, were intended (see below).
- Continuing work in identifying and confirming the cause of oft-reported `[[file:gpgme-python-howto#snafu-runtime-not-funtime]][problems installing the Python bindings on Windows]`.
- GSOC: Google's Surreptitiously Ordered Conscription ... erm ... oh, right; Google's Summer of Code. Though there were two hopeful candidates this year; only one ended up involved with the GnuPG Project directly, the other concentrated on an unrelated third party project with closer ties to one of the GNU/Linux distributions than to the GnuPG Project. Thus the Python bindings benefited from GSOC participant Jacob Adams, who added the `key_import` function; building on prior work by Tobias Mueller.
- Several new methods functions were added to the `gpg.Context()`, including: `[[file:gpgme-python-howto#howto-import-key]][key_import]`, `[[file:gpgme-python-howto#howto-export-key]][key_export]`, `[[file:gpgme-python-howto#howto-export-public-key]][key_export_minimal]` and `[[file:gpgme-python-howto#howto-export-secret-key]][key_export_secret]`.
- Importing and exporting examples include versions integrated with Marcel Fest's recently released `[[https://github.com/Selfnet/hkp4py]][HKP for Python]` module. Some `[[file:gpgme-python-howto#hkp4py]][additional notes on this module]` are included at the end of the HOWTO.
- Instructions for dealing with semi-walled garden implementations like ProtonMail are also included. This is intended to make things a little easier when communicating with users of ProtonMail's services and should not be construed as an endorsement of said service. The GnuPG Project neither favours, nor disfavors ProtonMail and the majority of this deals with interacting with the ProtonMail keyserver.
- Semi-formalised the location where `[[file:gpgme-python-howto#draft-editions]][draft versions]` of this HOWTO may periodically be accessible. This is both for the reference of others and testing the publishing of the document itself. Renamed this file at around the same time.
- The Texinfo documentation build configuration has been replicated from the parent project in order to make to maintain consistency with that project (and actually ship with each release).
- a reStructuredText (`=.rst=`) version is also generated for Python developers more used to and comfortable with that format as it is

the standard Python documentation format and Python developers may wish to use it with Sphinx. Please note that there has been no testing of the reStructuredText version with Sphinx at all. The reST file was generated by the simple expedient of using [\[\[https://pandoc.org/\]\]](https://pandoc.org/)[[Pandoc]].

- Added a new section for [\[\[file:gpgme-python-howto#advanced-use\]\]](#)[[advanced or experimental use]].

- Began the advanced use cases with [\[\[file:gpgme-python-howto#cython\]\]](#)[[a section]] on using the module with [\[\[https://cython.org/\]\]](https://cython.org/)[[Cython]].

- Added a number of new scripts to the =example/howto/= directory; some of which may be in advance of their planned sections of the HOWTO (and some are just there because it seemed like a good idea at the time).

- Cleaned up a lot of things under the hood.

This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

File: gpgme.info, Node: UI Server Decrypt, Next: UI Server Verify, Prev: UI Server Sign, Up: UI Server Protocol

A.3 UI Server: Decrypt a Message

=====

Decryption may include the verification of OpenPGP messages. This is due to the often used combined signing/encryption modus of OpenPGP. The client may pass an option to the server to inhibit the signature verification. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N

Set the file descriptor for the message to be decrypted to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The decryption is started with the command:

-- Command: DECRYPT --protocol=NAME [--no-verify]
[--export-session-key]

NAME is the encryption protocol used for the message. For a description of the allowed protocols see the ENCRYPT command.

This argument is mandatory. If the option --no-verify is given, the server

should not try to verify a signature, in case the input

data is an OpenPGP combined message. If the option

--export-session-key is given and the underlying engine knows how to export the session key, it will appear on a status line

File: gpgme.info, Node: UI Server Verify, Next: UI Server Set Input Files, Prev: UI Server Decrypt, Up: UI Server Protocol

A.4 UI Server: Verify a Message

=====

The server needs to support the verification of opaque signatures as well as detached signatures. The kind of input sources controls what kind message is to be verified.

-- Command: MESSAGE FD=N

This command is used with detached signatures to set the file descriptor for the signed data to N. The data is binary encoded (used verbatim). For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: INPUT FD=N

Set the file descriptor for the opaque message or the signature part of a detached signature to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded and only used for opaque signatures. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The verification is then started using:

-- Command: VERIFY --protocol=NAME [--silent]

NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. This argument is mandatory. Depending on the combination of MESSAGE INPUT and OUTPUT commands, the server needs to select the appropriate verification mode:

MESSAGE and INPUT

This indicates a detached signature. Output data is not applicable.

INPUT

This indicates an opaque signature. As no output command has been given, the server is only required to check the signature.

INPUT and OUTPUT

This indicates an opaque signature. The server shall write the signed data to the file descriptor set by the output command. This data shall even be written if the signatures cant be verified.

With --silent the server shall not display any dialog; this is for

example used by the client to get the content of opaque signed messages.

The client expects the server to send at least this status information before the final OK response:

-- Status line: SIGSTATUS FLAG DISPLAYSTRING

Returns the status for the signature and a short string explaining the status. Valid values for FLAG are:

none

The message has a signature but it could not not be verified due to a missing key.

green

The signature is fully valid.

yellow

The signature is valid but additional information was shown regarding the validity of the key.

red

The signature is not valid.

DISPLAYSTRING is a percent-and-plus-encoded string with a short human readable description of the status. For example

S SIGSTATUS green Good+signature+from+Keith+Moon+<keith@example.net>

Note that this string needs to fit into an Assuan line and should be short enough to be displayed as short one-liner on the clients window. As usual the encoding of this string is UTF-8 and it should be send in its translated form.

The server shall send one status line for every signature found on the message.

File: gpgme.info, Node: UI Server Set Input Files, Next: UI Server Sign/Encrypt Files, Prev: UI Server Verify, Up: UI Server Protocol

A.5 UI Server: Specifying the input files to operate on.

=====

All file related UI

server commands operate on a number of input files or directories, specified by one or more FILE commands:

-- Command: FILE [--clear] NAME

Add the file or directory NAME to the list of pathnames to be processed by the server. The parameter NAME must be an absolute path name (including the drive letter) and is percent spaced (in

particular, the characters %, = and white space characters are always escaped). If the option --clear is given, the list of files is cleared before adding NAME.

Historical note: The original spec did not define --clear but the keyword --continued after the file name to indicate that more files are to be expected. However, this has never been used and thus removed from the specs.

File: gpgme.info, Node: UI Server Sign/Encrypt Files, Next: UI Server Verify/Decrypt Files, Prev: UI Server Set Input Files, Up: UI Server Protocol

A.6 UI Server: Encrypting and signing files.

=====

First,

the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: ENCRYPT_FILES --nohup

-- Command: SIGN_FILES --nohup

-- Command: ENCRYPT_SIGN_FILES --nohup

Request that the files specified by FILE are encrypted and/or signed. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to encrypt or sign a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for each input file a new file is created under the original filename plus a protocol specific extension (like .gpg or .sig), which contain the encrypted/signed file or a detached signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The ENCRYPT_SIGN_FILES command requests a combined sign and encrypt operation. It may not be available for all protocols (for example, it is available for OpenPGP but not for CMS).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

A.7 UI Server: Decrypting and verifying files.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

```
-- Command: DECRYPT_FILES --nohup
-- Command: VERIFY_FILES --nohup
-- Command: DECRYPT_VERIFY_FILES
--nohup
```

Request that the files specified by FILE are decrypted and/or verified. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to decrypt or verify a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for decryption, a new file is created for each input file under the original filename minus a protocol specific extension (like .gpg) which contains the original plaintext. For verification a status is displayed for each signed input file, indicating if it is signed, and if yes, if the signature is valid. For files that are signed and encrypted, the VERIFY command transiently decrypts the file to verify the enclosed signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

A.8 UI Server: Managing certificates.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: `IMPORT_FILES --nohup`
Request that the certificates contained in the files specified by `FILE` are imported into the local certificate databases.

For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option `--nohup` is mandatory. It is currently unspecified what should happen if `--nohup` is not present. Because `--nohup` is present, the server always returns OK promptly, and completes the operation asynchronously.

FIXME: It may be nice to support an `EXPORT` command as well, which is enabled by the context menu of the background of a directory.

File: `gpgme.info`, Node: UI Server Checksum Files, Next: Miscellaneous UI Server Commands, Prev: UI Server Import/Export Keys, Up: UI Server Protocol

A.9 UI Server: Create and verify checksums for files.

=====

First, the input files need to be specified by one or more `FILE` commands. Afterwards, the actual operation is requested:

-- Command: `CHECKSUM_CREATE_FILES --nohup`
Request that checksums are created for the files specified by `FILE`. The choice of checksum algorithm and the destination storage and format for the created checksums depend on the

preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option `--nohup` is mandatory. It is currently unspecified what should happen if `--nohup` is not present. Because `--nohup` is present, the server always returns OK promptly, and completes the operation asynchronously.

-- Command: `CHECKSUM_VERIFY_FILES --nohup`
Request that checksums are created for the files specified by `FILE` and verified against previously created and stored checksums. The choice of checksum algorithm and the source storage and format for previously created checksums depend on the preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

If the source storage of previously created checksums is available to the user through the Windows shell, this command may also accept such checksum files as FILE arguments. In this case, the UI server should instead verify the checksum of the referenced files as if they were given as INPUT files.

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: Miscellaneous UI Server Commands, Prev: UI Server Checksum Files, Up: UI Server Protocol

A.10 Miscellaneous UI Server Commands

=====

The server needs to implement the following commands which are not related to a specific command:

-- Command: GETINFO WHAT

This is a multi purpose command, commonly used to return a variety of information. The required subcommands as described by the WHAT parameter are:

pid

Return the process id of the server in decimal notation using an Assuan data line.

To allow the server to pop up the windows in the correct relation to the client, the client is advised to tell the server by sending the option:

-- Command option: window-id NUMBER

The NUMBER represents the native window ID of the clients current window. On Windows systems this is a windows handle (HWND) and on X11 systems it is the X Window ID. The number needs to be given as a hexadecimal value so that it is easier to convey pointer values (e.g. HWND).

A client may want to fire up the certificate manager of the server. To do this it uses the Assuan command:

-- Command: START_KEYMANAGER

The server shall pop up the main window of the key manager (aka certificate manager). The client expects that the key manager is

brought into the foreground and that this command immediately returns (does not wait until the key manager has been fully brought up).

A client may want to fire up the configuration dialog of the server. To do this it uses the Assuan command:

-- Command: START_CONFDialog

The server shall pop up its configuration dialog. The client expects that this dialog is brought into the foreground and that this command immediately returns (i.e. it does not wait until the dialog has been fully brought up).

When doing an operation on a mail, it is useful to let the server know the address of the sender:

-- Command: SENDER [--info] [--protocol=NAME] EMAIL

EMAIL is the plain ASCII encoded address ("addr-spec" as per RFC-2822) enclosed in angle brackets. The address set with this command is valid until a successful completion of the operation or until a RESET command. A second command overrides the effect of the first one; if EMAIL is not given and --info is not used, the server shall use the default signing key.

If option --info is not given, the server shall also suggest a protocol to use for signing. The client may use this suggested protocol on its own discretion. The same status line as with PREP_ENCRYPT is used for this.

The option --protocol may be used to give the server a hint on which signing protocol should be preferred.

To allow the UI-server to visually identify a running operation or to associate operations the server MAY support the command:

-- Command: SESSION NUMBER [STRING]

The NUMBER is an arbitrary value, a server may use to associate simultaneous running sessions. It is a 32 bit unsigned integer with 0 as a special value indicating that no session association shall be done.

If STRING is given, the server may use this as the title of a window or, in the case of an email operation, to extract the senders address. The string may contain spaces; thus no plus-escaping is used.

This command may be used at any time and overrides the effect of the last command. A RESET undoes the effect of this command.

File: gpgme.info, Node: Debugging, Next: Deprecated Functions, Prev: UI Server Protocol, Up: Top

Appendix B How to solve problems

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like GPGME and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using `gpg` or `gpgsm` on the command line. If you cant figure out why things dont work, you may use GPGMEs built in trace feature. This feature is either enabled using the environment variable `GPGME_DEBUG` or, if this is not possible, by calling the function `gpgme_set_global_flag`. The value is the trace level and an optional file name. If no file name is given the trace output is printed to `stderr`.

For example

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

File: gpgme.info, Node: Deprecated Functions, Next: Library Copying, Prev: Debugging, Up: Top

Appendix C Deprecated Functions

For backward compatibility GPGME has a number

of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

***Warning:** These interfaces will be removed in a future version of GPGME.

-- Function: void gpgme_key_release (gpgme_key_t KEY)

The function gpgme_key_release is equivalent to gpgme_key_unref.

-- Function: gpgme_error_t gpgme_op_import_ext (gpgme_ctx_t CTX, gpgme_data_t KEYDATA, int *NR)

SINCE: 0.3.9

The function gpgme_op_import_ext is equivalent to:

```
gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
{
    gpgme_import_result_t result = gpgme_op_import_result (ctx);
    *nr = result->considered;
}
```

-- Data type: gpgme_error_t (*gpgme_edit_cb_t) (void *HANDLE, gpgme_status_code_t STATUS, const char *ARGS, int FD)

The gpgme_edit_cb_t type is the type of functions which GPGME calls if it a key edit operation is on-going. The status code STATUS and the argument line ARGS are passed through by GPGME from the crypto engine. The file descriptor FD is -1 for normal status messages. If STATUS indicates a command rather than a status message, the response to the command should be written to FD. The HANDLE is provided by the user at start of operation.

The function should return GPG_ERR_FALSE if it did not handle the status code, 0 for success, or any other error value.

-- Function: gpgme_error_t gpgme_op_edit (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

SINCE: 0.3.9

Note: This function is deprecated, please use gpgme_op_interact instead.

The function gpgme_op_edit processes the key KEY interactively,

using the edit callback function FNC with the handle HANDLE. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object OUT.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

The function returns the error code GPG_ERR_NO_ERROR if the edit operation completes successfully, GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: gpgme_error_t gpgme_op_edit_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

SINCE: 0.3.9

Note: This function is deprecated, please use gpgme_op_interact_start instead.

The function gpgme_op_edit_start initiates a gpgme_op_edit operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation was started successfully, and GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_card_edit (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

Note: This function is deprecated, please use gpgme_op_interact with the flag GPGME_INTERACT_CARD instead.

The function gpgme_op_card_edit is analogous to gpgme_op_edit, but should be used to process the smart card corresponding to the key KEY.

-- Function: gpgme_error_t gpgme_op_card_edit_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

Note: This function is deprecated, please use gpgme_op_interact_start with the flag GPGME_INTERACT_CARD

instead.

The function `gpgme_op_card_edit_start` initiates a

`gpgme_op_card_edit` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_data_new_with_read_cb`
(`gpgme_data_t *DH`, `int (*READFUNC)` (`void *HOOK`, `char *BUFFER`,
`size_t COUNT`, `size_t *NREAD`), `void *HOOK_VALUE`)

The function `gpgme_data_new_with_read_cb` creates a new `gpgme_data_t` object and uses the callback function `READFUNC` to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type GPGME provides. However, it can not be used to write data.

The callback function receives `HOOK_VALUE` as its first argument whenever it is invoked. It should return up to `COUNT` bytes in `BUFFER`, and return the number of bytes actually read in `NREAD`. It

may return 0 in `NREAD` if no data is currently available. To indicate EOF the function should return with an error code of -1 and set `NREAD` to 0. The callback function may support to reset its internal read pointer if it is invoked with `BUFFER` and `NREAD` being `NULL` and `COUNT` being 0.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `READFUNC` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_rewind` (`gpgme_data_t DH`)

The function `gpgme_data_rewind` is equivalent to:

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
? gpgme_error_from_errno (errno) : 0;
```

-- Data type: `gpgme_attr_t`

The `gpgme_attr_t` type is used to specify a key or trust item attribute. The following attributes are defined:

`GPGME_ATTR_KEYID`

This is the

key ID of a sub key. It is representable as a string.

GPGME_ATTR_FPR

This is the fingerprint of a sub key. It is representable as a string.

GPGME_ATTR_ALGO

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the enum `gcry_pk_algos` values in the `gcrypt` library.

GPGME_ATTR_LEN

This is the key length of a sub key. It is representable as a number.

GPGME_ATTR_CREATED

This is the timestamp at creation time of a sub key. It is representable as a number.

GPGME_ATTR_EXPIRE

This is the expiration time of a sub key. It is representable as a number.

GPGME_ATTR_USERID

This is a user ID. There can be more than one user IDs in a `GPGME_KEY_T` object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

GPGME_ATTR_NAME

This is the name belonging to a user ID. It is representable as a string.

GPGME_ATTR_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

GPGME_ATTR_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

GPGME_ATTR_VALIDITY

This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

GPGME_ATTR_UID_REVOKED

This specifies if a user ID is revoked. It is representable as a number, and is 1 if the user ID is revoked, and 0 otherwise.

GPGME_ATTR_UID_INVALID

This specifies if a user ID is invalid. It is representable as a number, and is 1 if the user ID is invalid, and 0 otherwise.

GPGME_ATTR_TYPE

This
returns information about the type of key. For the string function this will either be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509.

GPGME_ATTR_IS_SECRET

This specifies if the key is a secret key. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_KEY_REVOKED

This specifies if a sub key is revoked. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_KEY_INVALID

This specifies if a sub key is invalid. It is representable as a number, and is 1 if the key is invalid, and 0 otherwise.

GPGME_ATTR_KEY_EXPIRED

This specifies if a sub key is expired. It is representable as a number, and is 1 if the key is expired, and 0 otherwise.

GPGME_ATTR_KEY_DISABLED

This specifies if a sub key is disabled. It is representable
as a number, and is 1 if the key is disabled, and 0 otherwise.

GPGME_ATTR_KEY_CAPS

This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter e if the key can be used for encryption, s if the key can be used for signatures, and c if the key can be used for certifications.

GPGME_ATTR_CAN_ENCRYPT

This specifies if a sub key can be used for encryption. It is representable as a number, and is 1 if the sub key can be used for encryption, and 0 otherwise.

GPGME_ATTR_CAN_SIGN

This specifies if a sub key can be used to create data signatures. It is representable as a number, and is 1 if the sub key can be used for signatures, and 0 otherwise.

GPGME_ATTR_CAN_CERTIFY

This specifies if a sub key can be used to create key certificates. It is representable as a number, and is 1 if the sub key can be used for certifications, and 0 otherwise.

GPGME_ATTR_SERIAL

The X.509 issuer serial attribute of the key. It is representable as a string.

GPGME_ATTR_ISSUE

The X.509 issuer name attribute of the key. It is representable as a string.

GPGME_ATTR_CHAINID

The X.509 chain ID can be used to build the certification chain. It is representable as a string.

-- Function: `const char * gpgme_key_get_string_attr (gpgme_key_t KEY, gpgme_attr_t WHAT, const void *RESERVED, int IDX)`

The function `gpgme_key_get_string_attr` returns the value of the string-representable attribute `WHAT` of key `KEY`. If the attribute is an attribute of a sub key or an user ID, `IDX` specifies the sub key or user ID of which the attribute value is returned. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a string, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED` not `NULL`.

-- Function: `unsigned long gpgme_key_get_ulong_attr (gpgme_key_t KEY, gpgme_attr_t WHAT, const void *RESERVED, int IDX)`

The function `gpgme_key_get_ulong_attr` returns the value of the number-representable attribute `WHAT` of key `KEY`. If the attribute

is an attribute of a sub key or an user ID, `IDX` specifies the sub key or user ID of which the attribute value is returned. The argument `RESERVED` is reserved for later use and should be `NULL`.

The function returns 0 if the attribute cant be returned as a number, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED` not `NULL`.

The signatures on a key are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIGS` mode enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function `gpgme_get_key`.

-- Data type: `gpgme_attr_t`

The `gpgme_attr_t` type is used to specify a key signature attribute. The following attributes are defined:

`GPGME_ATTR_KEYID`

This is the key ID of the key which was used for the signature. It is representable as a string.

`GPGME_ATTR_ALGO`

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the enum `gcry_pk_algos` values in the `gcrypt` library.

`GPGME_ATTR_CREATED`

This is the timestamp at creation time of the signature. It is representable as a number.

`GPGME_ATTR_EXPIRE`

This is the expiration time of the signature. It is representable as a number.

`GPGME_ATTR_USERID`

This is the user ID associated with the signing key. The user ID is representable as a number.

`GPGME_ATTR_NAME`

This is the name belonging to a user ID. It is representable as a string.

GPGME_ATTR_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

GPGME_ATTR_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

GPGME_ATTR_KEY_REVOKED

This specifies if a key signature is a revocation signature. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_SIG_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

GPGME_ATTR_SIG_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

GPGME_ATTR_SIG_STATUS

This is the same value as returned by `gpgme_get_sig_status`.

```
-- Function: const char * gpgme_key_sig_get_string_attr  
            (gpgme_key_t KEY, int UID_IDX, gpgme_attr_t WHAT,  
            const void *RESERVED, int IDX)
```

The function `gpgme_key_sig_get_string_attr` returns the value of the string-representable attribute `WHAT` of the signature `IDX` on the user ID `UID_IDX` in the key `KEY`. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `UID_IDX` or `IDX` out of range, or `RESERVED` not `NULL`.

```
-- Function: unsigned long gpgme_key_sig_get_ulong_attr  
            (gpgme_key_t KEY, int UID_IDX, gpgme_attr_t  
            WHAT,  
            const void *RESERVED, int IDX)
```

The function `gpgme_key_sig_get_ulong_attr` returns the value of the number-representable attribute `WHAT` of the signature `IDX` on the

user ID `UID_IDX` in the key `KEY`. The argument `RESERVED` is reserved for later use and should be `NULL`.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `UID_IDX` or `IDX` out of range, or `RESERVED` not `NULL`.

-- Data type: enum `gpgme_sig_stat_t`

The `gpgme_sig_stat_t` type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

`GPGME_SIG_STAT_NONE`

This status should not occur in normal operation.

`GPGME_SIG_STAT_GOOD`

This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

`GPGME_SIG_STAT_GOOD_EXP`

This status indicates that the signature is valid but expired.

For the combined result this status means that all signatures are valid and expired.

`GPGME_SIG_STAT_GOOD_EXPKEY`

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

`GPGME_SIG_STAT_BAD`

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

`GPGME_SIG_STAT_NOKEY`

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

`GPGME_SIG_STAT_NOSIG`

This status indicates that the signature data provided was not a real signature.

`GPGME_SIG_STAT_ERROR`

This status indicates that there was some other error which prevented the signature verification.

GPGME_SIG_STAT_DIFF

For the combined result this status means that at least two signatures have a different status. You can get each keys status with `gpgme_get_sig_status`.

-- Function: `const char * gpgme_get_sig_status (gpgme_ctx_t CTX, int IDX, gpgme_sig_stat_t *R_STAT, time_t *R_CREATED)`

The function `gpgme_get_sig_status` is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
    sig = sig->next;
    idx--;
}
if (!sig || idx)
    return NULL;

if (r_stat)
{
    switch (gpg_err_code (sig->status))
    {
case GPG_ERR_NO_ERROR:
    *r_stat = GPGME_SIG_STAT_GOOD;
    break;

case GPG_ERR_BAD_SIGNATURE:
    *r_stat = GPGME_SIG_STAT_BAD;
    break;

case GPG_ERR_NO_PUBKEY:
    *r_stat = GPGME_SIG_STAT_NOKEY;
    break;

case GPG_ERR_NO_DATA:
    *r_stat = GPGME_SIG_STAT_NOSIG;
    break;

case GPG_ERR_SIG_EXPIRED:
    *r_stat = GPGME_SIG_STAT_GOOD_EXP;
```

```

break;

case GPG_ERR_KEY_EXPIRED:
    *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
    break;

default:
    *r_stat = GPGME_SIG_STAT_ERROR;
    break;
}
}
if (r_created)
    *r_created = sig->timestamp;
return sig->fpr;

```

-- Function: const char * gpgme_get_sig_string_attr (gpgme_ctx_t CTX,
int IDX, gpgme_attr_t WHAT, int WHATIDX)
The function gpgme_get_sig_string_attr is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
    sig = sig->next;
    idx--;
}
if (!sig || idx)
    return NULL;

switch (what)
{
case GPGME_ATTR_FPR:
    return sig->fpr;

case GPGME_ATTR_ERRTOK:
    if (whatidx == 1)
        return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
    else
return "";
default:
    break;
}

```

```
return NULL;
```

```
-- Function: const char * gpgme_get_sig_ulong_attr (gpgme_ctx_t CTX,  
int IDX, gpgme_attr_t WHAT, int WHATIDX)
```

The function `gpgme_get_sig_ulong_attr` is equivalent to:

```
gpgme_verify_result_t result;  
gpgme_signature_t sig;
```

```
result = gpgme_op_verify_result (ctx);  
sig = result->signatures;
```

```
while (sig && idx)  
{  
    sig = sig->next;  
    idx--;  
}
```

```
if (!sig || idx)  
return 0;
```

```
switch (what)
```

```
{  
case GPGME_ATTR_CREATED:  
    return sig->timestamp;
```

```
case GPGME_ATTR_EXPIRE:  
    return sig->exp_timestamp;
```

```
case GPGME_ATTR_VALIDITY:  
    return (unsigned long) sig->validity;
```

```
case GPGME_ATTR_SIG_STATUS:  
    switch (sig->status)  
{  
case GPG_ERR_NO_ERROR:  
    return GPGME_SIG_STAT_GOOD;
```

```
case GPG_ERR_BAD_SIGNATURE:  
    return GPGME_SIG_STAT_BAD;
```

```
case GPG_ERR_NO_PUBKEY:  
    return GPGME_SIG_STAT_NOKEY;
```

```
case GPG_ERR_NO_DATA:  
    return GPGME_SIG_STAT_NOSIG;
```

```
case GPG_ERR_SIG_EXPIRED:
```

```

return GPGME_SIG_STAT_GOOD_EXP;

    case GPG_ERR_KEY_EXPIRED:
        return GPGME_SIG_STAT_GOOD_EXPKEY;

    default:
        return GPGME_SIG_STAT_ERROR;
}

    case GPGME_ATTR_SIG_SUMMARY:
        return sig->summary;

    default:
        break;
}
return 0;

```

-- Function: const char * gpgme_get_sig_key (gpgme_ctx_t CTX, int IDX, gpgme_key_t *R_KEY)

The function gpgme_get_sig_key is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
    sig = sig->next;
    idx--;
}
if (!sig || idx)
    return gpg_error (GPG_ERR_EOF);

return gpgme_get_key (ctx, sig->fpr, r_key, 0);

```

File: gpgme.info, Node: Library Copying, Next: Copying,
Prev: Deprecated Functions, Up: Top

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Version 2.1, February 1999

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(line 21)

Wenn Sie dies lesen können, ist es wohl nicht
geheim genug.

hkp4py

requests

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For files:
- cJSON.c, cJSON.h

```
#+begin_quote  
Copyright (c) 2009 Dave Gamble
```

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```
#+end_quote  
#-*- mode: org -*-  
#+TITLE: Maintenance Mode  
#+AUTHOR: Ben McGinnes  
#+LATEX_COMPILER: xelatex  
#+LATEX_CLASS: article  
#+LATEX_CLASS_OPTIONS: [12pt]  
#+LATEX_HEADER: \usepackage{xltextra}  
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}  
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}  
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

* Maintenance Mode from 2019
:PROPERTIES:
:CUSTOM_ID: maintenance-mode

:END:

```
| Version:      | 0.0.1          |
| GPGME Version: | 1.13.0        |
| Author:       | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:     | Australian English, British English |
| xml:lang:     | en-AU, en-GB, en |
```

From the beginning of 2019 the Python bindings to GPGME will enter maintenance mode, meaning that new features will not be added and only bug fixes and security fixes will be made.

This also means that documentation beyond that existing at the end of 2018 will not be developed further except to correct errors.

Though use of these bindings appears to have been quite well received, there has been no indication of what demand there is, if any for either financial backing of the current Python bindings development or support contracts with g10code GmbH citing the necessity of including the bindings.

** Maintainer from 2019 onward

```
:PROPERTIES:
:CUSTOM_ID: maintenance-mode-bm
:END:
```

How does this affect the position of GnuPG Python Bindings Maintainer?

Well, I will remain as maintainer of the bindings; but without funding for that position, the amount of time I will be able to dedicate solely to this task will be limited and reduced to volunteered time. As with all volunteered time and effort in free software projects, this will be subject to numerous external imperatives.

** Using the Python Bindings from 2019 and beyond

```
:PROPERTIES:
:CUSTOM_ID:
maintenance-mode-blade-runner
:END:
```

For most, if not all, Python developers using these bindings; they will continue to just work the same as they always have. Expansions of GPGME itself are usually handled by SWIG with the existing code and thus bindings are generated properly when the bindings are installed alongside GPGME and when the latter is built from source.

In the rare circumstances where that is not enough to address some new addition to GPGME, then that is a bug and thus subject to the maintenance mode provisions (i.e. it will be fixed following a bug report being raised and your humble author will need to remember where the timesheet template was filed, depending on how many years off such an event is).

All the GPGME functionality will continue to be accessible via the lower level, dynamically generated methods which match the GPGME C documentation. While the more intuitively Pythonic higher level layer already covers the vast majority of functionality people require with key generation, signatures, certifications (key signing), encryption, decryption, verification, validation, trust levels and so on.

Any wanted features lacking in the Python bindings are usually lacking because they are missing from GPGME itself (e.g. revoking keys via the API) and in such cases they are usually deliberately excluded. More discussion of these issues can be found in the archives of the [\[\[https://lists.gnupg.org/mailman/listinfo/gnupg-devel\]\]](https://lists.gnupg.org/mailman/listinfo/gnupg-devel) [gnupg-devel mailing list].

Any features existing in the dynamically generated layer for which people want a specific, higher level function included to make it more Pythonic (e.g. to avoid needing to learn or memorise cryptographic mode values or GnuPG status code numbers), would be a feature request and /not/ a bug.

It is still worthwhile requesting it, but the addition of such a feature would not be guaranteed and provided on a purely volunteer basis. Expediting such a request would require funding that request.

Those with a commercial interest in expediting such a feature request already know how to [\[\[https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset\]\]](https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset) [expedite it] (use the message field to state what feature is being requested).

** Documentation formats

:PROPERTIES:

:CUSTOM_ID: docs

:END:

The documentation has been written in Org mode for GNU Emacs, with both Texinfo and reStructuredText formats generated from that. The Texinfo files are intended for use with the rest of the GnuPG documentation; while the reStructuredText files are intended for use

with Docutils and Sphinx, as with other Python projects.

*** Cautionary Notes regarding Sphinx and EPUB

:PROPERTIES:

:CUSTOM_ID: sphinx-made-epubs-suck

:END:

Though Python's Docutils in conjunction with Sphinx is capable of generating some very useful HTML sites, as proven by [\[https://readthedocs.org/\]](https://readthedocs.org/)[\[Read the Docs\]](#) and the [\[https://docs.python.org/\]](https://docs.python.org/)[\[Python documentation\]](#), there are a number of output formats it does not

handle well. At the top of the list of things it manages to break so atrociously as to be embarrassing is the [\[http://idpf.org/epub/\]](http://idpf.org/epub/)[\[EPUB 3\]](#) format.

The automatically generated EPUB of the CPython documentation always contains hundreds of validation errors and even the modest amount of documentation here [\[https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub\]](https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub)[\[produced a file\]](#) with approximately thirty validation errors. As the volume of documentation content increases, so does the induced errors. Whereas Texinfo doesn't produce EPUB output at all, nor does Org-mode.

Should there ever be genuine demand for this format, lodge a [\[https://dev.gnupg.org/maniphest/task/edit/form/4/\]](https://dev.gnupg.org/maniphest/task/edit/form/4/)[\[feature request\]](#) case marked for [\[https://dev.gnupg.org/p/BenM/\]](https://dev.gnupg.org/p/BenM/)[\[my\]](#) attention. The means of generating such files flawlessly is already available, but is not yet part of the GnuPG build system. Nor is it integrated with a means of converting Org

mode input files to the relevant base format automatically, as can already be done when converting Org to reStructuredText or Org to Texinfo. As a certain amount of work would be required to get it done, there would need to be clear demand for that work to be done. Just GNU it!

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

* m4/pth.m4: Removed.

* configure.ac: Remove check for pth and automake conditional HAVE_PTH.

2011-06-16 Marcus Brinkmann <marcus@g10code.com>

Release 1.3.1

* configure.ac: Set LT version to C19/A8/R0.

2011-05-06 Marcus Brinkmann <marcus@g10code.com>

* Makefile.am (SUBDIRS): Remove complus.

* configure.ac (AC_CONFIG_FILES): Remove complus/Makefile.

(BUILD_COMPLUS): Remove AM_CONDITIONAL.

* complus/: Remove very old and stale component.

* acinclude.m4 (GNUPG_FIX_HDR_VERSION): Remove.

2011-04-14 Werner Koch <wk@g10code.com>

* configure.ac: Require automake 1.11.

2011-04-06 Werner Koch <wk@g10code.com>

* autogen.sh (--build-w32):

Support option --build-w64.

* configure.ac (HAVE_W64_SYSTEM): Define.

(INSERT__TYPEDEFS_FOR_GPGME_H): New.

(GPGME_CONFIG_HOST): New.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* configure.ac (NEED_LIBASSUAN_VERSION): Bump to 2.0.2 for system hooks.

2010-12-30 Werner Koch <wk@g10code.com>

* configure.ac: Support a git revision.

2010-11-03 Werner Koch <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys/types.h and

sys.stat.h.

2010-11-02 Werner Koch <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys.time.h.

2010-08-19 Werner Koch <wk@g10code.com>

* configure.ac (AH_BOTTOM): Define GPG_ERR_ENABLE_ERRNO_MACROS.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for setlocale.

2010-05-07 Werner Koch <wk@g10code.com>

* configure.ac: Change checks to always require libassuan.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh: Update the thing.

* configure.ac: Check for locale.h.

2010-05-06

Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Detect Windows CE.

(HAVE_W32CE_SYSTEM): New symbol and automake conditional.

* ltmain.sh, m4/libtool.m4: Patch so that it works for Windows CE.

* configure.ac: Require libgpg-error 1.8.

2010-03-15 Werner Koch <wk@g10code.com>

* configure.ac (emacs_local_vars_begin)

(emacs_local_vars_read_only, emacs_local_vars_end): New.

2010-01-22 Werner Koch <wk@g10code.com>

* autogen.sh (--build-w32): Add --with-libassuan-prefix.

2010-01-11 Marcus Brinkmann <marcus@g10code.de>

Release 1.3.0.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Do not use echo -n. Test for __thread.

2009-12-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Make largefile check more robust.

2009-12-10 Werner Koch <wk@g10code.com>

* configure.ac: Check for getgid and getegid.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

Update to libtool 2.2.6a.

* configure.ac: Invoke AC_CONFIG_MACRO_DIR.

(AC_LIBTOOL_WIN32_DLL,

AC_LIBTOOL_RC): Replace by ...

(LT_PREREQ, LT_INIT, LT_LANG): ... these.

* config.guess, config.sub, install-sh, ltmain.sh, m4/libtool.m4:

Updated to libtool 2.2.6a.

* m4/ltoptions.m4, m4/ltsugar.m4, m4/ltversion.m4,

m4/lt~obsolete.m4: New files from libtool 2.2.6a.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Activate UIServer if FD passing is enabled and

Assuan is available.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for argp.h and error_t.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION_DEFAULT): Bump to 1.4.0 as 1.3.0 was development versions only.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add support for G13.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_CONFIG_FILES): Remove assuan/Makefile.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Replace internal libassuan by external libassuan.

* m4/libassuan.m4:

New file.

* Makefile.am (assuan): Remove variable.

(SUBDIRS): Remove \${assuan}.

* assuan/: Removed.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add AC_TYPE_UINTPTR_T.

* assuan/assuan.h [_ASSUAN_IN_GPGME_BUILD_ASSUAN]: Declare

_gpgme_io_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

Released GPGME 1.2.0.

* configure.ac (my_version): Set to 1.2.0.
(LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump.
(LIBGPGME_LT_REVISION): Reset.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add infrastructure for compile time check of
_FILE_OFFSET_BITS.

2009-04-19 Moritz <moritz@gnu.org>

* Makefile.am (DISTCHECK_CONFIGURE_FLAGS): Specify --with-gpg.

2009-03-06 Marcus Brinkmann <marcus@g10code.de>

* assuan/: Update to libassuan SVN 2009-03-06.

2009-01-26 Werner Koch <wk@g10code.com>

* configure.ac (AC_CONFIG_FILES): Add tests/opassuan/Makefile.

2008-12-08 Marcus Brinkmann <marcus@g10code.de>

Release GPGME
1.1.8.

* configure.ac: Bump API revision.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

* configure.ac: Replace gpgme paths with src.
* gpgme: Move to ...
* src: ... this new directory.

2008-10-20 Werner Koch <wk@g10code.com>

* configure.ac (AC_CONFIG_FILES): Add gpgme.h.
(GNUPG_FIX_HDR_VERSION): Remove.

2008-10-17 Marcus Brinkmann <marcus@g10code.com>

Release GPGME 1.1.7.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2008-09-19 Moritz <moritz@gnu.org>

* configure.ac: Remove bogus "esac".

2008-09-16 Marcus Brinkmann <marcus@g10code.com>

* configure.ac (_XOPEN_SOURCE) [apple-darwin]: Define it.

2008-07-04 Werner Koch <wk@g10code.com>

* config.guess, config.sub: Update to 2007-11-19. Also update missing et al scripts.

2008-04-01 Werner Koch <wk@g10code.com>

* configure.ac (AC_INIT): Fix quoting.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Bump required version of automake up to 1.10.

* autogen.sh: Fix

aclocal check.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

Release GPGME 1.1.6.

* configure.ac: Support gpgconf.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* assuan-pipe-connect.c (pipe_connect_gpgme): Do not close process handle here. Use this function also on Unix systems.

* assuan-pipe-connect.c (pipe_connect_gpgme): Fix last change.

* assuan-pipe-connect.c (pipe_connect_gpgme): New function, use it if _ASSUAN_IN_GPGME_BUILD_ASSUAN.

2007-09-17 Werner Koch <wk@g10code.com>

* configure.ac: Use the svn version magic.

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for C++, Qt and support --enable-w32-qt.
* m4/pkg.m4: New file.

2007-08-21 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (--enable-w32-glib): Use --enableval, not --withval.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

* assuan/assuan-socket.c (_assuan_close): Always use close().
* assuan/assuan.h (_gpgme_io_close): New prototype.
(close): New
macro, define as _gpgme_io_close.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

* assuan/assuan-io.c (_assuan_simple_read, _assuan_simple_write):
Always use read/write (which means _gpgme_io_read and
_gpgme_io_write).

2007-07-09 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.5.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-07-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (GPGSM_DEFAULT) [*-mingw32*]: Initialize it.
(HAVE_ASSUAN_H): Set to 1 if we have it.
(funopen): Use AC_REPLACE_FUNCS.
(USE_DESCRIPTOR_PASSING): Define to 1 if we have it. Do not
define it at all if we don't.
(NETLIBS) [have_w32_system]: Add -lws2_32.
(DIRSEP_C, DIRSEP_S, EXPSEP_C, EXPSEP_S, PATHSEP_S)
[HAVE_DOSISH_SYSTEM]: Remove definitions.

* assuan/assuan.h (_assuan_funopen): Define to _gpgme_funopen.
* assuan/funopen.c: Move to ../gpgme/funopen.c.
* assuan/Makefile.am (libassuan_la_SOURCES): Remove funopen.c.

2007-07-04 Marcus Brinkmann <marcus@g10code.de>

*
assuan/Makefile.am (INCLUDES): Include \$(top_srcdir)/gpgme.
* assuan/assuan.h: Include <ath.h> instead of trying to duplicate
the definitions.

* assuan/: Update files to 2007-07-04 version of assuan.

* autogen.sh: Use = not == in test.

2007-03-05 Werner Koch <wk@g10code.com>

Released 1.1.4.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

* autogen.sh: New option --force.

2007-01-29 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.3.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-01-26 Werner Koch <wk@g10code.com>

* configure.ac: Changed gpg and gpgsm version checks to work with arbitrary names of the gpg binary. New option --disable-gpg-test and --disable-gpgsm-test.

2007-01-09 Werner Koch <wk@g10code.com>

* configure.ac (NEED_GPG_VERSION, NEED_GPGSM_VERSION): Must define after it may have been changed by an option.

2007-01-08 Werner Koch <wk@g10code.com>

* configure.ac: Require gpg-error 1.4 due to the use of gpg_error_from_syserror.
(HAVE_ASSUAN_H):
New.

2007-01-05 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add options --with-gpg-version and --with-gpgsm-version to allow overriding the minimum version requirements.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Fix two typos in last change.

2006-12-03 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Use descriptor passing only if --enable-fd-passing is provided.

* configure.ac: Add check for use of descriptor passing.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump to 1.3.0.

2006-09-19 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Turn stpcpy into a replacement function.
Check for unistd.h and add setenv as replacement function.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for network libraries and set NETLIBS.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

* lang, lang/cl: New subdirectories.

*

lang/Makefile.am, lang/README: New files.

* configure.ac (AC_CONFIG_FILES): Add lang/Makefile,
lang/cl/Makefile and lang/cl/gpgme.asd.

* Makefile.am (SUBDIRS): Add lang.

2006-03-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.1.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump for release.

(LIBGPGME_LT_REVISION): Reset to 0 for release.

2006-01-05 Werner Koch <wk@g10code.com>

* configure.ac: Test for inline feature.

(AH_BOTTOM): New to define the pure attribute.

2006-01-03 Werner Koch <wk@g10code.com>

* configure.ac: Append SVN revision to the version.

2005-11-18 Werner Koch <wk@g10code.com>

* configure.ac (BUILD_REVISION): New.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add support for --enable-w32-glib (disabled by default). Invoke AM_PATH_GLIB_2_0.

2005-11-16 Werner Koch <wk@g10code.com>

* configure.ac
(CFLAGS) [W32]: Make sure that -mms-bitfields are used.

2005-11-15 Werner Koch <wk@g10code.com>

* configure.ac: Create BUILD_FILEVERSION from SVN Revision.

* autogen.sh [W32]: Build shared and static versions of the library.

2005-10-20 Marcus Brinkmann <marcus@g10code.de>

* w32-dll/ChangeLog, w32-dll/build-dll, w32-dll/gpgme.def: Remove files.

* configure.ac: Instead checking for windres and dlltool, invoke AC_LIBTOOL_WIN32_DLL and AC_LIBTOOL_RC.

* src/Makefile.am [HAVE_W32_SYSTEM]: Use libtool, which simplifies the rules.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.0.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump for release.

(LIBGPGME_LT_REVISION): Reset to 0 for release.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (HAVE_PTH): Don't add \$PTH_CFLAGS to \$CFLAGS here.

2005-08-26 Werner Koch <wk@g10code.com>

* configure.ac (SEPCONSTANTS): New to define DIRSEP_C et al.

2005-08-19 Werner Koch <wk@g10code.com>

*

configure.ac [W32]: Create values for versioninfo.rc and list
substitute versioninfo.rc.

* configure.ac: Define ENABLE_GPGSM.

2005-08-08 Werner Koch <wk@g10code.com>

* configure.ac (stpcpy): Changed from replace to test.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AH_BOTTOM): Removed.

2005-03-09 Werner Koch <wk@g10code.com>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): Assume no when cross-compiling.

* Makefile.am (EXTRA_DIST): Include autogen.sh

* autogen.sh: Added the usual code to build for W32 (--build-w32).

* configure.ac: Fixed the mingw32 host string, removed OS/2 stuff.

(HAVE_DRIVE_LETTERS): Removed.

(HAVE_W32_SYSTEM): Added.

(AC_GNU_SOURCE): New to replace the identical AH_VERBATIM.

(AH_BOTTOM): Added.

2004-12-28 Werner Koch <wk@g10code.com>

Released 1.0.2.

* Makefile.am (AUTOMAKE_OPTIONS): Build bzip 2 version.

(ACLOCAL_AMFLAGS): Add -I m4.

* configure.ac: Require automake 1.9.3 and autoconf 2.59.

* acinclude.m4:

Changed quoting for automake 1.9.

* README: Use SHA1 instead of MD5.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Replace ttyname_r if it doesn't exist (and warn in
that case).

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* README: Refer to COPYING.LESSER and "each file" instead of
COPYING.

- * COPYING.LESSER: New file.
- * gpgme.spec.in (%doc): Add COPYING.LESSER.
- * acinclude.m4, configure.ac, Makefile.am: Change license to LGPL 2.1 or later.
- * TODO: Add copyright notice.
- * README.CVS: Likewise.

* configure.ac (GPGSM_VERSION): Fix filter to get it.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.1.

- * configure.ac (LIBGPGME_LT_REVISION): Bump up to 2.
- (AC_INIT): Set version to 1.0.1.
- * configure.ac: Set HAVE_GPGSM to true only if \$GPGSM is not "no".

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.0.

- * configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.
- (AC_INIT): Set version to 1.0.0.
- * Makefile.am
- (EXTRA_DIST): Remove README-alpha.
- * README-alpha: Remove file.

2004-09-17 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Disable AC_CONFIG_MACRO_DIR for now.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Improve diagnostics with version check.
- * configure.ac: Print diagnostics about found thread libraries at the end. Check for the versions of GPG and GPGSM and print the found versions at the end.
- (HAVE_GPGSM): Do not require GPGSM to exist and be readable.
- (AC_CONFIG_MACRO_DIR): Invoke with argument m4.

- * acinclude.m4: Add copyright notice.
- (jm_GLIBC21, AM_PATH_GPG_ERROR, _AC_PTH_ERROR, _AC_PTH_VERBOSE, AC_CHECK_PTH): Removed.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for <sys/uiio.h>.

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

Released 0.9.0.

* configure.ac (AC_INIT): Set version number to 0.9.0.
(LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by one.
(LIBGPGME_LT_REVISION): Reset to zero.

2004-05-21

Marcus Brinkmann <marcus@g10code.de>

* configure.ac (GPGME_CONFIG_API_VERSION): New variable,
substitute it.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.7.

* configure.ac (LIBGPGME_LT_REVISION): Bump it up.

2004-04-02 Thomas Schwinge <schwinge@nic-nac-project.de>

* autogen.sh: Added ACLOCAL_FLAGS.

2004-04-06 Werner Koch <wk@gnupg.org>

Released 0.4.6.

* config.guess, config.sub, ltmain.sh: Updated to those from
libtools 1.5.4.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.5.

* configure.ac (NEED_GPGSM_VERSION): Bump up to 1.9.6.

* Makefile.am (EXTRA_DIST): Remove autogen.sh and README.CVS.

2004-02-18 Werner Koch <wk@gnupg.org>

* configure.ac: Make the check for funopen fail with just a
warning.

2004-02-11 Werner Koch <wk@gnupg.org>

* autogen.sh (check_version): Removed bashism and simplified.

2004-02-10 Werner Koch <wk@gnupg.org>

* configure.ac: Fixed funopen test change.

2004-02-06 Moritz Schulte

<mo@g10code.com>

* configure.ac: Fix funopen replacement mechanism.

2004-01-31 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add invocation of AC_SYS_LARGEFILE, AC_TYPE_OFF_T and AC_FUNC_FSEEKO.

2004-01-12 Werner Koch <wk@gnupg.org>

Released 0.4.4.

* configure.ac: Bumbed LT_Revision; now at C12/A1/R1.

(NEED_GPGSM_VERSION): Set to 1.9.3.

(min_automake_version): Added.

* README.CVS: New.

* Makefile.am (EXTRA_DIST): Added README.CVS.

* autogen.sh: Updated.

2003-11-19 Werner Koch <wk@gnupg.org>

* acinclude.m4: Add AM_PATH_GPG_ERROR.

* configure.ac: Check for timegm. Made warning messages more prominent.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.3.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by 1.

(LIBGPGME_LT_REVISION): Set to 0.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Require libpgp-error 0.5.

* acinclude.m4: Remove libtool cruft, add jm_GLIBC21.

* configure.ac: Add check for

getenv_r, and call jm_GLIBC21.

Define HAVE_THREAD_SAFE_GETENV if appropriate.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Remove GPGME_CONFIG_LIBS and GPGME_CONFIG_CFLAGS.

2003-09-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Move invocation of AC_CANONICAL_HOST up to suppress warning by autoconf.

2003-08-30 Robert Schiele <rschiele@uni-mannheim.de>

* gpgme.spec.in: %[_infodir]/dir is not packaged, remove to prevent checking failure.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: If building Assuan, check for funopen and fopencookie, and make isascii, putc_unlocked and memrchr replacement functions.

(AM_PATH_GPG_ERROR): Require 0.3.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.3.

2003-07-30 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.

Released 0.4.2.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac:
Complain if libgpg-error is not found.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.2.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_CURRENT): Bump up to 11.

* configure.ac: Use AM_PATH_GPG_ERROR.

* configure.ac: Check for libgpg-error. Define
GPG_ERR_SOURCE_DEFAULT.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump up to 1.2.2.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

In all files, replace the Gpgme* type names with the new gpgme_*
type names.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

* assuan/: Update files to 2002-11-10 version of assuan.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* bonobo/gpgme.c, bonobo/main.c, bonobo/main.h, bonobo/Makefile,
bonobo/Makefile.am, bonobo/Makefile.in: Dead files removed.

* configure.ac: Remove automake conditional BUILD_BONOBO
(AC_CONFIG_FILES): Remove bonobo/Makefile.

*

Makefile.am (bonobo): Remove variable.

(SUBDIRS): Remove \${bonobo}.

* configure.ac: Remove all uses of GNUPG_CHECK_TYPEDEF, for byte,
ushort, ulong, u16 and u32.

* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Remove macro.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: New conditional HAVE_LD_VERSION_SCRIPT.
Call AC_CANONICAL_HOST, use host instead target.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Bump up to 0.4.1.

Released 0.4.0.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh (automake_vers): Require 1.7 (really 1.7.1) for the
conditional source distribution bug fix.

2002-12-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_CURRENT): Increase by one.
(LIBGPGME_LT_AGE, LIBGPGME_LT_REVISION): Set to 0.

2002-11-28 Marcus Brinkmann <marcus@g10code.de>

* NEWS: Add note about moving "gpgmeplug" to the "cryptplug" package.
* README: Remove instructions related to "gpgmeplug".
* configure.ac:
Remove enable option "gpgmeplug" and automake conditional BUILD_GPGMEPLUG, as well as the status info about it.
(GPGMEPLUG): Remove variable.
* Makefile.am (gpgmeplug): Remove variable.
(SUBDIRS): Remove \${gpgmeplug}.
* cryptplug.h, gpgme-openpgp.c, gpgmeplug.dox, gpgme-smime.c, Makefile.am, gpgmeplug.c, ChangeLog: Files removed.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Disable GPGSM for all dosish systems.

2002-10-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add automake conditional HAVE_GPGSM.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version up to 0.4.0.
(NEED_GPG_VERSION): Bump up to 1.2.0.
(NEED_GPGSM_VERSION): Bump up to 0.9.0.
* README: Update version numbers.
* NEWS: Start entry for 0.4.0.

2002-09-20 Werner Koch <wk@gnupg.org>

Released 0.3.11.

* configure.ac: Bump up LIBGPGME_LT_REVISION.

* configure.ac (AC_CHECK_HEADERS): Check for sys/select.h.

2002-09-04 Marcus Brinkmann
<marcus@g10code.de>

* autogen.sh (autoconf_vers): Bump up to 2.53 to get the @&t@ quadrigraph. Always cutting the edge!

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Create and substitute LTLIBOBS.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.10.

* NEWS: Update for 0.3.9 release.

* configure.ac: Bump up LIBGPGME_LT_REVISION.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.spec.in: Changed user name in Wojciech Polak's email address from ghostface to polak per request by himself.

2002-08-28 Werner Koch <wk@gnupg.org>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): New.

* configure.ac: Use it.

2002-08-23 Werner Koch <wk@gnupg.org>

* configure.ac (GPGME_CONFIG_CFLAGS): Renamed from GPGME_CFLAGS and removed the libpath because it is set by the config script.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Bump version number to 0.3.10.

* NEWS: Add template for development version.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

Released 0.3.9.

* NEWS: Update for 0.3.9 release.

* Makefile.am (EXTRA_DIST): Add gpgme.spec.in.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* jnlib/argparse.c, jnlib/argparse.h, jnlib/ChangeLog,
jnlib/dotlock.c, jnlib/dotlock.h, jnlib/libjnlib-config.h,
jnlib/logging.c, jnlib/logging.h, jnlib/Makefile.am,
jnlib/mischelp.h, jnlib/README, jnlib/stringhelp.c,
jnlib/stringhelp.h, jnlib/strlist.c, jnlib/strlist.h,
jnlib/types.h, jnlib/xmalloc.c, jnlib/xmalloc.h: Remove files.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

- * Makefile.am (SUBDIRS): Remove jnlib.
- * configure.ac: Don't check for unsigned short or unsigned long.
Don't check for memicmp, strtoul, strtoul, memmove, stricmp.
Make stpcpy a replaced function.
Don't define HAVE_JNLIB_LOGGING.
Don't generate jnlib/Makefile.

2002-07-02 Werner Koch <wk@gnupg.org>

- * configure.ac: Bumped version number to 0.3.9; add a comment on when to change it.
- * gpgme.spec.in:
New. Contributed by Wojciech Polak.
- * Makefile.am (dist-hook): New.
- * AUTHORS: Added Wojciech and bug reporting addresses.

2002-06-25 Werner Koch <wk@gnupg.org>

Released 0.3.8.

- * configure.ac: Bumped LT version to 9/3/0.
(NEED_GPGSM_VERSION): Need 0.3.8 due to fixed export command.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.7.

- * configure.ac (AC_INIT): Set version to 0.3.7.
(LIBGPGME_LT_REVISION): Add one.
- * README: Document version requirement correctly.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

- * acinclude.m4: Fix Pth check so that it doesn't error out if pth is not found.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Add checks for Pth and pthreads.
- * acinclude.m4: Add slightly hacked check for pth (seems to be an autoconf version problem).

2002-05-21 Werner Koch <wk@gnupg.org>

* configure.ac (NEED_GPGSM_VERSION): We need gpgsm 0.3.7.

2002-05-03 Werner Koch <wk@gnupg.org>

Released 0.3.6.

2002-04-05

Marcus Brinkmann <marcus@g10code.de>

* acconfig.h: File removed.

* configure.ac (NEED_GPG_VERSION): Add description.

(NEED_GPGSM_VERSION): Likewise.

(HAVE_DOSISH_SYSTEM): Likewise.

(HAVE_DRIVE_LETTERS): Likewise.

(GPG_PATH): Likewise.

(GPGSM_PATH): Likewise.

* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Likewise.

2002-04-01 Werner Koch <wk@gnupg.org>

Released 0.3.5.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add automake conditional HAVE_DOSISH_SYSTEM.

2002-03-04 Werner Koch <wk@gnupg.org>

* configure.ac: Bumbed version to 0.3.4-cvs to continue development.

Released 0.3.4.

* configure.ac: Bumbed LT version numbers to (7,1,0), requires gpgsm 0.3.1.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Change version number to snapshot CVS version.

2002-02-13 Werner Koch <wk@gnupg.org>

* configure.ac (vasprintf,fopencookie): Add checks.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT):

Bump version to 0.3.3.

* jnlib/Makefile.am: Revert to older version that includes xmalloc but not dotlock and some other files. Reported by Stphane Corthsy.

2002-02-10 Marcus Brinkmann <marcus@g10code.de>

* Released 0.3.2.

* configure.ac (AC_INIT): Bump version to 0.3.2.

* jnlib/libjnlibconfig.h: Revert to older version that doesn't expect libgcrypt. Reported by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* Released 0.3.1.

* configure.ac (LIBGPGME_LT_CURRENT): Bump it up to 6!

(NEED_GPGSM_VERSION): Bump it up to 0.3.0!

(AC_INIT): Bump version to 0.3.1

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (HAVE_JNLIB_LOGGING): Define always for assuan.

2001-12-19 Werner Koch <wk@gnupg.org>

* configure.ac (VERSION,PACKAGE): Defined and subst. Used for AM_INIT_AUTOMAKE and moved all version number more to the top.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh (libtool_vers):

Bump to 1.4.

* configure.ac (LIBGPGME_LT_CURRENT): Increment.

(LIBGPGME_LT_AGE): Reset.

Improve comment.

Fix wrong comment character.

2001-12-18 Werner Koch <wk@gnupg.org>

* acinclude.m4 (GNUPG_FIX_HDR_VERSION): Fixed for new automake.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (GPG): Substitute this variable.
(GPGSM): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_CONFIG_FILES): Add tests/gpg/Makefile and tests/gpgsm/Makefile.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgmeplug): New variable, set to gpgmeplug if [BUILD_GPGMEPLUG].
* configure.ac (AC_CONFIG_FILES): Add gpgmeplug/Makefile. Support --enable-gpgmeplug.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh: Tighten version dependencies.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (SUBDIRS): Support building the assuan library (currently if GPGSM_PATH is set)..
* configure.ac: Support building the assuan library.
* assuan: New directory, populated with the Assuan library (copied from the newpg repository).

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPGSM_VERSION): New variable. Treat it similarly to NEED_GPG_VERSION.
* acconfig.h: Likewise.

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

* configure.in: Renamed to ...
* configure.ac: ... this. Update to autoconf 2.52. Lots of small changes in the transition. Support --with-gpg=PATH and --with-gpgsm=PATH options. Check if test suites can be run.
* acconfig.h: Add GPGSM_PATH.
* Makefile.am: New variable `tests', set to `tests' if RUN_GPG_TESTS.
(SUBDIRS): Replace string `tests' with variable `tests'.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh: Invoke automake with `-a' (add missing files).

Do not invoke configure.

2001-09-17 Werner Koch <wk@gnupg.org>

Released 0.2.3.

* configure.in (NEED_GPG_VERSION): Set to 1.0.6. Incremented LT current and age.

* Makefile.am (SUBDIRS): Add doc

2001-06-12 Werner Koch <wk@gnupg.org>

Released 0.2.2.

2001-04-05 Werner Koch <wk@gnupg.org>

* configure.in (NEED_GPG_VERSION): Set to 1.0.4g

2001-04-02 Werner Koch <wk@gnupg.org>

Released 0.2.1.

Changed the copyright notices all over the place.

2001-02-28 Werner Koch <wk@gnupg.org>

Released 0.2.0.

2001-01-18 Werner Koch <wk@gnupg.org>

* autogen.sh: Added option --build-w32.

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2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting

on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-05-11 Marcus Brinkmann <marcus@g10code.com>

* gpgsm/Makefile.am (DISTCLEANFILES): Move to ...
(CLEANFILES): ... here.
(clean-local): New rule.
* gpg/Makefile.am (DISTCLEANFILES): Move to ...
(CLEANFILES): ... here.

2011-05-05 Marcus Brinkmann <marcus@g10code.com>

* gpg/Makefile.am: Unset GPG_AGENT_INFO when setting up local configuration.
(clean-local): Shut down local gpg-agent.

2011-05-04 Marcus Brinkmann <marcus@g10code.com>

* gpg/t-import.c (check_result): Complete secret key pair counting and disable status check, as GPG 2.1 currently emits two IMPORT_OK lines and we only look at the first.

2011-04-27 Marcus Brinkmann <marcus@g10code.com>

* gpg/Makefile.am (DISTCLEANFILES):
Add S.gpg-agent.
(mkdemodirs, ./Alpha/Secret.gpg): Remove targets.
(GNUPGHOME): Export as absolute build directory (for gpg-agent).
(./pubring.gpg): Remove --homedir option, import secdemo.asc.
(clean-local): Rewrite.
* gpg/secdemo.asc: New file.
* gpg/pubkey-1.asc, gpg/seckey-1.asc: Change passphrase to "abc" (now needed as GnuPG 2.1 asks for secret key passphrase on import).
* gpg/t-keylist.c (keys): Update key info for Joe Random Hacker.
(main): Disable check for can_encrypt, as this is now in a different subkey.
* gpg/t-encrypt-sign.c (check_result): Allow RMD160 hash algorithm.
* gpg/t-import.c (check_result): One secret key pair now counts as two secret keys, allow that.

2009-11-03 Werner Koch <wk@g10code.com>

* run-support.h (fail_if_err): Include program name.

* run-sign.c (main): Add option --uiserver.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

* opassuan/t-command.c: Update to new interface.

2009-10-15 Werner Koch <wk@g10code.com>

* run-verify.c:

New.

2009-08-06 Werner Koch <wk@g10code.com>

* run-sign.c: New.

2009-07-07 Werner Koch <wk@g10code.com>

* run-keylist.c (main): Add options --cms and --openpgp.

* gpg/pgp-keylist.c: Rename to ...

* run-keylist.c: ... this.

* gpg/pgp-import.c: Rename to ...

* run-import.c: ... this.

* gpg/pgp-export.c: Rename to ...

* run-export.c: ... this.

* run-support.h: New. Copied from gpg/t-support.h.

* gpg/Makefile.am (noinst_PROGRAMS): Remove them.

* Makefile.am (noinst_PROGRAMS): Add them.

(noinst_HEADERS): New.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-support.h (passphrase_cb): Implement write() according to the book to silence compiler warning.

* gpgsm/t-support.h (passphrase_cb): Likewise.

2009-06-16 Werner Koch <wk@g10code.com>

* gpg/pgp-import.c: New.

* gpg/t-support.h (print_import_result, nonnull): Factored out from other tools.

* gpg/pgp-export.c, gpg/pgp-keylist.c: New.

2009-06-09 Werner Koch <wk@g10code.com>

* gpg/Makefile.am

(./pubring.gpg): Ignore errors in case of
already imported keys. Add --no-permission-warning and remove
obsolete --allow-secret-key-import.
* gpg/mkdemodirs.in (GPG): Add --no-permission-warning.

* gpg/t-edit.c (edit_fnc): Use gpgme_io_write.

2009-04-19 Moritz <moritz@gnu.org>

* gpg/Makefile.am (EXTRA_DIST): Replaced mkdemodirs with mkdemodirs.in.
(mkdemodirs): New target.
(clean-local): Added command for removing mkdemodirs script.
(./Alpha/Secret.gpg): Added dependency on mkdemodirs.

* gpg/mkdemodirs: Renamed to ...
* gpg/mkdemodirs.in: ... here.
* gpg/mkdemodirs.in (GPG): Derive value from @GPG@ instead of
hard-coding "gpg".

2009-02-24 Werner Koch <wk@g10code.com>

* opassuan/t-command.c: Adjust for changed new op_assuan interface.

2009-02-03 Werner Koch <wk@g10code.com>

* gpg/t-keylist.c (main): Check that new fields is_cardkey and
card_number are not set.

2009-01-26 Werner Koch <wk@g10code.com>

* opassuan/: New.
* opassuan/Makefile.am:
New.
* opassuan/t-command.c: New.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (INCLUDES): Fix path to include file.
* gpg/Makefile.am (INCLUDES), gpgsm/Makefile.am (INCLUDES): Likewise.

2008-11-18 Werner Koch <wk@g10code.com>

* gpgsm/cms-decrypt.c: New.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

* gpgsm/Makefile.am (INCLUDES, LDADD): Replace gpgme path with src.
* gpg/Makefile.am (INCLUDES, LDADD, t_thread1_LDADD): Likewise.

* Makefile.am (LDADD): Likewise.

2008-10-30 Werner Koch <wk@g10code.com>

* gpgsm/cms-keylist.c: New.

2008-06-19 Werner Koch <wk@g10code.com>

* gpg/t-gpgconf.c (dump_arg): Add new types. Print strings in quotes.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (DISTCLEANFILES): Add pubring.kbx~.

2008-01-10 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-gpgconf.c (main): Allow for dirmngr not to be available.

* gpg/Makefile.am (./gpg-agent.conf): Correct pinentry path.

* gpg/pinentry:

New file.

* gpg/Makefile.am (DISTCLEANFILES, all-local): Add gpg-agent.conf

(./gpg-agent.conf): New target.

(EXTRA_DIST): Add pinentry.

* gpg/t-gpgconf.c (main): Exit early if compiled without gpgconf.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): Add pubring.kbx and dirmngr.conf.

* Makefile.am (TESTS_ENVIRONMENT): Use absolute path for GNUPGHOME.

* gpg/Makefile.am (TESTS_ENVIRONMENT): Use absolute path for GNUPGHOME.

* gpgsm/Makefile.am (TESTS_ENVIRONMENT): Use absolute path for GNUPGHOME.

* gpg/Makefile.am (TESTS): Add t-gpgconf.

t-gpgconf.c: New file.

2007-11-23 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c (show_auditlog): Check for GPG_ERR_ASS_UNKNOWN_CMD.

2007-11-23 Werner Koch <wk@g10code.com>

* gpgsm/t-verify.c (check_result): Don't exit on error but set a flag.
(main): Consult flag for return value.
(show_auditlog): New.
(main): Use it.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* t-engine-info.c
(check_engine_info): Fix debug output.
* gpg/Makefile.am (tests_unix): New variable.
(TESTS): Use it.
* gpg/t-support.h (passphrase_cb) [HAVE_W32_SYSTEM]: Use WriteFile instead of write.
* gpg/t-wait.c [HAVE_W32_SYSTEM]: Define sleep as _sleep.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c (main): Release TEXT and SIG.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (key_id): Change := into =.

2007-07-12 Werner Koch <wk@g10code.com>

* gpgsm/t-support.h (init_gpgme) [W32]: Do not init the locales as the constants are not available.

2007-02-26 Werner Koch <wk@g10code.com>

* gpg/t-verify.c (double_plaintext_sig): New.
(main): Check it.

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (main): Skip unknown keys. Newer versions of GPGSM import more keys than older ones.

2005-12-06 Werner Koch <wk@g10code.com>

* gpg/t-keylist.c (main): Changed for that secondary keys now have a fingerprint.
*
gpg/t-keylist-sig.c (main): Ditto.
* gpgsm/t-keylist.c (main): Ditto. The test used to be wrong.

2005-10-18 Werner Koch <wk@g10code.com>

* gpg/pubdemo.asc, gpg/secdemo.asc: Add 2 expired subkeys to

Whisky.

- * gpg/t-keylist.c: Reordered list to match new demo keyring. Add arg for number of subkeys and for extra checking function.
- (main): Enhanced a few error outputs. Changed subkey counting. Call extra checking function.
- (check_whisky): New.

2005-10-07 Marcus Brinkmann <marcus@g10code.de>

- * gpgsm/t-keylist.c (main): Allow for an email address as a second uid.
- * gpg/t-sig-notation.c: Change critical notation to something GnuPG understands.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

- * gpg/Makefile.am (EXTRA_DIST): Remove gpg.conf.
- (DISTCLEANFILES): Add gpg.conf.
- (all-local): Add gpg.conf.
- (./gpg.conf): New target.
- * gpg/gpg.conf: Remove file.
- * gpg/Makefile.am (EXTRA_DIST): Add gpg.conf.
- * gpg/Makefile.am (TESTS): Add t-sig-notation.
- * gpg/t-sig-notation.c
- (check_result): New file.
- * gpg/t-verify.c (check_result): Also check the length of the notation data.
- * gpg/gpg.conf: New file.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

- * gpg/Makefile.am (TESTS): Add t-filename.
- * gpg/t-filename.c: New file.

2005-09-23 Werner Koch <wk@g10code.com>

- * gpg/t-support.h (init_gpgme) [W32]: Don't use LC_MESSAGES.
- * gpg/t-encrypt-large.c: New test.
- * gpg/Makefile.am (TESTS): Add t-encrypt-large.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

- * gpg/Makefile.am (TESTS): Add t-wait.
- * gpg/t-wait.c (main): New test.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* gpg/mkdemodirs: Add copyright notice.

* gpgsm/Makefile.am, gpgsm/t-support.h, gpgsm/t-decrypt.c,
gpgsm/t-encrypt.c, gpgsm/t-export.c, gpgsm/t-genkey.c,
gpgsm/t-import.c, gpgsm/t-keylist.c, gpgsm/t-sign.c,
gpgsm/t-verify.c, gpg/Makefile.am, gpg/t-decrypt.c,
gpg/t-decrypt-verify.c, gpg/t-edit.c, gpg/t-encrypt.c,
gpg/t-encrypt-sign.c, gpg/t-encrypt-sym.c,
gpg/t-eventloop.c,
gpg/t-export.c, gpg/t-genkey.c, gpg/t-import.c, gpg/t-keylist.c,
gpg/t-keylist-sig.c, gpg/t-sign.c, gpg/t-signers.c,
gpg/t-support.h, gpg/t-thread1.c, gpg/t-trustlist.c,
gpg/t-verify.c, Makefile.am, t-data.c, t-engine-info.c,
t-version.c: Change license to LGPL.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (struct): Add new fields VALIDITY and
KEY_LENGTH.

(main): Use them.

* gpgsm/t-import.c (check_result): New argument total_stat.

(main): Pass this argument. Reduce number of total considered
keys to 1 for the second test.

2004-04-05 Werner Koch <wk@gnupg.org>

* gpgsm/Makefile.am: Changed the faked system time to 20011213T12000.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c: Add chain IDs.

2004-03-03 Werner Koch <wk@gnupg.org>

* gpgsm/t-export.c (main): Also check exporting 2 certificates.

2004-02-17 Werner Koch <wk@gnupg.org>

* gpgsm/t-import.c (check_result): gpgsm does now
return info in
the result->imports; adjust for that.

* gpgsm/Makefile.am (TESTS_ENVIRONMENT): Reset the GPG_AGENT_INFO.

Include config.h at the top of each C source. This is required

due to LFS support.

- * gpg/t-keylist-sig.c (main): s/class/sig_class/.
- * gpg/t-signers.c (check_result): Ditto.
- * gpg/t-sign.c (check_result): Ditto.
- * gpg/t-encrypt-sign.c (check_result): Ditto.
- * gpgsm/t-sign.c (check_result): Ditto.

2004-01-12 Werner Koch <wk@gnupg.org>

- * gpg/t-keylist-sig.c (main): Temporary disabled one test due top gpg 1.3.4 problems.
- * gpg/t-import.c (check_result): Likewise.

2003-11-19 Werner Koch <wk@gnupg.org>

- * gpg/t-support.h (DIM): Added.
- * gpg/t-verify.c (check_result): Rewrote test for notations because the order of notations is not guaranteed.
- * gpgsm/t-support.h (fail_if_err): Also print the numeric values.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

- * gpg/t-eventloop.c: Include <sys/types.h> for old systems.
- * gpgsm/Makefile.am (DISTCLEANFILES): Add random_seed.
- * gpg/t-thread1.c (thread_one): Do not call initialize_gpgme. Likewise.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

- * gpg/t-thread1.c (main): Call init_gpgme here. (initialize_gpgme): Function removed.
- * gpg/t-thread1.c: New file.
- * gpg/Makefile.am (TESTS): Add t-thread1.c. (t_thread1_LDADD): New variable. (LDADD): Remove GPG Error lib.
- * gpgsm/Makefile.am (LDADD): Likewise.
- * gpg/t-import.c (main): Likewise.
- * gpg/t-keylist-sig.c (main): Likewise.
- * gpg/t-keylist.c (main): Likewise.
- * gpg/t-sign.c (main): Likewise.

- * gpg/t-signers.c (main): Likewise.
- * gpg/t-trustlist.c (main): Likewise.
- * gpgsm/t-support.h: Include <stdlib.h> and <locale.h>.

(init_gpgme): New function.

- * gpg/t-support.h: Likewise.
- * gpgsm/t-verify.c (main): Call init_gpgme.
- * gpgsm/t-decrypt.c (main): Likewise.
- * gpgsm/t-encrypt.c (main): Likewise.
- * gpgsm/t-export.c (main): Likewise.
- * gpgsm/t-genkey.c (main): Likewise.
- * gpgsm/t-import.c (main):
Likewise.
- * gpgsm/t-keylist.c (main): Likewise.
- * gpgsm/t-sign.c (main): Likewise.
- * gpg/t-verify.c (main): Call init_gpgme.
- * gpg/t-decrypt-verify.c (main): Likewise.
- * gpg/t-decrypt.c (main): Likewise.
- * gpg/t-edit.c (main): Likewise.
- * gpg/t-encrypt-sign.c (main): Likewise.
- * gpg/t-encrypt-sym.c (main): Likewise.
- * gpg/t-encrypt.c (main): Likewise.
- * gpg/t-eventloop.c (main): Likewise.
- * gpg/t-export.c (main): Likewise.
- * gpg/t-genkey.c (main): Likewise.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

- * gpg/t-sign.c (check_result): Change output format for signature class to unsigned int.
- * gpg/t-signers.c (check_result): Likewise.
- * gpg/t-encrypt-sign.c (check_result): Likewise.
- * gpgsm/t-sign.c (check_result): Likewise.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

- * gpg/t-verify.c (check_result): Change type of SUMMARY to unsigned int.
- * gpg/t-decrypt-verify.c (check_verify_result): Likewise.
- * gpg/t-keylist-sig.c (keys): Change type of member CLASS to unsigned int.
- * t-data.c (read_cb): Change type of AMOUNT to unsigned int.
- * t-version.c (version): Remove unused variable.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

- * Makefile.am (AM_CPPFLAGS): New variable.
- (LDADD): Add @GPG_ERROR_LIBS@.

* gpg/Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.
* gpgsm/Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

* gpg/Makefile.am (noinst_HEADERS): New variable.
* gpg/t-support.h: New file.
* gpgsm/Makefile.am (noinst_HEADERS): New variable.
* gpgsm/t-support.h: New file.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sym.c (main): Adapt to new syntax.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.

2003-05-28 Marcus
Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c (main): Rewrite recipient management.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-export.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Order t-keylist and t-keylist-sig after
t-import.
* gpg/t-edit.c (edit_fnc): Fix primary UID for keylisting tests.
* gpg/t-keylist.c: Change order of user IDs.
* gpg/t-keylist-sig.c: Likewise.
* gpg/t-import.c: Add support for gpg in CVS.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* t-data.c: Remove TEST_OUT_CB.
(main): Likewise.
* gpg/t-trustlist.c (main): Access ITEM directly.

* (t-decrypt-verify.c, t-decrypt.c, t-edit.c, t-encrypt-sign.c, t-encrypt-sym.c, t-sign.c, t-signers.c): Include <unistd.h>. (passphrase_cb): Rewritten.
* t-edit.c (edit_fnc): Rewritten.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

*
gpg/t-keylist-sig.c (main): Remove timestamp check.
* gpgsm/t-keylist.c: Add check for timestamp.
* gpg/Makefile.am (TESTS): Add t-keylist-sig.
* gpg/t-keylist-sig.c: New file.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c (main): Do not call print_op_info. (print_op_info): Function removed.
* gpg/t-keylist.c: Rewritten.
* gpgsm/t-keylist.c (main): Rewritten.
* gpg/t-edit.c (main): Do not use gpgme_key_get_as_xml. Use gpgme_key_unref instead gpgme_key_release.
* gpg/t-signers.c (main): Use gpgme_key_unref instead gpgme_key_release.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-trustlist.c: Rewritten.
* gpg/t-verify.c (main): Rewritten.
* gpg/t-decrypt-verify.c: Rewritten.
* gpgsm/t-verify.c (main): Rewritten.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-decrypt.c (main): Rewritten.
* gpg/t-decrypt.c: Rewritten.
* gpg/t-signers.c: Rewritten.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

*
gpg/t-encrypt-sign.c (check_result): Rewritten.

- * gpg/t-sign.c: Rewritten.
- * gpgsm/t-sign.c: Rewritten.
- * gpg/t-encrypt.c: Check for invalid recipients.
- * gpgsm/t-encrypt.c: Likewise.

- * gpg/t-import.c (check_result): Really use FPR.
- * gpgsm/t-import.c (check_result): Rewritten.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

- * gpg/t-import.c: Rewritten.

- * gpgsm/t-genkey.c: Rewritten.
- * gpgsm/Makefile.am (noinst_PROGRAMS): Add t-genkey.
- * gpg/t-genkey.c: Include <stdlib.h>.
- (main): Check result->fpr before checking its length.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

- * gpg/t-genkey.c: Rewritten to match new semantics.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

- * gpg/t-decrypt.c (passphrase_cb): Fix to new prototype.
- * gpg/t-decrypt-verify.c (passphrase_cb): Likewise.
- * gpg/t-edit.c (passphrase_cb): Likewise.
- * gpg/t-encrypt-sign.c (passphrase_cb): Likewise.
- * gpg/t-encrypt-sym.c (passphrase_cb): Likewise.
- * gpg/t-sign.c (passphrase_cb): Likewise.
- *
- gpg/t-signers.c (passphrase_cb): Likewise.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

- * t-engine-info.c: Use file_name instead path throughout.

- * Makefile.am (TESTS): Add t-engine-info.
- * t-engine-info.c: New file.
- * gpg/t-encrypt.c (main): Don't print engine info.
- * gpg/t-eventloop.c (main): Likewise.
- * gpg/t-encrypt-sign.c (main): Likewise.
- * gpgsm/t-encrypt.c (main): Likewise.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

- * gpgsm/t-verify.c (main): Adjust caller of gpgme_op_verify.
- * gpg/t-verify.c (main): Likewise.
- * gpg/t-decrypt-verify.c (main): Likewise for

gpgme_op_decrypt_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (./gpgsm.conf): Add a faked system time to avoid certification's expiry.

* gpgsm/t-encrypt.c (main): Use the short certification name.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-genkey.c (main): Add missing argument to gpgme_op_genkey invocation.

2002-10-09 Marcus Brinkmann

<marcus@g10code.de>

* gpg/t-decrypt.c (print_data): Update to new gpgme_data_read interface, and use gpgme_engine_check_version instead gpgme_check_version.

* gpg/t-decrypt-verify.c (print_data): Likewise.

* gpg/t-edit.c (main): Likewise.

* gpg/t-encrypt.c (print_data): Likewise.

* gpg/t-encrypt-sign.c (print_data): Likewise.

* gpg/t-encrypt-sym.c (print_data): Likewise.

* gpg/t-eventloop.c (print_data): Likewise.

* gpg/t-export.c (print_data): Likewise.

* gpg/t-sign.c (print_data): Likewise.

* gpg/t-signers.c (print_data): Likewise.

* gpgsm/t-decrypt.c (print_data): Likewise.

* gpgsm/t-encrypt.c (print_data): Likewise.

* gpgsm/t-export.c (print_data): Likewise.

* gpgsm/t-sign.c (print_data): Likewise.

* gpg/t-verify.c (main): Likewise for gpgme_op_verify.

* gpgsm/t-verify.c (main): Likewise for gpgme_op_verify.

* t-data.c (read_once_test): Likewise.

(write_test): Update for new behaviour of data objects.

(main): Remove type test.

2002-09-30 Werner Koch <wk@gnupg.org>

*

gpgsm/t-keylist.c (doit): Add arg SECRET.

(main): Add option --secret.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

* t-version.c: Include <string.h>. Reported by Stphane Corthisy.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-keylist.c (main): Test PATTERN for NULL before printing.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-08-01 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-edit.c: Also add a test for the expire command (testing
the passphrase callback).

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-edit.c: New file.
* gpg/Makefile (TESTS): Add t-edit.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sym.c (main): Change type of I to size_t and
rename to LEN.
* gpg/t-verify.c (main): Likewise. Submitted by Stphane
Corthsy.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c: New file.
* gpg/Makefile (TESTS): Add t-eventloop.

2002-06-26 Werner Koch <wk@gnupg.org>

*
gpgsm/t-import.c (print_op_info): New.
(main): Print operation info.

2002-06-25 Werner Koch <wk@gnupg.org>

* gpgsm/Makefile.am (DISTCLEANFILES): new.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (TESTS): Add t-export.
gpgsm/t-export.c: New file.

2002-06-20 Werner Koch <wk@gnupg.org>

* gpgsm/t-sign.c (main): Also test a normal signature.

* gpg/Makefile (TESTS_ENVIRONMENT): Set GPG_AGENT_INFO empty.
* gpg/t-signers.c, gpg/t-sign.c, gpg/t-encrypt-sym.c

* gpg/t-encrypt-sign.c, gpg/t-decrypt.c
* gpg/t-decrypt-verify.c (main): Changed the GPG_AGENT_INFO check to match the one in ../../gpgme/rungpg.c.

2002-06-12 Werner Koch <wk@gnupg.org>

* gpgsm/t-keylist.c (doit): Print operation info if available.

2002-06-10 Werner Koch <wk@gnupg.org>

* gpgsm/t-verify.c (print_sig_stat): Print the error token.

2002-06-04 Werner Koch <wk@gnupg.org>

* gpgsm/t-encrypt.c (main): Add a simple option parser and allow to specify an encryption key.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (all-local): Remove dependency on ./secreting.gpg.
(./secreting.gpg): Remove target, and move all rules for this target to ...
(./pubring.gpg): ... here. This was necessary because GnuPG 1.0.7 does create an empty secreting.gpg file when importing public keys.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c (validity_string): New.
(print_sig_stat): Print expire time and validity.
(status_string): Add new expired stati.

2002-05-03 Werner Koch <wk@gnupg.org>

* gpg/t-verify.c (validity_string): New.
(print_sig_stat): Print expire time and validity.
(status_string): Add new expired stati.

2002-04-05 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (./trustlist.txt): Put more into this file to prevent use of gpg-agent.
(./gpg-agent.conf): Remove target.
(all-local): Remove ./gpg-agent.conf.

2002-04-05 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c

(main): Use gpgme_engine_check_version instead

gpgme_check_engine.

* gpgsm/t-encrypt.c (main): Likewise.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sym.c: New file.

* gpg/Makefile.am (TESTS): Add t-encrypt-sym.

2002-03-05 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): Remove random_seed, which is now in DISTCLEANFILES.

2002-03-04 Werner Koch <wk@gnupg.org>

* gpg/Makefile.am (DISTCLEANFILES): Added.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-verify.c (main): Add a few more sanity checks, and a check for normal signatures.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sign.c: New file.

* gpg/Makefile.am (TESTS): Add t-encrypt-sign.

2002-02-13 Werner Koch <wk@gnupg.org>

* gpgsm/Makefile.am (private-keys-v1.d): Don't fail when the directory already exists.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): New target.

(distclean-local): Rename to

...

(clean-local): ... this.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (./private-keys-v1.d/\$(key_id).key): Fix rule.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-genkey.c: New file (not added to Makefile.am because of gpg-agent bug).

2002-02-08 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (key_id): Update value.
(all-local): Add .key to keyid filename.
(./private-keys-v1.d/\${key_id}): Renamed to ...
(./private-keys-v1.d/\${key_id}.key): ... this.
(all-local): Add ./gpgsm.conf, ./trustlist.txt.
(./gpgsm.conf, ./trustlist.txt): New target.
* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Renamed to ...
* gpgsm/32100C27173EF6E9C4E9A25D3D69F86D37A4F939: ... this.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-import.c (print_op_info): New function.
(main): Use it.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-signers.c (passphrase_cb): Change type of r_hd to void**.
* gpg/t-sign.c (passphrase_cb):
Likewise.
* gpg/t-decrypt-verify.c (passphrase_cb): Likewise.
* gpg/t-decrypt.c (passphrase_cb): Likewise.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-decrypt-verify.c: Don't include `mcheck.h'. Reported by
Stphane Corthisy.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (EXTRA_DIST): Add missing line continuation.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (EXTRA_DIST): Add \${key_id}.

2001-12-16 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile: Rename `pubcerts.kbx' to `pubring.kbx'.

2001-12-15 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (check_two_contexts): Set protocols.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-sign.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-sign.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-decrypt.c: New file.
* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Likewise.
* gpgsm/Makefile.am (TESTS): Add
t-decrypt.
(key_id): New variable.
(all-local): New target ./private-keys-v1.d/\$(key_id) added.
(./private-keys-v1.d/\$(key_id)): New target.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-verify.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (GPG): Set to @GPG_PATH@.
(./pubring.gpg): Use \$(GPG) instead gpg.
(./secring.gpg): Likewise.

* gpgsm/t-import.c (main): Remove third test case.
* gpgsm/Makefile.am (GPGSM): Set to @GPGSM@.
(all-local): New target.
(./pubcerts.kbx): Likewise.
* gpgsm/t-encrypt.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-encrypt.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-keylist.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/cert_dfn_pca01.der: New file.
* gpgsm/cert_dfn_pca15.der: Likewise.
* gpgsm/cert_g10code_test1.der: Likewise.
* gpgsm/t-import.c: Likewise.
*

gpgsm/Makefile.am (EXTRADIST): Add new files.
(TESTS): Add t-import.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* gpg/: New directory.
* Makefile.am, t-verify.c, t-encrypt.c, t-signers.c, t-trustlist.c,
t-sign.c, t-keylist.c, t-import.c, t-genkey.c, t-export.c,
t-decrypt-verify.c, t-decrypt.c, t-version.c, t-data.c, mkdemodirs.
cipher-1.asc, cipher-2.asc, geheim.txt, pubdemo.asc, pubkey-1.asc,
secdemo.asc, seckey-1.asc): Move to sub directory gpg/.

* gpg/Makefile.am (INCLUDES): Include gpgme/, not include/ and
intl/.

(LDD): Correct relative path to gpgme library.

(TESTS): Remove t-version and t-data.

* gpg/t-verify.c, gpg/t-encrypt.c, gpg/t-signers.c, gpg/t-trustlist.c,
gpg/t-sign.c, gpg/t-keylist.c, gpg/t-import.c, gpg/t-genkey.c,
gpg/t-export.c, gpg/t-decrypt-verify.c, gpg/t-decrypt.c,
t-version.c, t-data.c): Include gpgme.h, not "../gpgme/gpgme.h".

* Makefile.am: New file.

* gpgsm/: New directory.

* gpgsm/Makefile.am: New file.

2001-11-16 Marcus

Brinkmann <marcus@g10code.de>

* Makefile.am (TESTS): Add t-decrypt-verify.

* t-decrypt-verify.c: New file.

* cipher-2.asc: Likewise.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

* t-data.c: Include stddef.h.

(read_once_test): Change type of READ to size_t.

(read_test): Likewise.

(write_test): Likewise.

2001-10-29 Marcus Brinkmann <marcus@g10code.de>

* t-signers.c: New file.

* Makefile.am (TESTS): Add t-signers.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (TEST_ENVIRONMENT): Revert last change.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (TEST_ENVIRONMENT): Set environment to \$(srcdir),
not current directory.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* t-data.c (write_test): New function.
(main): Invoke write_test for all rounds except TEST_OUT_CB.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (INCLUDES): Remove spurious duplicate to silence automake.

2001-10-16 Marcus Brinkmann <marcus@g10code.de>

*
t-version.c: New file.
* t-data.c: Likewise.
* t-data-1.txt: Likewise.
* t-data-2.txt: Likewise.
* Makefile.am (TESTS): Add t-version, t-data.

2001-09-17 Werner Koch <wk@gnupg.org>

* t-keylist.c (check_two_contexts): New.

2001-09-03 Werner Koch <wk@gnupg.org>

* t-encrypt.c (print_op_info): New and use it after each operation.

2001-08-28 Werner Koch <wk@gnupg.org>

* t-sign.c (print_op_info): New and use it after each operation.

2001-03-15 Werner Koch <wk@gnupg.org>

* t-keylist.c (doit): List subkeys too, show caps.

2001-02-13 Werner Koch <wk@gnupg.org>

* t-verify.c (print_sig_stat): Repaled along by unsigned long because we don't use the config stuff here.

2001-02-12 Werner Koch <wk@gnupg.org>

* tests/t-verify.c (print_sig_stat): Print info about the keys.

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```
(11:private-key(3:dsa(1:p129:eC_L&$2,6tx.gh1VirIqI9
,^g3.$DveUvX1'oIj)(1:q21: #UfK2z(tuVG)(1:g128:zu^Rab;qeQQA B?/6/aspfE/
gx!Mr0YY*oMrJc2xWG:.r6)(1:y128:Ufj^@oEn4j#QrRq" RcEa E/}4C[3A
5+~~.#!+
)W&5d)j)(1:x21:` )))
# libgpgme.vers - List of symbols to export.
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#
# This file is part of GPGME.
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# the License, or (at your option) any later version.
#
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#
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#-----
# Please remember to add new functions also to gpgme.def
#-----
```

```
GPGME_1.1 {
global:
  gpgme_set_engine_info;

  gpgme_ctx_get_engine_info;
  gpgme_ctx_set_engine_info;

  gpgme_data_set_file_name;
  gpgme_data_get_file_name;
  gpgme_data_identify;

  gpgme_sig_notation_clear;
  gpgme_sig_notation_add;
```

gpgme_sig_notation_get;

gpgme_free;

gpgme_op_getauditlog_start;

gpgme_op_getauditlog;

gpgme_conf_release;

gpgme_conf_arg_new;

gpgme_conf_arg_release;

gpgme_conf_opt_change;

gpgme_op_conf_load;

gpgme_op_conf_save;

gpgme_op_conf_dir;

gpgme_cancel_async;

gpgme_op_assuan_result;

gpgme_op_assuan_transact;

gpgme_op_assuan_transact_start;

gpgme_check_version_internal;

gpgme_io_read;

gpgme_io_write;

gpgme_result_ref;

gpgme_result_unref;

gpgme_op_import_keys;

gpgme_op_import_keys_start;

gpgme_op_export_keys;

gpgme_op_export_keys_start;

gpgme_op_assuan_transact_ext;

gpgme_wait_ext;

gpgme_op_vfs_mount_result;

gpgme_op_vfs_mount;

gpgme_op_vfs_create;

gpgme_key_from_uid;

gpgme_set_sub_protocol;

gpgme_get_sub_protocol;

gpgme_op_passwd_start;

gpgme_op_passwd;

gpgme_set_global_flag;

gpgme_io_writen;

gpgme_set_pinentry_mode;
gpgme_get_pinentry_mode;

gpgme_get_dirinfo;

gpgme_op_spawn_start;
gpgme_op_spawn;

gpgme_set_offline;
gpgme_get_offline;

gpgme_set_status_cb;
gpgme_get_status_cb;

gpgme_pubkey_algo_string;
gpgme_set_ctx_flag;
gpgme_get_ctx_flag;
gpgme_data_set_flag;

gpgme_op_createkey_start;
gpgme_op_createkey;
gpgme_op_createsubkey_start;
gpgme_op_createsubkey;
gpgme_op_adduid_start;
gpgme_op_adduid;
gpgme_op_revuid_start;
gpgme_op_revuid;
gpgme_op_keysign_start;
gpgme_op_keysign;
gpgme_op_tofu_policy_start;
gpgme_op_tofu_policy;
gpgme_op_interact_start;
gpgme_op_interact;

gpgme_addrspec_from_uid;

gpgme_set_sender;
gpgme_get_sender;

gpgme_op_query_swdb;
gpgme_op_query_swdb_result;

```
    gpgme_op_set_uid_flag_start;
    gpgme_op_set_uid_flag;

    gpgme_op_decrypt_ext;
    gpgme_op_decrypt_ext_start;

    gpgme_data_new_from_estream;

};
```

```
GPGME_1.0 {
global:
    gpgme_check_version;
    gpgme_get_engine_info;
    gpgme_engine_check_version;

    gpgme_err_code_from_errno;
    gpgme_err_code_to_errno;
    gpgme_err_make_from_errno;
    gpgme_error_from_errno;
    gpgme_strerror;
    gpgme_strerror_r;
    gpgme_strsource;

    gpgme_data_get_encoding;
    gpgme_data_new;
    gpgme_data_new_from_cbs;
    gpgme_data_new_from_fd;
    gpgme_data_new_from_file;
    gpgme_data_new_from_filepart;
    gpgme_data_new_from_mem;
    gpgme_data_new_from_stream;
    gpgme_data_read;
    gpgme_data_release;
    gpgme_data_release_and_get_mem;
    gpgme_data_seek;
    gpgme_data_set_encoding;
    gpgme_data_write;

    gpgme_get_protocol_name;
    gpgme_hash_algo_name;
    gpgme_pubkey_algo_name;

    gpgme_new;
    gpgme_get_armor;
    gpgme_get_include_certs;
    gpgme_get_io_cbs;
```

gpgme_get_keylist_mode;
gpgme_get_passphrase_cb;
gpgme_get_progress_cb;
gpgme_get_protocol;
gpgme_get_textmode;
gpgme_release;
gpgme_set_armor;
gpgme_set_include_certs;
gpgme_set_io_cbs;
gpgme_set_keylist_mode;
gpgme_set_locale;
gpgme_set_passphrase_cb;
gpgme_set_progress_cb;
gpgme_set_protocol;
gpgme_set_textmode;
gpgme_signers_add;
gpgme_signers_clear;
gpgme_signers_count;
gpgme_signers_enum;

gpgme_key_ref;
gpgme_key_unref;
gpgme_key_release;

gpgme_trust_item_ref;
gpgme_trust_item_unref;

gpgme_cancel;
gpgme_op_card_edit;
gpgme_op_card_edit_start;
gpgme_op_decrypt;
gpgme_op_decrypt_result;
gpgme_op_decrypt_start;
gpgme_op_decrypt_verify;
gpgme_op_decrypt_verify_start;
gpgme_op_delete;
gpgme_op_delete_start;
gpgme_op_delete_ext;
gpgme_op_delete_ext_start;
gpgme_op_edit;
gpgme_op_edit_start;
gpgme_op_encrypt;
gpgme_op_encrypt_start;
gpgme_op_encrypt_ext;
gpgme_op_encrypt_ext_start;
gpgme_op_encrypt_sign;
gpgme_op_encrypt_sign_ext;
gpgme_op_encrypt_sign_start;

gpgme_op_encrypt_sign_ext_start;

gpgme_op_encrypt_result;

gpgme_op_export;

gpgme_op_export_ext;

gpgme_op_export_ext_start;

gpgme_op_export_start;

gpgme_op_genkey;

gpgme_op_genkey_result;

gpgme_op_genkey_start;

gpgme_get_key;

gpgme_op_import;

gpgme_op_import_result;

gpgme_op_import_start;

gpgme_op_keylist_end;

gpgme_op_keylist_ext_start;

gpgme_op_keylist_from_data_start;

gpgme_op_keylist_next;

gpgme_op_keylist_result;

gpgme_op_keylist_start;

gpgme_op_sign;

gpgme_op_sign_result;

gpgme_op_sign_start;

gpgme_op_trustlist_end;

gpgme_op_trustlist_next;

gpgme_op_trustlist_start;

gpgme_op_verify;

gpgme_op_verify_result;

gpgme_op_verify_start;

gpgme_wait;

gpgme_data_new_with_read_cb;

gpgme_data_rewind;

gpgme_get_sig_status;

gpgme_get_sig_string_attr;

gpgme_get_sig_ulong_attr;

gpgme_get_sig_key;

gpgme_key_get_string_attr;

gpgme_key_get_ulong_attr;

gpgme_key_sig_get_string_attr;

gpgme_key_sig_get_ulong_attr;

gpgme_op_import_ext;

gpgme_trust_item_get_int_attr;

gpgme_trust_item_get_string_attr;

gpgme_trust_item_release;

gpgme_err_code_from_syserror;

gpgme_err_set_errno;

```

gpgme_op_setexpire;
gpgme_op_setexpire_start;

gpgme_op_revsig;
gpgme_op_revsig_start;

local:
    *;

};
# -*- mode: org -*-
#+TITLE: What's New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

```

* What's New

```

:PROPERTIES:
:CUSTOM_ID: new-stuff
:END:

```

```

| Version:      | 0.0.1          |
| GPGME Version: | 1.13.0         |
| Author:       | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:     | Australian English, British English |
| xml:lang:     | en-AU, en-GB, en |

```

Last time the most obviously new thing was adding the /What's New/ section to the HOWTO. Now it's moving it out of the HOWTO.

** New in GPGME 1130

```

:PROPERTIES:
:CUSTOM_ID: new-stuff-1-13-0
:END:

```

Additions since GPGME 1.12.0 include:

- Moving the /What's New/ section out of the basic [\[\[file:gpgme-python-howto.org\]\]](http://file.gpgme-python-howto.org) [HOWTO] document and into its own file so as to more readily include other documents

beyond that HOWTO.

- Moving the preceding, archival, segments into `[[file:what-was-new.org]][another file]]`.
- Added `=gpg.version.versionintlist=` to make it easier for Python developers to check for a specific version number, even with beta versions (it will drop the "-betaN" part).
- Added expanded detail on issues pertaining to installing for Windows users.
- Bindings enter `[[file:maintenance-mode]][maintenance mode]]` from January, 2019.
- Added documentation on maintenance mode and what changes can be made to the code when in that status. Essentially that boils down to bug fixes only and no feature requests.
- The `import-keys-hkp.py` example script, which uses the `=hkp4py=` module to search the SKS servers for a key, has been tightened up to search for both hexadecimal key IDs and user ID strings with reduced chance of unnecessary repetition. There may still be some repetition if a key includes a user ID matching the hexadecimal value of a key ID.

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Version 2.1, February 1999

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with any other library
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That's all there is to it!

1603972630

##Sketch 1 2

document()

layout('A4',1)

fp((0,0,0))

ft(1)

Fn('Helvetica-Bold')

Fs(18)

dstyle('Text')

fp((0,1,0.498))

ft(1)

lp((0,0,0))

lw(0.283465)

lc(1)

lj(0)

ld(0)

la1(0)

la2(0)

dstyle('Application Box')

layer('Layer 1',1,1,0,0,(0,0,0))

lw(1)

r(0,0,0,0,688.145,44.1554)

lw(1)

r(0,0,0,0,682.363,85.0359)

lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(605.383,329.758,0)
bs(605.383,230.546,0)
lw(1)
r(0,0,0,0,807.414,53.6148)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(480.134,240.945,0)
bs(480.358,325.277,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(474.803,432.284,0)
bs(475.334,360.243,0)
lw(3.25)
ld((1, 1))
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(354.331,432.284,0)
bs(352.806,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(212.598,432.284,0)
bs(212.598,361.417,0)
fp((0.999,1,0.4))
lw(0.283465)
r(70.5968,0,0,-56.6929,191.608,488.976,0.0603744,0.151107)
lw(1)
r(0,0,0,0,88.5492,390.805)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(226.772,524.409,0)
bs(226.772,488.976,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(403.937,528.718,0)
bs(403.937,488.976,0)
lp((0.392,0.584,0.929))

```

lw(3.25)
ld((1,
  1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(240.945,432.284,0)
bs(240.574,394.994,0)
bs(595.276,396.85,0)
bs(595.276,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(333.071,432.284,0)
bs(333.07,425.196,0)
bs(333.07,382.677,0)
bs(240.945,382.677,0)
bs(240.945,361.417,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,318.897,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(10)
txt('GPG',(1,0,0,0.905764,344.004,335.686))
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,446.763,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgConf',(0.552654,0,0,0.500564,481.802,340.184),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,191.338,354.331,0.0670228,0.151107)
fp((0,0,0))
le()

```

lw(1)
 Fn('Helvetica')
 Fs(14)
 style('Text')
 txt('GpgSM',(0.552654,0,0,0.500574,226.376,340.185),1,1)
 G_()
 lp((0.392,0.584,0.929))
 lw(4.25)
 b()
 bs(347.244,325.984,0)
 bs(347.244,325.984,0)
 bs(347.244,255.118,0)
 bs(304.724,255.118,0)
 bs(304.724,226.771,0)
 lp((0.392,0.584,0.929))
 lw(4.25)
 b()
 bs(233.858,325.984,0)
 bs(233.858,255.118,0)
 bs(276.378,255.118,0)
 bs(276.378,226.771,0)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Palatino-Roman')
 txt('2008-07-17',(0.608301,0,0,0.608301,708.661,65.8308))
 lw(1)
 r(0,0,0,0,750.427,153.265)
 lp((0.392,0.584,0.929))
 lw(3.25)
 ld((1,
 1))
 la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
 b()
 bs(219.685,325.984,0)
 bs(219.685,198.425,0)
 bs(219.685,162.992,0)
 G()
 fp((1,1,1))
 lw(0.283465)
 r(113.386,0,0,-42.5196,35.4333,162.992,0.0670228,0.151107)
 fp((0,0,0))
 lw(0.283465)
 Fn('Helvetica')
 Fs(14)
 style('Text')
 Fn('Helvetica-Bold')
 Fs(18)

txt('LDAP
Server',(0.552654,0,0,0.552654,92.1261,148.819),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs, Certificates)',(0.552654,0,0,0.552654,92.1261,134.646),1,1)
G_
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4331,99.2125,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('HTTP Server',(0.552654,0,0,0.552654,92.1259,85.0394),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs)',(0.552654,0,0,0.552654,92.1259,70.8662),1,1)
G_
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.866,0,0,-31.2962,191.338,158.855,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('DirMgr',(0.552654,0,0,0.552654,224.02,142.978),1,1)
G_
lw(2)
ld((1, 1))
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))
b()

bs(219.15,126.18,0)
bs(219.685,77.9528,0)
bs(155.906,77.9528,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(233.858,127.559,0)
bs(233.858,99.2125,0)
bs(276.378,99.2125,0)
bs(276.378,85.0393,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(248.031,127.559,0)
bs(248.031,113.386,0)
bs(375.59,113.386,0)
bs(375.59,85.0393,0)
G()
fp((1,0.647,0.31))
lw(0.283465)
r(99.2124,0,0,-28.3464,333.07,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Certificate
Cache',(0.552654,0,0,0.552654,382.606,69.8548),1,1)
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.3464,248.031,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('CRL Cache',(0.552654,0,0,0.552654,284.147,70.6936),1,1)
G_
lw(1)
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,240.945,0)
bs(503.149,283.464,0)
bs(588.189,283.465,0)

bs(588.189,325.984,0)
lw(1)
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,283.464,0)
bs(503.149,283.464,0)
bs(361.417,283.464,0)
bs(361.417,325.984,0)
lw(1)
la2(((-4.0,
3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(361.417,283.464,0)
bs(205.512,283.465,0)
bs(205.512,325.984,0)
lw(1)
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.015,85.0393,0)
bs(574.015,141.732,0)
bs(262.204,141.732,0)
lw(1)
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(602.361,85.0393,0)
bs(602.361,170.079,0)
bs(439.37,170.079,0)
bs(439.37,311.811,0)
bs(460.629,311.811,0)
bs(460.629,325.984,0)
lw(1)
ld((5, 1))
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,240.945,0)
bs(389.763,269.291,0)
bs(290.551,269.291,0)
bs(290.551,340.157,0)
bs(262.204,340.157,0)
lw(1)
ld((5, 1))
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,269.291,0)
bs(559.843,269.291,0)
bs(559.843,333.071,0)
bs(574.016,333.071,0)
lw(1)

ld((5, 1))
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(488.976,85.0393,0)
bs(488.976,127.559,0)
bs(389.763,127.559,0)
bs(389.763,212.598,0)
lw(2)
ld((1,
1))
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(205.512,127.559,0)
bs(205.512,113.386,0)
bs(170.079,113.386,0)
bs(170.079,141.732,0)
bs(155.906,141.732,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(622.961,356.76,0)
bs(622.961,518.503,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3459,573.199,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgAgent',(0.552654,0,0,0.500554,608.238,340.185),1,1)
G_
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(721.712,467.717,0)
bs(721.712,297.838,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,686.278,297.637,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)

Fn('Helvetica')
 Fs(14)
 style('Text')
 txt('SCdaemon',(0.552654,0,0,0.500564,721.316,283.492),1,1)
 G_
 fp((1,0.647,0.31))
 lw(0.283465)
 lj(1)
 r(86.162,0,0,-117.493,679.192,566.929,0.181818,0.333333)
 G()
 fp((0,0,0))
 le()
 lw(1)
 Fn('Helvetica-Bold')
 Fs(18)
 txt('Smartcard',(0.552654,0,0,0.552654,698.127,491.036))
 fp((0.999,1,0.4))
 lw(0.283465)
 r(70.5589,0,0,-31.2962,686.279,557.593,0.0670228,0.151107)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Helvetica')
 Fs(14)
 style('Text')
 txt('Card
 Reader',(0.552654,0,0,0.552654,721.318,541.975),1,1)
 G_
 G()
 fp((0.999,1,0.4))
 lw(0.283465)
 r(73.6353,0,0,-41.2944,587.066,565.703,0.0670228,0.151107)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Helvetica')
 Fs(14)
 style('Text')
 txt('PIN Entry',(0.57675,0,0,0.729211,623.632,545.097),1,1)
 G_
 lp((0.392,0.584,0.929))
 lw(3.25)
 ld((1, 1))
 la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
 b()
 bs(643.758,340.157,0)
 bs(643.758,340.157,0)
 bs(707.539,340.158,0)

bs(707.539,304.724,0)
lw(1)
la2(((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.016,283.465,0)
bs(587.066,283.464,0)
bs(686.278,283.464,0)
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(98.9053,325.985,0)
bs(98.9053,240.945,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,63.7795,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('WatchGnuPG',(0.552654,0,0,0.552654,98.8185,338.713),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.1194,63.7795,240.718,0.0670228,0.168178)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Log
Socket',(0.552654,0,0,0.552654,98.8175,225.1),1,1)
G_()
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,446.457,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)

style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,485.621,226.772),1,1)
G_
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,545.669,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,584.834,70.8662),1,1)
G_
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,347.245,239.959,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help
Files',(0.552654,0,0,0.552654,388.252,224.705),1,1)
G_
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,446.457,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help Files',(0.552654,0,0,0.552654,487.464,69.7854),1,1)
G_
G()

G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,248.032,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Keybox Files',(0.552654,0,0,0.552654,289.59,226.322),1,1)
G_
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.866,0,0,-28.3464,574.016,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Private Keys',(0.552654,0,0,0.552654,609.449,226.772),1,1)
G_
G()
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(24)
txt('Scute',(0.552654,0,0,0.599958,224.978,465.775),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Times-Roman')
Fs(10)
txt('(pkcs#11)',(1,0,0,1.08559,206.081,445.011))
G_
G()
fp((0.999,1,0.4))
lw(0.283465)

```

r(198.827,0,0,-56.6929,304.322,488.976,0.0603744,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(36)
txt('GPGME
Library',(0.552654,0,0,0.552654,404.952,457.853),1,1)
G_()
G()
lw(1)
style('Application Box')
r(197.598,0,0,-42.5187,304.724,566.928,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('GPGME aware Application',(0.98062,0,0,0.937018,334.892,540.985))
G_()
G()
lw(1)
style('Application Box')
r(127.829,0,0,-41.7496,162.992,566.159,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('Legacy Application',(174.688,540.01))
G_()
G()
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(749.296,162.296,0)
bs(705.89,162.296,0)
lw(3.25)
ld((1, 1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0,
-3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,100.083,0)
bs(744.472,100.083,0)
lp((0.392,0.584,0.929))
lw(3.25)

```

ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,131.189,0)
bs(744.472,131.189,0)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('execute/access',(0.31891,0,0,0.280771,726.951,87.3768),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('closely linked',(0.31891,0,0,0.280771,724.715,149.589),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Assuan protocol',(0.31891,0,0,0.280771,728.535,118.483),1,1)
G_()
lw(1)
r(56.6929,0,0,-92.126,701.575,170.079)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(248.031,325.984,0)
bs(248.031,297.638,0)
bs(538.583,297.638,0)
bs(538.583,340.157,0)
bs(566.929,340.157,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(375.591,325.984,0)
bs(375.591,304.724,0)
bs(531.496,304.724,0)

bs(531.496,347.244,0)
bs(566.929,347.244,0)
guidelayer('Guide
Lines',1,0,0,1,(0,0,1))
grid((0,0,7.08661,7.08661),1,(0,0,1),'Grid')
00~0
*H
0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10
011203093638Z
021203093638Z0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 100
*H
0l+Pu.\-ZT\$e'nE&h4<}BePm[%j-/-7PcHKi@FKy~npcd\${}K~Q00U37Tq8_eK40U#037Tq8_eK4om0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10U00
*H
l8gD Z
wYL,M'j
pk2pf[L ;Rl]#h\$~O!9;3e\A'v&P^\$'Oc.-TS~A>:fQY<
-* - mode: org -* -
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* Introduction

:PROPERTIES:

:CUSTOM_ID: intro

:END:

Version:	0.1.5
GPGME Version:	1.13.0
Author:	Ben McGinnes <ben@gnupg.org>
Author GPG Key:	DB4724E6FA4286C92B4E55C4321E4E2373590E5D
Language:	Australian English, British English
Language codes:	en-AU, en-GB, en

This document provides basic instruction in how to use the GPGME Python bindings to programmatically leverage the GPGME library.

**** Python 2 versus Python**

3

:PROPERTIES:

:CUSTOM_ID: py2-vs-py3

:END:

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

**** Examples**

:PROPERTIES:

:CUSTOM_ID: howto-python3-examples

:END:

All of the examples found in this document can be found as Python 3 scripts in the =lang/python/examples/howto= directory.

**** Unofficial Drafts**

:PROPERTIES:

:CUSTOM_ID: unofficial-drafts

:END:

In addition to shipping with each release of GPGME, there is a section

on locations to read or download [\[#draft-editions\]\[draft editions\]](#) of this document from at the end of it. These are unofficial versions produced in between major releases.

** What's New

```
:PROPERTIES:  
:CUSTOM_ID: new-stuff  
:END:
```

Full details of what is new are now available in the [\[\[file:what-is-new.org\]\[What's New\]\]](#) file and archives of the preceding /What's New/ sections are available in the [\[\[file:what-was-new\]\[What Was New\]\]](#) file.

*** New in GPGME 1130

```
:PROPERTIES:  
:CUSTOM_ID:  
new-stuff-1-13-0  
:END:
```

See the [\[\[file:what-is-new#new-stuff-1-13-0\]\[What's New\]\]](#) document for what is new in version 1.13.0.

*** New in GPGME 1120

```
:PROPERTIES:  
:CUSTOM_ID: new-stuff-1-12-0  
:END:
```

See the [\[\[file:what-was-new#new-stuff-1-12-0\]\[What Was New\]\]](#) document for what was new in version 1.12.0.

* GPGME Concepts

```
:PROPERTIES:  
:CUSTOM_ID: gpgme-concepts  
:END:
```

** A C API

```
:PROPERTIES:  
:CUSTOM_ID: gpgme-c-api  
:END:
```

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `=gpgme.h=` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some

means of providing an interface to those languages. This is where the need for bindings in various languages stems.

** Python bindings

```
:PROPERTIES:  
:CUSTOM_ID: gpgme-python-bindings  
:END:
```

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of =gpgme.h= generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of =gpgme.h=.

** Difference between the Python bindings and other GnuPG Python packages

```
:PROPERTIES:  
:CUSTOM_ID: gpgme-python-bindings-diffs  
:END:
```

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

*** The python-gnupg package maintained

by Vinay Sajip

```
:PROPERTIES:  
:CUSTOM_ID: diffs-python-gnupg  
:END:
```

This is arguably the most popular means of integrating GPG with Python. The package utilises the =subprocess= module to implement wrappers for the =gpg= and =gpg2= executables normally invoked on the command line (=gpg.exe= and =gpg2.exe= on Windows).

The popularity of this package stemmed from its ease of use and

capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the `=subprocess=` calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The `python-gnupg` package is available under the MIT license.

```
*** The gnupg package created
and maintained by Isis Lovecruft
:PROPERTIES:
:CUSTOM_ID: diffs-isis-gnupg
:END:
```

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the `python-gnupg` package as just `gnupg`. This new package also relied on `subprocess` to call the `=gpg=` or `=gpg2=` binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original `python-gnupg` and since its functions were called in a different manner to `python-gnupg`, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The `gnupg` package is available under the GNU General Public License version 3.0 (or any later version).

```
*** The PyME package maintained by Martin Albrecht
:PROPERTIES:
:CUSTOM_ID: diffs-pyme
:END:
```

This package is the origin of these bindings, though they are somewhat different now.

For details of when and how the PyME package was folded back into GPGME itself see the [\[\[file:short-history.org\]\]](http://file:short-history.org) [\[Short History\]](#) document.^[fn:1]

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the

=python-gnupg= or =gnupg= packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

* GPGME Python bindings installation

:PROPERTIES:

:CUSTOM_ID: gpgme-python-install

:END:

** No PyPI

:PROPERTIES:

:CUSTOM_ID: do-not-use-pypi

:END:

Most

third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against =gpgme.h= and =gpgme.h= is generated from =gpgme.h.in= at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding [[#snafu-ffi][CFFI and SWIG]] at the end of this section for further details.

** Requirements

:PROPERTIES:

:CUSTOM_ID: gpgme-python-requirements

:END:

The GPGME Python bindings only have three requirements:

1. A suitable version of Python 2 or Python 3. With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.
2. [\[\[https://www.swig.org\]\[SWIG\]\]](https://www.swig.org).
3. GPGME itself. Which also means that all of GPGME's dependencies must be installed too.

*** Recommended Additions

```
:PROPERTIES:  
:CUSTOM_ID: gpgme-python-recommendations  
:END:
```

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

1. If possible, use Python 3 instead of 2.
2. Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.
3. If possible add the following Python modules which are not part of the standard library: [\[\[http://docs.python-requests.org/en/latest/index.html\]\[Requests\]\]](http://docs.python-requests.org/en/latest/index.html), [\[\[https://cython.org/\]\[Cython\]\]](https://cython.org/), [\[\[https://pendulum.eustace.io/\]\[Pendulum\]\]](https://pendulum.eustace.io/) and [\[\[https://github.com/Selfnet/hkp4py\]\[hkp4py\]\]](https://github.com/Selfnet/hkp4py).

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

** Installation

```
:PROPERTIES:  
:CUSTOM_ID: installation  
:END:
```

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your `=$PATH=`.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in `=$PATH=`. It specifically checks for the `=python=` and `=python3=` executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: `=python=`, `=python2=` and `=python2.7=`.

For Python 3 it checks for these executables in this order: `=python3=`, `=python3.7=`, `=python3.6=`, `=python3.5=` and `=python3.4=`.^[fn:2]

On systems where `=python=` is actually `=python3=` and not `=python2=` it may be possible that `=python2=` may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred Python versions has been changed to move Python 3.7 ahead of Python 3.6.

```
*** Installing GPGME
:PROPERTIES:
:CUSTOM_ID: install-gpgme
:END:
```

See the GPGME `=README=` file for details of how to install GPGME from source.

```
** Known Issues
:PROPERTIES:
:CUSTOM_ID: snafu
:END:
```

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should

they be encountered.

*** Breaking Builds

```
:PROPERTIES:  
:CUSTOM_ID: snafu-a-swig-of-this-builds-character  
:END:
```

Occasionally when installing GPGME with the Python bindings included it may be observed that the `=make=` portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with `=make check=` and `=make install=` appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce `=lang/python/python2-gpg/=` and `=lang/python/python3-gpg/=` directories. These should contain the build output generated during compilation, including the complete bindings and module installed into `=site-packages=`.

Occasionally the errors in the early part or some other conflict (e.g. not installing as `*/root/*` or `*/su/*`) may result in nothing being installed to the relevant `=site-packages=` directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the `*root*` user or prepended with `=sudo -H=[fn:3]` in the `=lang/python/=` directory:

```
#+BEGIN_SRC shell  
/path/to/pythonX.Y setup.py build  
/path/to/pythonX.Y setup.py build  
/path/to/pythonX.Y setup.py install  
#+END_SRC
```

Yes, the build command does need to be run twice. Yes, you still need to run the potentially failing or incomplete steps during the `=configure=`, `=make=` and `=make install=` steps with installing GPGME. This is because those steps generate a lot of essential files needed, both by and in order to create, the bindings (including both the `=setup.py=` and `=gpgme.h=` files).

**** IMPORTANT Note

```
:PROPERTIES:  
:CUSTOM_ID: snafu-swig-build-note  
:END:
```

If specifying a selected number of languages to create bindings for, try to leave Python last. Currently the majority of the other language bindings are also preceding Python of either version when listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative `=configure=` steps for GPGME using the `--enable-languages=$LANGUAGE=` option.

Alternatively

`=make=` (or `=gmake=`, depending on your platform) may be run with the `=-k=` option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

*** Reinstalling Responsibly

```
:PROPERTIES:  
:CUSTOM_ID: snafu-lessons-for-the-lazy  
:END:
```

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing

the previous version(s) is simply a matter of changing to the relevant `=site-packages=` directory for the version of Python in question and removing the `=gpg/=` directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on

the system, but the same is true of installing the module in the first place.

*** Multiple installations

```
:PROPERTIES:  
:CUSTOM_ID: snafu-the-full-monty  
:END:
```

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings *must* match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME [<https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e>][1.12.1]] the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, and so on up until the current dev branch that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the `=PATH=` when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

*** Won't Work With Windows

```
:PROPERTIES:  
:CUSTOM_ID: snafu-runtime-not-funtime  
:END:
```

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users

and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the [\[\[https://python.org\]\]](https://python.org) [Python website] (i.e. mostly MSI installers, sometimes self-extracting `=.exe=` files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is /considerably/ more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

1. Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

2. Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

Do **not** use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following

table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released [\[\[https://www.python.org/downloads/windows/\]\]](https://www.python.org/downloads/windows/) [for Windows]:

| CPython | Microsoft product name | runtime filename |

2.7.6	Visual Studio 2008	MSVCR90.DLL
3.4.0	Visual Studio 2010	MSVCR100.DLL
3.5.0	Visual Studio 2015	*see below*
3.6.0	Visual Studio 2015	*see below*
3.7.0	Visual Studio 2017*	*see below*

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus **incompatible** with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds

of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [\[\[https://matthew-brett.github.io/pydagogue/python_msvc.html\]\]](https://matthew-brett.github.io/pydagogue/python_msvc.html)[[Using Microsoft Visual C with Python]]. It is also worth reading the Microsoft Developer Network blog post on [\[\[http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx\]\]](http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx)[[the universal CRT]] and Steve Dower's blog posts on Python extensions ([\[\[http://stevedower.id.au/blog/building-for-python-3-5\]\]](http://stevedower.id.au/blog/building-for-python-3-5)[[part 1]] and [\[\[http://stevedower.id.au/blog/building-for-python-3-5-part-two\]\]](http://stevedower.id.au/blog/building-for-python-3-5-part-two)[[part 2]]).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [\[\[https://wiki.python.org/moin/WindowsCompilers\]\]](https://wiki.python.org/moin/WindowsCompilers)[[Windows compilers]] wiki page on the CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten

different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare *minimum*, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from `=python.org=` the advanced options available which utilise `[[#cython][Cython]]` will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

1. Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.
2. Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).
3. Compile both CPython and GPGME with these bindings using the tools selected in step 2.
4. Ignore MingW, Msys2 and the official CPython binary installers.
5. Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

```
*** CFFI is the Best and GPGME should use it instead of SWIG
:PROPERTIES:
:CUSTOM_ID: snafu-ffi
:END:
```

There are many reasons for favouring `[[https://cffi.readthedocs.io/en/latest/overview.html][CFFI]]` and proponents of it are quite happy to repeat these things as if all it would take to switch from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the bindings to Python using the `=gpgme.h=` file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable codebase. If there were some means of applying SWIG's dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the `=pgpme-tool.c=` file in the GPGME `=src/=` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

Virtualised Environments

:PROPERTIES:

:CUSTOM_ID: snafu-venv

:END:

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with `virtualenv`, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like `=usr/local=` or `=opt/local=` then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from

minor annoyances to complete failures
in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a `=sites.pth=` file in the `=site-packages/=` directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as

long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. [\[\[https://docs.pytest.org/en/latest/index.html\]\]](https://docs.pytest.org/en/latest/index.html)`[[pytest]]`) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. [\[\[https://www.virtualbox.org/\]\]](https://www.virtualbox.org/)`[[VirtualBox]]`), a hardware emulation layer (e.g. [\[\[https://www.qemu.org/\]\]](https://www.qemu.org/)`[[QEMU]]`) or an application container (e.g. [\[\[https://www.docker.com/why-docker/\]\]](https://www.docker.com/why-docker/)`[[Docker]]`).

Finally it should be noted that the limited tests conducted thus far have been using the `=virtualenv=` command in a new directory to create the virtual python environment. As opposed to the standard `=python3 -m venv=` and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command `=python3 -m virtualenv /path/to/install/virtual/thingy=` instead.

```
*** Post installation
:PROPERTIES:
:CUSTOM_ID: snafu-docs
:END:
```

Following installation it is recommended to move the `=post_installer.py=` script from the `=lang/python/examples/howto/=` directory to the `=lang/python/=` directory and run it. This will fix or restore files needed by Sphinx which may be removed during a distribution build for release. It will also generate reST files from Org mode files with Pandoc and generate Texinfo files from Org mode files with GNU Emacs and Org mode (in batch mode). Additionally it will fix the UTF-8 declaration line in the Texinfo files (Emacs expects "UTF-8" to be "utf-8").

```
* Fundamentals
:PROPERTIES:
:CUSTOM_ID: howto-fund-a-mental
:END:
```

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

```
** No REST
:PROPERTIES:
:CUSTOM_ID: no-rest-for-the-wicked
:END:
```

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is *not* a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct

bindings and it's this pythonic layer that this HOWTO deals with.

** Context

```
:PROPERTIES:  
:CUSTOM_ID: howto-get-context  
:END:
```

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

* Working with keys

```
:PROPERTIES:  
:CUSTOM_ID: howto-keys  
:END:
```

** Key selection

```
:PROPERTIES:  
:CUSTOM_ID: howto-keys-selection  
:END:
```

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without

any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

This is passable and very likely to be common:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

And this is a really bad idea:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
#+END_SRC
```

Alternatively it may be that the intention is to create a list of keys which all match a particular search string. For instance all the addresses at a particular domain, like this:

```
#+BEGIN_SRC python -i
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
#+END_SRC
```

```
*** Counting keys
:PROPERTIES:
:CUSTOM_ID: howto-keys-counting
```

:END:

Counting the number of keys in your public keybox (=pubring.kbx=), the format which has superseded the old keyring format (=pubring.gpg= and =secring.gpg=), or the number of secret keys is a very simple task.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
Number of secret keys: {0}
Number of public keys: {1}
""".format(secnum, pubnum))
#+END_SRC
```

NOTE: The `[[#cython]][Cython]` introduction in the `[[#advanced-use]][Advanced and Experimental]` section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

```
** Get key
:PROPERTIES:
:CUSTOM_ID: howto-get-key
:END:
```

An alternative method of getting a single key via its fingerprint is available directly within a Context with `=Context().get_key=`. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select

secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
#+END_SRC
```

Whereas this example demonstrates selecting the author's current key with the `=secret=` key word argument set to `=True=`:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
#+END_SRC
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
** Importing keys
:PROPERTIES:
:CUSTOM_ID: howto-import-key
:END:
```

Importing keys is possible with the `=key_import(=` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyservers via the web using the requests module. Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
```

```

import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result
= c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
    print(result)
elif result is not None and hasattr(result, "considered") is True:
    num_keys = len(result.imports)
    new_revs = result.new_revocations
    new_sigs = result.new_signatures
    new_subs = result.new_sub_keys
    new_uids = result.new_user_ids
    new_scr = result.secret_imported
    nochange = result.unchanged
    print("""
The total number of keys considered for import was: {0}

    Number of keys revoked: {1}
    Number of new signatures: {2}
    Number of new subkeys: {3}
    Number of new user IDs: {4}
    Number of new secret keys: {5}
    Number of unchanged keys: {6}

The key IDs for all considered keys were:
""").format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scr,
            nochange)
    for i in range(num_keys):
        print("{0}\n".format(result.imports[i].fpr))
else:
    pass
#+END_SRC

```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading =0x= indicative of hexadecimal be included. Also note that the old short key IDs (e.g. =0xDEADBEEF=) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal value which may be missing the leading =0x= is a simple matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a ValueError simply results in treating the string as a string. This is the method and logic utilised in the =import-keys-hkp.py= script (see below).

```
*** Working with ProtonMail
```

```
:PROPERTIES:  
:CUSTOM_ID: import-protonmail  
:END:
```

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

```
#+BEGIN_SRC python -i  
import gpg  
import requests  
import sys  
  
print("""  
This script searches the ProtonMail key server for the specified key and  
imports it.  
""")  
  
c = gpg.Context(armor=True)  
url = "https://api.protonmail.ch/pks/lookup"  
ksearch = []  
  
if len(sys.argv) >= 2:  
    keyterm = sys.argv[1]  
else:  
    keyterm = input("Enter the key ID, UID or search string: ")  
  
if keyterm.count("@") == 2 and keyterm.startswith("@") is True:  
    ksearch.append(keyterm[1:])  
    ksearch.append(keyterm[1:])  
    ksearch.append(keyterm[1:])  
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:  
    ksearch.append("{}@protonmail.com".format(keyterm[1:]))  
    ksearch.append("{}@protonmail.ch".format(keyterm[1:]))  
    ksearch.append("{}@pm.me".format(keyterm[1:]))  
elif keyterm.count("@") == 0:  
    ksearch.append("{}@protonmail.com".format(keyterm))
```

```

ksearch.append("{0}@protonmail.ch".format(keyterm))
ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") ==
2 and keyterm.startswith("@") is False:
uidlist = keyterm.split("@")
for uid in uidlist:
ksearch.append("{0}@protonmail.com".format(uid))
ksearch.append("{0}@protonmail.ch".format(uid))
ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
uidlist = keyterm.split("@")
for uid in uidlist:
ksearch.append("{0}@protonmail.com".format(uid))
ksearch.append("{0}@protonmail.ch".format(uid))
ksearch.append("{0}@pm.me".format(uid))
else:
ksearch.append(keyterm)

for k in ksearch:
payload = {"op": "get", "search": k}
try:
r = requests.get(url, verify=True, params=payload)
if r.ok is True:
result = c.key_import(r.content)
elif r.ok is False:
result = r.content
except Exception as e:
result = None

if result is not None and hasattr(result, "considered") is False:
print("{0} for {1}".format(result.decode(), k))
elif result is not None
and hasattr(result, "considered") is True:
num_keys = len(result.imports)
new_revs = result.new_revocations
new_sigs = result.new_signatures
new_subs = result.new_sub_keys
new_uids = result.new_user_ids
new_sct = result.secret_imported
nochange = result.unchanged
print("""
The total number of keys considered for import was: {0}

```

With UIDs wholly or partially matching the following string:

```
{1}
```

Number of keys revoked: {2}

Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"""format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
         nochange))
for i in range(num_keys):
    print(result.imports[i].fpr)
print("")
elif result is None:
    print(e)
#+END_SRC
```

Both the above example, `[./examples/howto/pmkey-import.py][pmkey-import.py]`,
and a version which prompts
for an alternative GnuPG home directory, `[./examples/howto/pmkey-import-alt.py][pmkey-import-alt.py]`, are
available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers,
their server is related more to their API and is not feature complete
by comparison to the servers in the SKS pool. One notable difference
being that the ProtonMail server does not permit non ProtonMail users
to update their own keys, which could be a vector for attacking
ProtonMail users who may not receive a key's revocation if it had been
compromised.

```
*** Importing with HKP for Python
:PROPERTIES:
:CUSTOM_ID: import-hkp4py
:END:
```

Performing the same tasks with the `[https://github.com/Selfnet/hkp4py][hkp4py module]` (available via PyPI)
is not too much different, but does provide a number of options of
benefit to end users. Not least of which being the ability to perform
some
checks on a key before importing it or not. For instance it may
be the policy of a site or project to only import keys which have not
been revoked. The hkp4py module permits such checks prior to the
importing of the keys found.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import sys
```

```

c = gpg.Context()
server = hkps4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
    pattern = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
    pattern = sys.argv[1]
else:
    pattern = input("Enter the pattern to search for keys or user IDs: ")

if pattern is not None:
    try:
        key = server.search(hex(int(pattern, 16)))
        keyed = True
    except ValueError as ve:
        key = server.search(pattern)
        keyed = False

    if key is not None:
        keys.append(key[0])
        if keyed is True:
            try:
                fob = server.search(pattern)
            except:
                fob = None
            if fob is not
None:
                keys.append(fob[0])
            else:
                pass
        else:
            pass

    for logrus in pattern.split():
        try:
            key = server.search(hex(int(logrus, 16)))
            hexed = True
        except ValueError as ve:
            key = server.search(logrus)
            hexed = False

        if key is not None:
            keys.append(key[0])
            if hexed is True:

```



```

        try:
            fob = server.search(logrus)
        except:
            fob = None
        if fob is not None:
            keys.append(fob[0])
        else:
            pass
    else:
        pass

if len(keys) > 0:
    for key in keys:
        import_result = c.key_import(key.key_blob)
        results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print(result)
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_s crt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was: {0}

Number of keys revoked: {1}
Number of new signatures: {2}
Number of new subkeys: {3}
Number of new user IDs: {4}
Number of new secret keys: {5}
Number of unchanged keys: {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_s crt,
nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    else:
        pass
#+END_SRC

```

Since the hkp4py module handles multiple keys just as effectively as one (=keys= is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

```
*** Importing from ProtonMail with HKP for Python
:PROPERTIES:
:CUSTOM_ID: import-protonmail-hkp4py
:END:
```

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

```
**** Import from ProtonMail via HKP for Python Example no. 1
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm1
:END:
```

The following script is available with the rest of the examples under the somewhat less than original name, =pmkey-import-hkp.py=.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
```

Usage: pmkey-import-hkp.py [search strings]

```
""")
```

```
c = gpg.Context(armor=True)
```

```
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
```

```
keyterms = []
```

```
ksearch = []
```

```
allkeys = []
```

```
results = []
```

```
paradox = []
```

```
homeless = None
```

```
if len(sys.argv) > 2:
```

```
    keyterms = sys.argv[1:]
```

```
elif len(sys.argv) == 2:
```

```
    keyterm = sys.argv[1]
```

```
    keyterms.append(keyterm)
```

```
else:
```

```
    key_term = input("Enter the key ID, UID or search string: ")
```

```
    keyterms = key_term.split()
```

```
for keyterm in keyterms:
```

```
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
```

```
        ksearch.append(keyterm[1:])
```

```
        ksearch.append(keyterm[1:])
```

```
        ksearch.append(keyterm[1:])
```

```
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
```

```
        ksearch.append("{}@protonmail.com".format(keyterm[1:]))
```

```
        ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
```

```
        ksearch.append("{}@pm.me".format(keyterm[1:]))
```

```
    elif keyterm.count("@") == 0:
```

```
        ksearch.append("{}@protonmail.com".format(keyterm))
```

```
        ksearch.append("{}@protonmail.ch".format(keyterm))
```

```
        ksearch.append("{}@pm.me".format(keyterm))
```

```
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
```

```
        uidlist = keyterm.split("@")
```

```
        for uid in uidlist:
```

```
            ksearch.append("{}@protonmail.com".format(uid))
```

```
            ksearch.append("{}@protonmail.ch".format(uid))
```

```
            ksearch.append("{}@pm.me".format(uid))
```

```
    elif keyterm.count("@") > 2:
```

```
        uidlist = keyterm.split("@")
```

```
        for uid in uidlist:
```

```
            ksearch.append("{}@protonmail.com".format(uid))
```

```
            ksearch.append("{}@protonmail.ch".format(uid))
```

```
            ksearch.append("{}@pm.me".format(uid))
```

```
    else:
```

```
ksearch.append(keyterm)
```

```
for k in ksearch:  
    print("Checking for key for: {0}".format(k))  
    try:  
        keys = server.search(k)  
        if isinstance(keys, list) is True:  
            for key in keys:  
                allkeys.append(key)  
                try:  
                    import_result = c.key_import(key.key_blob)  
                except Exception as e:  
                    import_result = c.key_import(key.key)  
            else:  
                paradox.append(keys)  
                import_result = None  
    except Exception as e:  
        import_result = None  
    results.append(import_result)
```

```
for result in results:  
    if result is not None and hasattr(result, "considered") is False:  
        print("{0} for {1}".format(result.decode(), k))  
    elif result is not None and hasattr(result, "considered") is True:  
        num_keys = len(result.imports)  
        new_revs = result.new_revocations  
        new_sigs = result.new_signatures  
        new_subs = result.new_sub_keys  
        new_uids = result.new_user_ids  
        new_scr_t = result.secret_imported  
        nochange = result.unchanged  
        print("""
```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

Number of keys revoked: {2}

Number of new signatures: {3}

Number of new subkeys: {4}

Number of new user IDs: {5}

Number of new secret keys: {6}

Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scr_t,  
        nochange))
```

```

    for i in range(num_keys):
        print(result.imports[i].fpr)
    print("")
elif result is None:
    pass
#+END_SRC

```

```

**** Import from ProtonMail via HKP for Python Example no. 2
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm2
:END:

```

Like

its counterpart above, this script can also be found with the rest of the examples, by the name `pmkey-import-hkp-alt.py`.

With this script a modicum of effort has been made to treat anything passed as a `=homedir=` which either does not exist or which is not a directory, as also being a possible user ID to check for. It's not guaranteed to pick up on all such cases, but it should cover most of them.

```

#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it. Optionally enables specifying a different GnuPG home directory.

Usage: pmkey-import-hkp.py [homedir] [search string]
or: pmkey-import-hkp.py [search string]
""")

```

```

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

```

```

if len(sys.argv) > 3:
    homedir = sys.argv[1]

```

```

    keyterms = sys.argv[2:]
elif len(sys.argv)
== 3:
    homedir = sys.argv[1]
    keyterm = sys.argv[2]
    keyterms.append(keyterm)
elif len(sys.argv) == 2:
    homedir = ""
    keyterm = sys.argv[1]
    keyterms.append(keyterm)
else:
    keyterm = input("Enter the key ID, UID or search string: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
    keyterms.append(keyterm)

if len(homedir) == 0:
    homedir = None
    homeless = False

if homedir is not None:
    if homedir.startswith("~"):
        if os.path.exists(os.path.expanduser(homedir)) is True:
            if os.path.isdir(os.path.expanduser(homedir)) is True:
                c.home_dir = os.path.realpath(os.path.expanduser(homedir))
            else:
                homeless = True
        else:
            homeless = True
    elif os.path.exists(os.path.realpath(homedir)) is True:
        if os.path.isdir(os.path.realpath(homedir)) is True:
            c.home_dir = os.path.realpath(homedir)
        else:
            homeless = True
    else:
        homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
# a search string.
if homeless is True:
    keyterms.append(homedir)
    c.home_dir = None
else:
    pass

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])

```

```

ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
    ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
    ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
    ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
    ksearch.append("{0}@protonmail.com".format(keyterm))
    ksearch.append("{0}@protonmail.ch".format(keyterm))
    ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
    uidlist = keyterm.split("@")

for uid in uidlist:
    ksearch.append("{0}@protonmail.com".format(uid))
    ksearch.append("{0}@protonmail.ch".format(uid))
    ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
    uidlist = keyterm.split("@")
    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
else:
    ksearch.append(keyterm)

for k in ksearch:
    print("Checking for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)
                except Exception as e:
                    import_result = c.key_import(key.key)
            else:
                paradox.append(keys)
                import_result = None
        except Exception
    as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:

```

```

num_keys = len(result.imports)
new_revs = result.new_revocations
new_sigs = result.new_signatures
new_subs = result.new_sub_keys
new_uids = result.new_user_ids
new_scert = result.secret_imported
nochange = result.unchanged
print("""

```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

```

Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}

```

The key IDs for all considered keys were:

```

"".format(num_keys, k, new_revs, new_sigs,
new_subs, new_uids, new_scert,
nochange))
for i in range(num_keys):
    print(result.imports[i].fpr)
print("")
elif result is None:
    pass
#+END_SRC

```

```

** Exporting keys
:PROPERTIES:
:CUSTOM_ID: howto-export-key
:END:

```

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

```

*** Exporting public keys
:PROPERTIES:
:CUSTOM_ID: howto-export-public-key
:END:

```


There are two methods of exporting public keys, both of which are very similar to the other. The default method, `=key_export()`, will export a public key or keys matching a specified pattern as normal. The alternative, the `=key_export_minimal()` method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

```
#+BEGIN_SRC
python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
    if os.path.exists(os.path.expanduser(homedir)) is True:
        c.home_dir = os.path.expanduser(homedir)
    else:
        pass
elif
os.path.exists(homedir) is True:
    c.home_dir = homedir
else:
    pass
```

```

try:
    result = c.key_export(pattern=logrus)
except:
    result = c.key_export(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)
else:
    pass
#+END_SRC

```

It should be noted that the result will only return =None= when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to =None= this triggers the exporting of the entire public keybox.

```

#+BEGIN_SRC python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus =
= input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
    if os.path.exists(os.path.expanduser(homedir)) is True:

```

```

        c.home_dir = os.path.expanduser(homedir)
    else:
        pass
elif os.path.exists(homedir) is True:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export_minimal(pattern=logrus)
except:
    result = c.key_export_minimal(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)
else:
    pass
#+END_SRC

```

```

*** Exporting secret keys
:PROPERTIES:
:CUSTOM_ID: howto-export-secret-key
:END:

```

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of `=pinentry=` via `=gpg-agent=` in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```

#+BEGIN_SRC python -i
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

```

```

c = gpg.Context(armor=True)

```

```

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir = None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export_secret(pattern=logrus)
except:
    result = c.key_export_secret(pattern=None)

if result is not None:

```

```

with open(keyfile, "wb") as f:
    f.write(result)
os.chmod(keyfile, 0o600)
else:
    pass
#+END_SRC

```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (=gpg=) and ASCII armoured (=asc=) files.

```

#+BEGIN_SRC python -i
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
    gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
    gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]

```

```

logrus = input("Enter the UID matching the secret key(s) to export: ")
homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the filename to save the secret key to: ")
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir = None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir
    = homedir
else:
    pass

if c.home_dir is not None:
    if c.home_dir.endswith("/"):
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
    else:
        gpgfile = "{0}/1.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/1.asc".format(c.home_dir, keyfile)
else:
    if os.path.exists(os.environ["GNUPGHOME"]) is True:
        hd = os.environ["GNUPGHOME"]
    else:
        try:
            hd = subprocess.getoutput(gpgconfcmd)
        except:
            process = subprocess.Popen(gpgconfcmd.split(),
                                       stdout=subprocess.PIPE)

```

```

    procom = process.communicate()
    if sys.version_info[0] == 2:
        hd = procom[0].strip()
    else:
        hd = procom[0].decode().strip()
    gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
    ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
    a_result = a.key_export_secret(pattern=logrus)
    b_result
= b.key_export_secret(pattern=logrus)
except:
    a_result = a.key_export_secret(pattern=None)
    b_result = b.key_export_secret(pattern=None)

if a_result is not None:
    with open(ascfile, "wb") as f:
        f.write(a_result)
    os.chmod(ascfile, 0o600)
else:
    pass

if b_result is not None:
    with open(gpgfile, "wb") as f:
        f.write(b_result)
    os.chmod(gpgfile, 0o600)
else:
    pass
#+END_SRC

```

```

*** Sending public keys to the SKS Keyservers
:PROPERTIES:
:CUSTOM_ID: howto-send-public-key
:END:

```

As with the previous section on importing keys, the `hkp4py` module adds another option with exporting keys in order to send them to the public key servers.

The following example demonstrates how this may be done.

```

#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

```

```
print("""
This script sends one or more public keys to the SKS keyserver and is
essentially a slight variation on the export-key.py script.
""")
```

```
c = gpg.Context(armor=True)
server
= hkp4py.KeyServer("hkps://hkps.pool.sks-keyserver.net")

if len(sys.argv) > 2:
    logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
    logrus = sys.argv[1]
else:
    logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
    try:
        export_result = c.key_export(pattern=logrus)
    except Exception as e:
        print(e)
        export_result = None
    else:
        export_result = c.key_export(pattern=None)

if export_result is not None:
    try:
        try:
            send_result = server.add(export_result)
        except:
            send_result = server.add(export_result.decode())
        if send_result is not None:
            print(send_result)
        else:
            pass
    except Exception as e:
        print(e)
    else:
        pass
#+END_SRC
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as `=send-key-to-keyserver.py=`.

The `=hkp4py=` module appears to

handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

* Basic Functions

:PROPERTIES:

:CUSTOM_ID: howto-the-basics

:END:

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

** Encryption

:PROPERTIES:

:CUSTOM_ID: howto-basic-encryption

:END:

Encrypting is very straight forward. In the first example below the message, =text=, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

*** Encrypting to one key

:PROPERTIES:

:CUSTOM_ID: howto-basic-encryption-single

:END:

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the =gpg.Context().encrypt()= method.

Those keyword arguments are: =recipients=, a list of keys encrypted to (covered in greater detail in the following section); =sign=, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to =True=); =sink=, to write results or partial results to a secure sink instead of returning it (defaults to =None=); =passphrase=, only used when utilising symmetric encryption (defaults to =None=); =always_trust=, used to override the trust model settings for recipient keys (defaults to =False=); =add_encrypt_to=, utilises any preconfigured =encrypt-to= or =default-key= settings in the user's =gpg.conf= file (defaults to =False=); =prepare=, prepare for encryption (defaults to =False=);

`=expect_sign=`, prepare for signing (defaults to `=False=`); `=compress=`, compresses the plaintext prior to encryption (defaults to `=True=`).

```
#+BEGIN_SRC python -i
import
    gpg

a_key = "0x12345678DEADBEEF"
text = b""Some text to test with.
```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
#+END_SRC
```

Though this is even more likely to be used like this; with the plaintext input read from a file, the recipient keys used for encryption regardless of key trust status and the encrypted output also encrypted to any preconfigured keys set in the `=gpg.conf=` file:

```
#+BEGIN_SRC python -i
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
    text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext,
result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
                                always_trust=True,
                                add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
#+END_SRC
```

If the `=recipients=` parameter is empty then the plaintext is encrypted

symmetrically. If no `=passphrase=` is supplied as a parameter or via a callback registered with the `=Context()=` then an out-of-band prompt for the passphrase via `pinentry` will be invoked.

*** Encrypting to multiple keys

```
:PROPERTIES:  
:CUSTOM_ID: howto-basic-encryption-multiple  
:END:
```

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (`=text=`) to everyone with an email address on the `=gnupg.org=` domain, `[fn:4]` but does `/not/` encrypt to a default key or other key which is configured to normally encrypt to.

```
#+BEGIN_SRC python -i  
import gpg  
  
text = b""Oh look, another test message.
```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an `input()` prompt.

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with `"rb"` as this is the simplest method of obtaining the correct data format.

```
"""  
  
c = gpg.Context(armor=True)  
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))  
logrus = []  
  
for i in range(len(rpattern)):  
    if rpattern[i].can_encrypt == 1:  
        logrus.append(rpattern[i])  
  
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,  
                                             sign=False, always_trust=True)  
  
with open("secret_plans.txt.asc", "wb") as afile:  
    afile.write(ciphertext)
```

```
#+END_SRC
```

All it would take to change the above example to sign the message and also encrypt the message to any configured default keys would be to change the `=c.encrypt=` line to this:

```
#+BEGIN_SRC python -i
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                           always_trust=True,
                                           add_encrypt_to=True)
#+END_SRC
```

The only keyword arguments requiring modification are those for which the default values are changing. The default value of `=sign=` is `=True=`, the default of `=always_trust=` is `=False=`, the default of `=add_encrypt_to=` is `=False=`.

If `=always_trust=` is not set to `=True=` and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
#+BEGIN_SRC python -i
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
    text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org",
                          secret=False))
logrus = []

for i in range(len(rpattern)):
    if rpattern[i].can_encrypt == 1:
        logrus.append(rpattern[i])

try:
    ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                                add_encrypt_to=True)
except gpg.errors.InvalidRecipients as e:
    for i in range(len(e.recipients)):
        for n in range(len(logrus)):
            if logrus[n].fpr == e.recipients[i].fpr:
                logrus.remove(logrus[n])
        else:
            pass
```

```

try:
    ciphertext, result, sign_result = c.encrypt(text,
                                                recipients=logrus,
                                                add_encrypt_to=True)
    with open("secret_plans.txt.asc", "wb") as afile:
        afile.write(ciphertext)
except:
    pass
#+END_SRC

```

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

```

** Decryption
:PROPERTIES:
:CUSTOM_ID: howto-basic-decryption
:END:

```

Decrypting something encrypted to a key in one's secret keyring is fairly straight forward.

In this example code, however, preconfiguring either `=gpg.Context()` or `=gpg.core.Context()` as `=c=` is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to `=c=` simply adds lines for no gain.

```

#+BEGIN_SRC python -i
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
    try:
        plaintext, result, verify_result = gpg.Context().decrypt(cfile)
    except gpg.errors.GPGMEError as e:
        plaintext = None
        print(e)

if plaintext is not None:
    with open(newfile, "wb") as nfile:
        nfile.write(plaintext)

else:
    pass

```

```
#+END_SRC
```

The data available in `=plaintext=` in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in `=result=` and the results of verifying any signatures of the data in `=verify_result=`.

If `=gpg.Context().decrypt(cfile, verify=False)=` is called instead, then `=verify_result=` will be returned as `=None=` and the rest remains as described here.

**** Signing text and files**

```
:PROPERTIES:  
:CUSTOM_ID: howto-basic-signing  
:END:
```

The following sections demonstrate how to specify keys to sign with.

***** Signing key selection**

```
:PROPERTIES:  
:CUSTOM_ID: howto-basic-signing-signers  
:END:
```

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

```
#+BEGIN_SRC python -i  
import gpg
```

```
logrus = input("Enter  
the email address or string to match signing keys to: ")  
hancock = gpg.Context().keylist(pattern=logrus, secret=True)  
sig_src = list(hancock)  
#+END_SRC
```

The signing examples in the following sections include the explicitly designated `=signers=` parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the `patten` expects a string, bytes or None and

not a list. A string with two fingerprints won't match any single key.

```
*** Normal or default signing messages or files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-normal
:END:
```

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armoring will be determined according to the value of `=gpg.Context().armor=`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
    afile.write(signed_data.decode())
#+END_SRC
```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```
#+BEGIN_SRC python -i
```

```

import gpg

with open("/path/to/statement.txt", "rb") as tfile:
    text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
    afile.write(signed_data)
#+END_SRC

```

```

*** Detached signing messages and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-detached
:END:

```

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```

#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc",
"w") as afile:
    afile.write(signed_data.decode())
#+END_SRC

```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```

#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
    text = tfile.read()

c = gpg.Context(signers=sig_src)

```



```
signed_data, result = c.sign(text, mode=pgg.constants.sig.mode.DETACH)
```

```
with open("/path/to/statement.txt.sig", "wb") as afile:  
    afile.write(signed_data)  
#+END_SRC
```

```
*** Clearsigning messages or text  
:PROPERTIES:  
:CUSTOM_ID: howto-basic-signing-clear  
:END:
```

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

```
#+BEGIN_SRC python -i  
import gpg  
  
text0 = """Declaration of ... something.  
  
"""  
text = text0.encode()  
  
c = gpg.Context()  
signed_data, result = c.sign(text, mode=pgg.constants.sig.mode.CLEAR)  
  
with  
    open("/path/to/statement.txt.asc", "w") as afile:  
        afile.write(signed_data.decode())  
#+END_SRC
```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```
#+BEGIN_SRC python -i  
import gpg  
  
with open("/path/to/statement.txt", "rb") as tfile:  
    text = tfile.read()  
  
c = gpg.Context()  
signed_data, result = c.sign(text, mode=pgg.constants.sig.mode.CLEAR)  
  
with open("/path/to/statement.txt.asc", "wb") as afile:  
    afile.write(signed_data)  
#+END_SRC
```

```
** Signature verification
:PROPERTIES:
:CUSTOM_ID: howto-basic-verification
:END:
```

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
#+BEGIN_SRC python
-i
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
    data, result = c.verify(open(gpg_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
#+END_SRC
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
#+BEGIN_SRC python -i
```

```

import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
    data, result = c.verify(open(asc_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
#+END_SRC

```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `=data=` to see if it matches with something like this:

```

#+BEGIN_SRC python -i
with open(filename, "rb") as afile:
    text = afile.read()

if text == data:
    print("Good signature.")
else:
    pass
#+END_SRC

```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `=c.verify=`. So `=data=` is `=None=` and only the information in `=result=` is available.

```

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
    data,
    result = c.verify(open(filename), open(sig_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
#+END_SRC

```

```

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
    data, result = c.verify(open(filename), open(asc_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):

```

```

    sign = result.signatures[i]
    print("""Good signature from:
{0}
with key {1}
made at {2}
""").format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp))
else:
    pass
#+END_SRC

```

*

```

Creating keys and subkeys
:PROPERTIES:
:CUSTOM_ID: key-generation
:END:

```

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to =SECRET= level clearance, so his keys will be 3072-bit keys.

The pre-configured =gpg.conf= file which sets cipher, digest and other preferences contains the following configuration parameters:

```

#+BEGIN_SRC conf
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128
AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences ZLIB BZIP2 ZIP Uncompressed
#+END_SRC

```

```
** Primary key
:PROPERTIES:
:CUSTOM_ID: keygen-primary
:END:
```

Generating a primary key uses the `create_key` method in a Context. It contains multiple arguments and keyword arguments, including: `userid`, `algorithm`, `expires_in`, `expires`, `sign`, `encrypt`, `certify`, `authenticate`, `passphrase` and `force`. The defaults for all of those except `userid`, `algorithm`, `expires_in`, `expires` and `passphrase` is `False`. The defaults for `algorithm` and `passphrase` is `None`. The default for `expires_in` is `0`. The default for `expires` is `True`. There is no default for `userid`.

If `passphrase` is left as `None` then the key will not be generated with a passphrase, if `passphrase` is set to a string then that will be the passphrase and if `passphrase` is set to `True` then `gpg-agent` will launch `pinentry` to prompt for a passphrase. For the sake of convenience, these examples will keep `passphrase` set to `None`.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()

c.home_dir = "~/gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
                    sign=True, certify=True)
#+END_SRC
```

One thing to note here is the use of setting the `c.home_dir` parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, `~/gnupg`, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to `700`.

The `temp-homedir-config.py` script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned =GenkeyResult= object, which includes the following data:

```
#+BEGIN_SRC python -i
print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""").format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
            dmkey.uid)
#+END_SRC
```

Alternatively the information can be confirmed using the command line program:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid      [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
#+END_SRC
```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the =gpg.conf= file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own =gpg.conf= file in order to be able to generate this:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.
```

```
sec  rsa3072/026D2F19E99E63AA
    created: 2018-03-15  expires: 2019-03-15  usage: SC
    trust: ultimate  validity: ultimate
[ultimate] (1). Danger Mouse <dm@secret.example.net>
```

```
[ultimate] (1). Danger Mouse <dm@secret.example.net>
    Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
```

IDEA, CAST5, 3DES

Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1

Compression: ZLIB, BZIP2, ZIP, Uncompressed

Features: MDC, Keyserver

no-modify

bash-4.4\$

#+END_SRC

** Subkeys

:PROPERTIES:

:CUSTOM_ID: keygen-subkeys

:END:

Adding subkeys to a primary key is fairly similar to creating the primary key with the `=create_subkey=` method. Most of the arguments are the same, but not quite all. Instead of the `=userid=` argument there is now a `=key=` argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/gnupg-dm"
```

```
key = c.get_key(dmkey.fpr, secret=True)
```

```
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,  
                        encrypt=True)
```

```
#+END_SRC
```

As with the primary key, the results here can be checked with:

```
#+BEGIN_SRC python -i
```

```
print("""
```

```
Fingerprint: {0}
```

```
Primary Key: {1}
```

```
Public Key: {2}
```

```
Secret Key: {3}
```

```
Sub Key: {4}
```

```
User IDs: {5}
```

```
""").format(dmsub.fpr, dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
```



```
    dmsub.uid))
#+END_SRC
```

As well as on the command line with:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid    [ultimate] Danger Mouse <dm@secret.example.net>
ssb  rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
#+END_SRC
```

```
** User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids
:END:
```

```
*** Adding User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids-add
:END:
```

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is `=key_add_uid=` and the only arguments it takes are for the `=key=` and the new `=uid=`.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr
= "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
#+END_SRC
```

Unsurprisingly the result of this is:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid      [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid      [ultimate] Danger Mouse <dm@secret.example.net>
ssb  rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
#+END_SRC
```

```
*** Revoking User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids-revoke
:END:
```

Revoking a user ID is a fairly similar process, except that it uses the `=key_revoke_uid=` method.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
= "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
#+END_SRC
```

```
** Key certification
:PROPERTIES:
:CUSTOM_ID: key-sign
:END:
```

Since key certification is more frequently referred to as key signing, the method used to perform this function is `=key_sign=`.

The `=key_sign=` method takes four arguments: `=key=`, `=uids=`,

=expires_in= and =local=. The default value of =uids= is =None= and which results in all user IDs being selected. The default value of both =expires_in= and =local= is =False=; which results in the signature never expiring and being able to be exported.

The =key= is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the =uids= value is not =None= then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
#+END_SRC
```

```
*** Verifying key certifications
:PROPERTIES:
:CUSTOM_ID: key-sign-verify
:END:
```

```
#+BEGIN_SRC python -i
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
    for sig in user.signatures:
        print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
              sig.uid)
```

```
#+END_SRC
```

Which for Danger Mouse displays the following:

```
#+BEGIN_EXAMPLE
```

```
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@secret.example.net>  
0x321E4E2373590E5D Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@adversary.org>
```

```
#+END_EXAMPLE
```

The two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year. Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
import math
```

```
import pendulum
```

```
import time
```

```
hd = "/home/dm/.gnupg"
```

```
c = gpg.Context()
```

```
d = gpg.Context(home_dir=hd)
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
```

```
dmuid = "Danger Mouse <dm@secret.example.net>"
```

```
dkeys = list(c.keylist(pattern=dmuid))
```

```
dmkey = dkeys[0]
```

```
c.key_import(d.key_export(pattern=None))
```

```
tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
```

```
ts = tp.total_seconds()
```

```
total_secs = math.ceil(ts)
```

```
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)
```

```
d.key_import(c.key_export(pattern=dmuid))
```

```
keys
```

```
= list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
```

```
key = keys[0]
```

```
for user in key.uids:
```

```
    for sig in user.signatures:
```

```
        print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
```

```
            sig.uid)
```

```
#+END_SRC
```

Note that this final code block includes the use of a module which is /not/ part of Python's standard library, the [\[https://pendulum.eustace.io/\]](https://pendulum.eustace.io/)[pendulum module]]. Unlike the standard datetime module, pendulum makes working with dates and times significantly easier in Python; just as the requests module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using the GPGME Python bindings, they are both highly recommended more generally.

* Advanced or Experimental Use Cases

```
:PROPERTIES:  
:CUSTOM_ID: advanced-use  
:END:
```

** C plus Python plus SWIG plus Cython

```
:PROPERTIES:  
:CUSTOM_ID: cython  
:END:
```

In

spite of the apparent incongruence of using Python bindings to a C interface only to generate more C from the Python; it is in fact quite possible to use the GPGME bindings with [\[http://docs.cython.org/en/latest/index.html\]](http://docs.cython.org/en/latest/index.html)[Cython]]. Though in many cases

the benefits may not be obvious since the most computationally intensive work never leaves the level of the C code with which GPGME itself is interacting with.

Nevertheless, there are some situations where the benefits are demonstrable. One of the better and easier examples being the one of the early examples in this HOWTO, the [\[#howto-keys-counting\]](#)[key counting]] code. Running that example as an executable Python script, =keycount.py= (available in the =examples/howto/= directory), will take a noticeable amount of time to run on most systems where the public keybox or keyring contains a few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that script on my laptop; as I tend to do periodically and timed it using =time= utility, with the following results:

```
#+BEGIN_SRC shell  
bash-4.4$ time keycount.py
```

```
Number of secret keys: 23
```

Number of public keys: 12112

```
real 11m52.945s
user 0m0.913s
sys 0m0.752s
```

```
bash-4.4$
#+END_SRC
```

Sometime after that I imported another key and followed it with a little test of Cython. This test was kept fairly basic, essentially lifting the material from the [\[\[http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html\]\]](http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html) [Cython Basic Tutorial] to demonstrate compiling Python code to C. The first step was to take the example key counting code quoted previously, essentially from the importing of the `=gpg=` module to the end of the script:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
    Number of secret keys: {0}
    Number
of public keys: {1}

""".format(secnum, pubnum))
#+END_SRC
```

Save that into a file called `=keycount.pyx=` and then create a `=setup.py=` file which contains this:

```
#+BEGIN_SRC python -i
from distutils.core import setup
from Cython.Build import cythonize

setup(
    ext_modules = cythonize("keycount.pyx")
```

```
)  
#+END_SRC
```

Compile it:

```
#+BEGIN_SRC shell  
bash-4.4$ python setup.py build_ext --inplace  
bash-4.4$  
#+END_SRC
```

Then run it in a similar manner to =keycount.py=:

```
#+BEGIN_SRC shell  
bash-4.4$ time python3.7 -c "import keycount"
```

```
Number of secret keys: 23  
Number of public keys: 12113
```

```
real 6m47.905s  
user 0m0.785s  
sys 0m0.331s
```

```
bash-4.4$  
#+END_SRC
```

Cython turned =keycount.pyx= into an 81KB =keycount.o= file in the =build/= directory, a 24KB =keycount.cpython-37m-darwin.so= file to be imported into Python 3.7 and a 113KB =keycount.c= generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the =keycount.pyx= file or the full 1,452 bytes of the full executable =keycount.py= example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The =keycount.pyx= and =setup.py= files used to generate this example have been added to the =examples/howto/advanced/cython/= directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the [\[\[http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd\]\]](http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd) [Magic Attributes]] section of the Cython documentation.

* Miscellaneous extras and work-arounds
:PROPERTIES:

```
:CUSTOM_ID: cheats-and-hacks
```

```
:END:
```

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with `[[#group-lines][group lines]]`.

```
** Group lines
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: group-lines
```

```
:END:
```

There is not yet an easy way to access groups configured in the `gpg.conf` file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
#+BEGIN_SRC python -i
import subprocess
import sys

if sys.platform == "win32":
    gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
    gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
    lines = procom[0].splitlines()
else:
    lines = procom[0].decode().splitlines()

for line in lines:
    if line.startswith("group") is True:
        break

groups = line.split(":")[-1].replace("'",
    "").split(',')
```



```

group_lines = []
group_lists = []

for group in groups:
    group_lines.append(group.split("="))
    group_lists.append(group.split("="))

```

```

for glist in group_lists:
    glist[1] = glist[1].split()
#+END_SRC

```

The result of that code is that `group_lines` is a list of lists where `group_lines[i][0]` is the name of the group and `group_lines[i][1]` is the key IDs of the group as a string.

The `group_lists` result is very similar in that it is a list of lists. The first part, `group_lists[i][0]` matches `group_lines[i][0]` as the name of the group, but `group_lists[i][1]` is the key IDs of the group as a list.

A demonstration of using the `groups.py` module is also available in the form of the executable `mutt-groups.py` script. This second script reads all the group entries in a user's `gpg.conf` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

```

** Keyserver access for Python
:PROPERTIES:
:CUSTOM_ID:
hkp4py
:END:

```

The [\[\[https://github.com/Selfnet/hkp4py\]\[hkp4py\]\]](https://github.com/Selfnet/hkp4py) module by Marcel Fest was originally a port of the old [\[\[https://github.com/dgladkov/python-hkp\]\[python-hkp\]\]](https://github.com/dgladkov/python-hkp) module from Python 2 to Python 3 and updated to use the [\[\[http://docs.python-requests.org/en/latest/index.html\]\[requests\]\]](http://docs.python-requests.org/en/latest/index.html) module instead. It has since been modified to provide support for Python 2.7 as well and is available via PyPI.

Since it rewrites the `hkp` protocol prefix as `http` and `hkps` as `https`, the module is able to be used even with servers which do not support the full scope of keyserver functions.^[fn:5] It also works quite readily when incorporated into a [\[\[#cython\]\[Cython\]\]](#) generated and compiled version of any code.

```

*** Key import format
:PROPERTIES:

```

```
:CUSTOM_ID: hkp4py-strings
:END:
```

The hkp4py module returns key data via requests as string literals (`=r.text=`) instead of byte literals (`=r.content=`). This means that the returned key data must be encoded to UTF-8 when importing that key material using a `=gpg.Context().key_import(=` method.

For this reason an alternative method has been added to the `=search=` function of `=hkp4py.KeyServer(=` which returns the key in the correct format as expected by `=key_import=`. When importing using this module, it is now possible to import with this:

```
#+BEGIN_SRC python -i
for key in keys:
    if key.revoked is False:
        gpg.Context().key_import(key.key_blob)
    else:
        pass
#+END_SRC
```

Without that recent addition it would have been necessary to encode the contents of each `=hkp4py.KeyServer().search()[i].key=` in `=hkp4py.KeyServer().search(=` before trying to import it.

An example of this is included in the [\[\[#howto-import-key\]\[Importing Keys\]\]](#) section of this HOWTO and the corresponding executable version of that example is available in the `=lang/python/examples/howto=` directory as normal; the executable version is the `=import-keys-hkp.py=` file.

```
** GPGME version checking
:PROPERTIES:
:CUSTOM_ID: gpgme-version-check
:END:
```

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the `=gpg.version.versionstr=` and `=gpg.version.versionlist=` methods have been quite sufficient. The former returns the same string as `=gpgme-config --version=`, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

```

#+BEGIN_SRC python -i
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                       stdout=subprocess.PIPE,
                                       stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
    gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0]
>= 3:
    gpgme_version = gpgme_version_str[0].decode().strip()
else:
    gpgme_version = None

if gpgme_version is not None:
    if gpgme_version == gpg.version.versionstr:
        print("The GPGME Python bindings match libgpgme.")
    else:
        print("The GPGME Python bindings do NOT match libgpgme.")
else:
    print("Upgrade Python and reinstall the GPGME Python bindings.")
#+END_SRC

```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the `=gpg.version.versionintlist=` method (added in version `=1.12.1-beta79=`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```

#+BEGIN_SRC python -i
import gpg

try:
    if gpg.version.is_beta is True:
        print("The installed GPGME Python bindings were built from beta code.")
    else:
        print("The installed GPGME Python bindings are a released version.")
except Exception as e:
    print(e)

```

```

try:
    if gpg.version.versionintlist[0] == 1:
        if gpg.version.versionintlist[1] == 12:
            if gpg.version.versionintlist[2] == 1:
                print("This is the minimum version for using versionintlist.")
            elif gpg.version.versionintlist[2] > 1:
                print("The versionintlist method is available.")
            else:
                pass
        elif gpg.version.versionintlist[1] > 12:
            print("The versionintlist method is available.")
        else:
            pass
    elif gpg.version.versionintlist[0] > 1:
        print("The versionintlist method is available.")
    else:
        pass
except Exception as e:
    print(e)
#+END_SRC

```

The points where =pass= is used in the above example will most likely also produce an =Exception= error since those results should only occur in versions which do not have the =gpgme.version.is_beta= and =gpgme.version.versionintlist= methods available.

```

* Copyright and Licensing
:PROPERTIES:
:CUSTOM_ID: copyright-and-license
:END:

```

```

** Copyright
:PROPERTIES:
:CUSTOM_ID: copyright
:END:

```

Copyright The GnuPG Project, 2018.

```

** Draft Editions of this HOWTO
:PROPERTIES:
:CUSTOM_ID: draft-editions
:END:

```

Draft editions of this HOWTO may be periodically available directly

from the author at any of the following URLs:

- [\[\[https://files.au.adversary.org/crypto/gpgme-python-howto.html\]\]](https://files.au.adversary.org/crypto/gpgme-python-howto.html) [GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]
- [\[\[http://files.au.adversary.org/crypto/gpgme-python-howto.html\]\]](http://files.au.adversary.org/crypto/gpgme-python-howto.html) [GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]
- [\[\[https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html\]\]](https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html) [GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 SSL)]
- [\[\[http://files.au.adversary.org/crypto/gpgme-python-howto/index.html\]\]](http://files.au.adversary.org/crypto/gpgme-python-howto/index.html) [GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 no SSL)]

These draft versions have been generated from this document via GNU Emacs [\[\[https://orgmode.org/\]\]](https://orgmode.org/) [Org mode] to `=.texi=` and [\[\[https://www.gnu.org/software/texinfo/\]\]](https://www.gnu.org/software/texinfo/) [GNU Texinfo] to HTML. Though it is likely that the specific [\[\[https://files.au.adversary.org/crypto/gpgme-python-howto/\]\]](https://files.au.adversary.org/crypto/gpgme-python-howto/) [file] [\[\[http://files.au.adversary.org/crypto/gpgme-python-howto.org/\]\]](http://files.au.adversary.org/crypto/gpgme-python-howto.org/) [version] used will be on the same server with the generated output formats. Occasionally I may include the Org mode generated XHTML versions:

- [\[\[https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml\]\]](https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml) [GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]
- [\[\[http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml\]\]](http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml) [GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]

That XHTML version, however, is exported in a way which inherits a colour scheme from [\[\[https://github.com/holomorph/emacs-zenburn\]\]](https://github.com/holomorph/emacs-zenburn) [the author's Emacs theme] (which is a higher contrast version of [\[\[http://kippura.org/zenburnpage/\]\]](http://kippura.org/zenburnpage/) [Zenburn] ported by [\[\[https://github.com/holomorph\]\]](https://github.com/holomorph) [Holomorph]). So it's fine for people who prefer dark themed web pages, but not so great for everyone else.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

```
#+BEGIN_SRC shell
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
#+END_SRC
```

The reStructuredText format is also generated from the Org mode source file, except it is generated using [\[\[https://pandoc.org/\]\]](https://pandoc.org/) [Pandoc] with either of the following commands (depending on the filename):

```

#+BEGIN_SRC shell
pandoc -f org -t rst+smart -o gpgme-python-howto.rst
gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
#+END_SRC

```

Note that the Org mode source files are identified as such via a mode line at the top of each file and have had their `.org` file extensions dropped in order to make scripted generation of output formats easier and not require renaming files post-conversion.

Due to a bug in Org mode's texinfo conversion method, the recommended steps for generating the Texinfo files for all the files in the `=lang/python/doc/src/=` directory are as follows:

```

#+BEGIN_SRC shell
for x in * ; do
  emacs $x --batch -f org-texinfo-export-to-texinfo --kill
  cat $x.texi | sed -e 's/@documentencoding UTF-8/@documentencoding utf-8/g' > ../texinfo/$x.texi
  pandoc -f org -t rst+smart -o ../rst/$x.rst $x
done ;
rm -fv *.texi
cd ../texinfo
mkdir info
mkdir html
for x in *.texi ; do
  makeinfo -v $x
  makeinfo --html --no-split $x
done ;
mv *.info info/
mv
*.html html/
#+END_SRC

```

This code snippet includes the generation of the reStructuredText files and would be expected to be run from the `=doc/src/=` directory containing the Org mode source files. It also assumes that the commands are being run on POSIX compliant systems with basic tools like sed, the Bourne shell and GNU Emacs^[fn:6] available. The code snippet also includes the steps for generating the Emacs Info files and HTML files from the Texinfo files. Using reStructuredText files with Sphinx is best left for the documentation of that project.

In addition to these there is a significantly less frequently updated version as a HTML [\[\[https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html\]\]](https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html) [WebHelp site] (AWS S3 SSL); generated from DITA XML source files, which can be found in [\[\[https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/\]\]](https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/) [an

alternative branch]] of the GPGME
git repository.

Various generated output formats may occasionally be found in
subdirectories

of the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python][gpgme-python]] directory. In particular within the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita][DITA]], [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst][reStructuredText]] and [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo][Texinfo]] subdirectories. The =rst= directory contains output files generated with Sphinx and may include a considerable number of its possible output formats, but there are no guarantees as to how recent these are or even if they are present.

These draft editions are not official documents and the version of documentation in the master branch or which ships with released versions is the only official documentation. Nevertheless, these draft editions may occasionally be of use by providing more accessible web versions which are updated between releases. They are provided on the understanding that they may contain errors or may contain content subject to change prior to an official release.

```
** License GPL compatible
:PROPERTIES:
:CUSTOM_ID: license
:END:
```

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* Footnotes

[fn:1] =short-history= and/or =short-history.html=.

[fn:2] With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements

will always enforce their own policies anyway and installation to each supported

minor release is quite possible too.

[fn:3] Yes, even if you use virtualenv with everything you do in Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the /entire/ GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it).

[fn:4] You probably don't really want to do this. Searching the key servers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.

[fn:5] Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as HKP or HKPS within the Python Code. The =hkp4py= module will rewrite these appropriately when the connection is made to the server.

[fn:6] Okay, Emacs might not necessarily qualify as a basic tool, but it is common enough that having it installed on a system isn't too great an expectation, nor is it difficult to add to most POSIX systems, even if the users of those systems do not personally use it.
2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

- * Makefile.am: Remove build rules for libpgpme-pth.
- * gpgme.m4: Remove support for libpgpme-pth.

2011-05-26 Marcus Brinkmann <marcus@g10code.com>

- * decrypt.c (gpgme_op_decrypt_start, gpgme_op_decrypt): Check CTX.
- * decrypt-verify.c (gpgme_op_decrypt_verify_start (gpgme_op_decrypt_verify): Likewise.
- * delete.c (gpgme_op_delete_start, gpgme_op_delete): Likewise.
- * edit.c (gpgme_op_edit_start, gpgme_op_edit (gpgme_op_card_edit_start, gpgme_op_card_edit): Likewise.

- * encrypt.c (gpgme_op_encrypt_start, gpgme_op_encrypt): Likewise.
- * encrypt-sign.c (gpgme_op_encrypt_sign_start)
(gpgme_op_encrypt_sign): Likewise.
- * export.c (gpgme_op_export_start,
gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext)
(gpgme_op_export_keys_start, gpgme_op_export_keys): Likewise.
- * genkey.c (gpgme_op_genkey_start, gpgme_op_genkey): Likewise.
- * getauditlog.c (gpgme_op_getauditlog_start)
(gpgme_op_getauditlog): Likewise.
- * gpgconf.c (gpgme_op_conf_load, gpgme_op_conf_save): Likewise.
- * import.c (gpgme_op_import_start, gpgme_op_import_keys_start)
(gpgme_op_import_keys, gpgme_op_import): Likewise.
- * keylist.c (gpgme_op_keylist_start, gpgme_op_keylist_ext_start):
Likewise.
- * opassuan.c (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact_ext): Likewise.
- * passwd.c (gpgme_op_passwd_start, gpgme_op_passwd): Likewise.
- * sign.c (gpgme_op_sign_start, gpgme_op_sign): Likewise.
- * trustlist.c (gpgme_op_trustlist_start)
(gpgme_op_trustlist_next): Likewise.
- * verify.c (gpgme_op_verify_start, gpgme_get_sig_key): Likewise.
- * op-support.c (_gpgme_op_data_lookup): Likewise.
- * vfs-create.c (gpgme_op_vfs_transact, gpgme_op_vfs_create):
Likewise.
- * vfs-mount.c (gpgme_op_vfs_mount, gpgme_op_vfs_transact): Likewise.
- * gpgme.c (gpgme_set_protocol)
(gpgme_set_sub_protocol)
(gpgme_set_armor, gpgme_set_include_certs)
(gpgme_set_keylist_mode, gpgme_set_passphrase_cb)
(gpgme_set_progress_cb, gpgme_set_io_cbs, gpgme_set_locale)
(gpgme_ctx_set_engine_info, gpgme_sig_notation_clear): Likewise.
- * gpgme.c (gpgme_new): Check for valid R_CTX.
(gpgme_cancel, gpgme_cancel_async, gpgme_release): Likewise.

2011-04-06 Werner Koch <wk@g10code.com>

- * gpgme-config.in: Add option --host. Change options --cflags and --libs to collapse duplicate include and lib dirs. Try to put extra libs at the end.

- * gpgme.h.in: Use INSERT__TYPEDEFS_FOR_GPGME_H to include platform specific typedefs.

2011-02-03 Werner Koch <wk@g10code.com>

- * extra-stati.h: New.
- * mkstatus: Extend to also process extra-stati.h

* Makefile.am (main_sources): Add extra-stati.h
(status-table.h): Depend on extra-stati.h and adjust rule.

2011-02-03

Marcus Brinkmann <marcus@g10code.com>

* w32-io.c (_gpgme_io_socket): Return fd, not res.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* assuan-support.c (my_socket, my_connect): New functions.
(_gpgme_assuan_system_hooks): Add my_Socket, my_connect.
* priv-io.h (_gpgme_io_socket): New prototype.
* w32-io.c (pid_to_handle, handle_to_oid, fd_to_handle): Remove macros.
(is_socket): Remove function.
(_gpgme_io_spawn) [HAVE_W32CE_SYSTEM]: Remove some dead code.
(_gpgme_io_spawn): Translate handles before DuplicateHandle them.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* w32-util.c (mkstemp): Don't use CreateFile instead of open (the
function is not used on Windows CE, and the callers were not
adjusted).

2011-01-21 Marcus Brinkmann <mb@g10code.com>

* engine-gpgconf.c (_gpgme_conf_opt_change): Fix the case that is
not self-assignment.

2010-12-08 Werner Koch <wk@g10code.com>

* gpgme-tool.c (strcpy_escaped_plus): New.
(DIM, xtoi_1, xtoi_2): New.
(cmd_keylist):
Allow for multiple patterns.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

* w32-io.c (create_reader, create_writer): Use small stack size on
Windows CE.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

* gpgme.h.in (gpgme_conf_arg_new): Make VALUE arg const void *.
* gpgconf.c (_gpgme_conf_arg_new): Likewise.
(gpgme_conf_arg_new): Likewise.
* engine-gpgconf.c (_gpgme_conf_arg_new): Likewise.
(gpgconf_write): Remove debug hack.

2010-11-19 Marcus Brinkmann <mb@g10code.com>

* engine-gpgconf.c (_gpgme_conf_opt_change): Support self-assignment. Requested by Marc Mutz.

2010-11-17 Marcus Brinkmann <mb@g10code.com>

* vasprintf.c (int_vasprintf) [HAVE_W32CE_SYSTEM]: Just use a fixed size buffer, as va_copy is not easy to fake.

2010-11-15 Marcus Brinkmann <mb@g10code.com>

* w32-ce.h (strcasecmp, strdup) [_MSC_VER]: Define.

* genkey.c, passphrase.c: Include util.h.

* w32-util.c (_gpgme_w32ce_get_debug_envvar): Fix return value.

2010-11-15 Werner Koch <wk@g10code.com>

*

data-compat.c (gpgme_data_new_from_filepart)

(gpgme_data_new_from_file) [W32CE && _MSC_VER]: Return not GPG_ERR_NOT_IMPLEMENTED.

* w32-ce.h (HKEY_PERFORMANCE_DATA, HKEY_CURRENT_CONFIG, _IOLBF) (abort) [_MSC_VER]: Provide these macros.

* ath.h [W32CE && _MSC_VER]: Include winsock2.h.

* ath.c (ath_read, ath_write) [W32CE && _MSC_VER]: Do not call non-available functions.

2010-11-04 Werner Koch <wk@g10code.com>

* w32-ce.h [_MSC_VER && W32CE]: Undef leave.

* export.c: Include util.h so that we get the above undef.

* memrchr.c: Remove. Used to be a replacement function required by the formerly included assuan code.

2010-11-03 Werner Koch <wk@g10code.com>

* debug.c (_gpgme_debug) [W32CE]: Replace localtime by GetLocalTime.

* signers.c (gpgme_signers_clear): Remove useless return. Reported by Patrick Spendrin.

* w32-util.c: s/___inline___/GPG_ERR_INLINE/

* setenv.c: Include string.h due to our strerror replacement.

* w32-ce.h (access, bsearch):

New macros.

* w32-ce.c (_gpgme_wince_access): New.

(RegQueryValueExA): Change DATA to a void*.

(_gpgme_wince_bsearch): New. Taken from glibc 2.6.

Guard include of sys/stat.h and sys/types.h.

2010-11-02 Werner Koch <wk@g10code.com>

* data-fd.c (read, write, lseek) [W32CE && !__MINGW32CE__]: New.

Taken from Pedro Alves Public Domain code.

* w32-ce.h (SHGetSpecialFolderPath): Remove our defines and prototypes. We use the system provided prototypes now.

* w32-ce.c: Include shlobj.h

(_WIN32_IE): Define to 0x0400

(CreateFileA): New.

* w32-util.c: Explicitly include windows headers before util.h.

(_gpgme_w32ce_get_debug_envvar): Do not use wchar_t strings for read_w32_registry_string.

(mkstemp): Use CreateFile instead of open.

* w32-io.c (handle_to_fd, fd_tohandle): Add. We need them for W32.

* w32-util.c (_WIN32_IE): Define to 0x0400.

* util.h [W32]: Include windows.h.

* w32-sema.c: Do not include windows.h directly.

* ath.c (ssize_t, pid_t)[_MSC_VER]: Add new

types.

* gpgme.c (gpgme_result_ref, gpgme_result_unref): Do not use a void pointer in pointer arithmetic.

* w32-util.c: Include util.h prior to ath.h. Don't include

windows.h directly.

(F_OK): Define if not defined.

* w32-ce.c: Include string.h.

(RegQueryValueExA): Use WINAPI modifier to match the declaration.

* vfs-create.c: Include string.h because under W32CE with MSC we get a warning related to our strerror replacement.

* encrypt-sign.c: Include stdlib.h, string.h and errno.h.

* priv-io.h [W32CE]: Include w32-ce.h

* w32-ce.h: Include winsock2.h and ws2tcpip.h.

(_MSV_VER): Remove useless macro.

(pid_t): Add typedef.

Guard all includes of unistd.h and sys/time.h.

2010-10-28 Marcus Brinkmann <marcus@g10code.com>

* opassuan.c (gpgme_op_assuan_transact_ext): Fix uninitialized value use. Reported by Marc Mutz.

2010-10-07 Werner Koch <wk@g10code.com>

* gpgme-tool.c (ARGP_ERR_UNKNOWN): Use EDEADLK if available.

* w32-util.c (_gpgme_w32ce_get_debug_envvar) [W32CE]:
New.

* debug.c (debug_init) [W32CE]: Use new function.

2010-09-16 Werner Koch <wk@g10code.com>

* import.c: Include "util.h".

(parse_import): Return GPG_ERR_MISSING_ISSUER_CERT.

* util.h: Add fallback define for GPG_ERR_MISSING_ISSUER_CERT.

* op-support.c: Include "util.h".

(_gpgme_parse_inv_recv): Handle new code 12.

2010-09-02 Marcus Brinkmann <marcus@g10code.de>

* error.c (gpgme_err_code_to_errno): Fix cut and paste bug (thanks to Marc Mutz).

2010-09-01 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c: Revert change from 2009-06-18, as it created a race condition.

2010-08-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.def: Add gpgme_err_code_from_syserror and gpgme_err_set_errno.

* libgpgme.vers: Likewise.

* gpgme.h.in (gpgme_error_from_errno): Fix return type to gpgme_error_t.

(gpgme_err_code_from_syserror, gpgme_err_set_errno): New prototype.

(gpgme_error_from_syserror): New inline function (why are gpgme_err_make_from_errno and gpgme_error_from_errno not inline functions?).

* error.c (gpgme_error_from_errno): Fix return type to gpgme_error_t.

(gpgme_err_set_errno, gpgme_err_code_from_syserror): New functions.

2010-08-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme-tool.c (result_encrypt_to_xml, result_sign_to_xml)
(result_verify_to_xml, result_import_to_xml)
(result_genkey_to_xml): Check vigorously for null pointers.

* w32-io.c (GPGCEDEV_IOCTL_ASSIGN_RVID): New macro.
(_gpgme_io_spawn): Use ASSIGN_RVID.

2010-06-11 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (_gpgme_io_spawn): Remove debug printf.

2010-06-10 Marcus Brinkmann <marcus@g10code.de>

* gpgme-tool.c (gpgme_server): Use special hack for Windows CE to
get at stdin and stdout.

* engine-gpgsm.c (gpgsm_new): Translate returned achild_fds back
to child_fds.

* debug.h (TRACE_SUC6): New macro.

* w32-io.c (MAX_SLAFD): New macro.

(fd_table): New static variable.

(new_fd, release_fd): New functions.

(fd_to_handle, handle_to_fd, handle_to_socket):

Remove macros.

(MAX_READERS, MAX_WRITERS): Increase to 64.

(notify_table): Increase to MAX_SLAFD.

(struct reader_context_s, struct writer_context_s): Add member
file_sock.

(reader, writer): Use file_hd vs file_sock to decide if socket
operations to use. Remove auto-detect mode.

(create_reader, create_writer): Set file_sock. Unblock pending
thread only if this is a pipe fd.

(_gpgme_io_pipe): Allocate fds from table and return slot indices
instead of windows handles. This allows to properly handle RVIDs.

(_gpgme_io_close): Handle dup'ed file descriptors.

(build_commandline) [HAVE_W32_SYSTEM]: Use RVID from fd table now.

(_gpgme_io_spawn): Use fd table now.

(_gpgme_io_fd2str): Use RVID from fd table now.

(_gpgme_io_dup): Implement using fd table.

(_gpgme_io_socket): Allocate fds from table.

(_gpgme_io_connect): Use fd from table.

* w32-glib-io.c (find_channel): Check that the slot is used.

2010-06-09 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c [HAVE_W32CE_SYSTEM]:
Include assuan.h and winioctl.h.
(GPGCEDEV_IOCTL_UNBLOCK) [HAVE_W32CE_SYSTEM]: Define.
(set_synchronize) [HAVE_W32CE_SYSTEM]: Stub it out.
(is_socket): Allow to return -1 for auto-detect (old behaviour).
(is_socket) [HAVE_W32CE_SYSTEM]: Return -1.
(reader): Handle auto-detect case. Handle ctx->stop_me before
checking for EOF.
(destroy_reader) [HAVE_W32CE_SYSTEM]: Unblock a pending reader.
(writer): Handle auto-detect case. Handle ctx->stop_me with
ERROR_BUSY.
(destroy_writer) [HAVE_W32CE_SYSTEM]: Unblock a pending writer.
(_gpgme_io_pipe) [HAVE_W32CE_SYSTEM]: Implement in terms of a
half-pipe.
(build_commandline) [HAVE_W32CE_SYSTEM]: New function.
(_gpgme_io_spawn) [HAVE_W32CE_SYSTEM]: Implement it differently
for this platform.
(_gpgme_io_fd2str) [HAVE_W32CE_SYSTEM]: Implement it for RVIDs.
(_gpgme_io_dup) [HAVE_W32CE_SYSTEM]: Stub it out.

* gpgme-tool.c (result_add_timestamp): Add missing NULL argument.
(result_sign_to_xml): Protect against NULL
fingerprint.
(struct server): New members input_fd, input_filename,
input_stream output_fd, output_filename, output_stream,
message_filename, message_stream.
(server_reset_fds): Deallocate those.
(server_parse_fd): New function.
(server_data_obj): Take optional filename argument and direction
argument. Also take new argument to return a filestream that
needs to be closed after destroying the data object.
Change all callers, too.
(input_notify, output_notify): Removed.
(cmd_input, cmd_output): New functions.
(gpgme_server): Do not register input and output notifier.
(register_commands): Use cmd_input and cmd_output.
(cmd_message): Rewritten to use server_parse_fd.
(cmd_delete, cmd_keylist): Fix inverted option check.
(main) [HAVE_W32CE_SYSTEM]: Sleep a bit to work around bug in ssh.

* genkey.c (gpgme_op_genkey): Return err with TRACE_ERR.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

* conversion.c (_gpgme_timegm) [HAVE_W32_SYSTEM]: New static
function.

(_gpgme_parse_timestamp)
[HAVE_W32_SYSTEM]: Use it.

* gpgme-tool.c (main): Protect call to setlocale with
HAVE_SETLOCALE.

* Makefile.am (system_components): Remove custom cppflags from
RCCOMPILER (because gpg-error adds -idirafter that makes RC bail.
[HAVE_W32CE_SYSTEM]: Add w32-ce.h and w32-ce.c, clear
libexec_PROGRAMS.

* w32-ce.h, w32-ce.c: New files.

* priv-io.h: Include <sys/types.h>

* util.h: Likewise.

2010-05-11 Marcus Brinkmann <marcus@g10code.de>

* w32-util.c: Include ath.h

(HAVE_ALLOW_SET_FOREGROUND_WINDOW) [!HAVE_W32CE_SYSTEM]: Define
it.

(RTLD_LAZY, dlopen, dlsym,

dlclose) [!HAVE_ALLOW_SET_FOREGROUND_WINDOW]: Don't define anymore.

(_gpgme_allow_set_foreground_window) [!HAVE_ALLOW_SET_FOREGROUND_WINDOW]:

Make it a stub.

(read_w32_registry_string): Use FooA variants of Windows functions
instead of Foo (which dispatches depending on UNICODE).

[!HAVE_W32CE_SYSTEM]: Don't check environment.

(w32_shgetfolderpath): Remove.

(find_program_at_standard_place): Call

SHGetSpecialFolderPath

(which is available on all Windows systems
and also Windows CE).

(mkstemp): Use ath_self instead of getpid.

(_gpgme_mkstemp): Use GetTempPathA instead of GetTempPath.

* gpgme.h.in: Use _WIN32 instead of _MSC_VER. Include time.h for
time_t.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

* engine-g13.c, gpgme.c, engine-gpgsm.c, engine-gpg.c,
op-support.c, engine-assuan.c, gpgme-tool.c: Include <locale.h>
only if available with HAVE_LOCALE_H and conditionalize use of
LC_CTYPE on its definition.

* engine-gpgconf.c: Do not include <locale.h>.

* engine-gpgsm.c (gpgsm_new, start): Cast between int and
assuan_fd_t.

- * assuan-support.c (my_pipe, my_close, my_read, my_write): Likewise.
- * gpgme-tool.c (server_data_obj, server_reset_fds, gpgme_server), (my_recvmmsg, my_sendmsg, my_spawn): Likewise.
- * engine-assuan.c (start): Likewise.
- * engine-g13.c (start): Likewise.

2010-05-06 Marcus Brinkmann <marcus@g10code.de>

- * w32-glib-io.c, w32-io.c, w32-qt-io.cpp, w32-sema.c, w32-util.c:
Do not include <signal.h>.

- * sign.c, data-user.c, conversion.c, debug.c, verify.c, data.c, decrypt.c, delete.c, assuan-support.c, import.c, engine-gpgsm.c, data-mem.c, op-support.c, w32-io.c, w32-util.c, data-compat.c: Use gpg_error_from_syserror instead gpg_error_from_errno, and use gpg_err_set_errno to set error number.
- * setenv.c: Include <gpg-error.h> and define __set_errno to use gpg_err_set_errno.
- * gpgme-tool.c (ARGP_ERR_UNKNOWN): Define to EDEADLOCK (which is mapped in Windows CE) instead of E2BIG (which is not).
- (gt_import_keys): Initialize err.

2010-04-19 Marcus Brinkmann <marcus@g10code.de>

- * assuan-support.c (my_spawn): Cast to avoid warning.
- * engine-g13.c (g13_new): Make ARGV array of pointer to const char.
- (g13_assuan_simple_command) [!USE_DESCRIPTOR_FUNCTION]: Don't define.
- * ops.h (_gpgme_key_append_name): Same in prototype.
- * key.c (_gpgme_key_append_name): Make SRC argument pointer to const char.
- * posix-util.c
(_gpgme_get_uiserver_socket_path): Make HOMEDIR const.
- * vfs-mount.c (gpgme_op_vfs_transact_start): Never define this potentially useful but currently unused function.
- * vfs-create.c (gpgme_op_vfs_transact_start): Likewise.

2010-04-16 Werner Koch <wk@g10code.com>

- * w32-io.c (is_socket): New.
(reader, writer): Use it to figure out the API to use.

2010-03-15 Werner Koch <wk@g10code.com>

- * gpgme.h.in: Add autoconf template to set generated file to read-only in an emacs buffer.

2010-03-12 Werner Koch <wk@g10code.com>

* gpgme.h.in (GPGME_STATUS_SUCCESS): Use the right file for the change; see below.

* passwd.c (op_data_t): New.
(passwd_start): Setup OPD.
(passwd_status_handler): Return GPG_ERR_NOT_SUPPORTED if needed.
* context.h (OPDATA_PASSWD): New.
* gpgme.h (GPGME_STATUS_SUCCESS): New.

2010-03-09 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (gpgsm_keylist): Try to start the agent.

2010-02-17 Werner Koch <wk@g10code.com>

* posix-io.c (notify_table):
Change implementation.
(notify_table_item_t, notify_table_size, notify_table_lock): New.
(_gpgme_io_close, _gpgme_io_set_close_notify): Adjust for new implementation.

2010-02-16 Werner Koch <wk@g10code.com>

* gpgme-tool.c (spacep, has_option, skip_options): New.
(cmd_export): Implement option --minimal.
* gpgme.h.in (GPGME_EXPORT_MODE_MINIMAL): New.
* export.c (export_start, export_ext_start): Implement it.
* engine-gpg.c (export_common): Ditto.

2010-01-25 Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_connect): Fix return code check to make it work.

* version.c (do_subsystem_inits): Remove superfluous second WSAStartup.

2010-01-22 Werner Koch <wk@g10code.com>

* w32-io.c (writer): Try to use send first.
(reader): Try to use recv first.

2010-01-08 Werner Koch <wk@g10code.com>

* engine-gpg.c (gpg_passwd): New.

(_gpgme_engine_ops_gpg): Register.

* passwd.c (parse_error): New.

(passwd_status_handler): Use it.

2010-01-07 Marcus Brinkmann <marcus@g10code.de>

*

gpgme-tool.c (result_xml_write_cb_t, struct result_xml_state):

New types.

(MAX_TAGS): New macro.

(result_init, result_xml_indent, result_xml_tag_start)

(result_xml_tag_data, result_xml_tag_end, result_add_error)

(result_add_pubkey_algo, result_add_hash_algo, result_add_keyid)

(result_add_fpr, result_add_timestamp, result_add_sig_mode)

(result_add_value, result_add_string, result_encrypt_to_xml)

(result_decrypt_to_xml, result_sign_to_xml)

(result_verify_to_xml, result_import_to_xml)

(result_genkey_to_xml, result_keylist_to_xml)

(result_vfs_mount_to_xml): New functions.

(gt_result): Rewritten.

2010-01-05 Werner Koch <wk@g10code.com>

* gpgme-tool.c (gt_passwd, cmd_passwd): New.

(register_commands): Register.

* gpgme.h.in (gpgme_op_passwd_start, gpgme_op_passwd): New.

* libgpgme.vers, gpgme.def: Add new functions.

* passwd.c: New.

* Makefile.am (main_sources): Add passwd.c

* engine.c, engine.h (_gpgme_engine_op_passwd): New.

* engine-backend.h (struct

engine_ops): Add PASSWD.

* engine-gpgsm.c (gpgsm_passwd): New.

(_gpgme_engine_ops_gpgsm): Register.

(gpgsm_reset): Reset only if we have a connection.

* gpgme.h.in (GPGME_PK_ECDSA, GPGME_PK_ECDH): New.

* gpgme.c (gpgme_pubkey_algo_name): Add them.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

* debug.c: Test for TLS, not __GNU__

2009-12-15 Marcus Brinkmann <marcus@g10code.de>

* assuan-support.c (my_spawn): Calloc, not malloc, the fd_items.

2009-12-10 Werner Koch <wk@g10code.com>

* debug.c (debug_init): Test on sgid process.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (LTRCCOMPILER): Refactor with ...
(RCCOMPILER): ... this new macro.
(SUFFIXES): Add .lo.
(gpgme_res_ldflag): Removed.
(gpgme_res): Use libtool object file name here.
(libgpgme_la_LDFLAGS): Remove gpgme_res_ldflag usage.
(libgpgme_la_LIBADD): Add gpgme_res.

* ath.c (ath_self) [HAVE_W32_SYSTEM]: Fix typo.

2009-12-02 Werner Koch <wk@g10code.com>

* gpgconf.c (gpgme_conf_arg_release):
No return in a function
returning void. Reported by Wyllys Ingersoll.

2009-12-01 Werner Koch <wk@g10code.com>

* gpgme-tool.c (cmd_getauditlog): Add flag --html.
(hlp_getauditlog): New.

* gpgme-tool.c (GT_GCC_A_SENTINEL, GT_GCC_A_PRINTF): New.
(gt_write_status): Use sentinel.
(argp_error, log_error): Use printf attribute.
(argp_parse): Remove extra argument to argp_error.
(_gt_progress_cb, gt_get_engine_info, gt_get_keylist_mode)
(gt_result): Add NULL arg.

2009-11-26 Marcus Brinkmann <marcus@g10code.de>

* opassuan.c (opassuan_start): Allocate result structure before
beginning operation.

2009-11-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme-tool.c (gpgme_server): Use assuan_fd_t and assuan_fdopen
on fds.

2009-11-13 <wk@g10code.com>

* sign.c (_gpgme_sign_status_handler): Handle SIG_CREATED_SEEN.
* engine-uiserver.c (uiserver_sign): Make sending SENDER optional.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* op-support.c (_gpgme_op_reset):
Instead of last change, only set
sub protocol if it is not the default.

2009-11-10 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_op_reset): Ignore GPG_ERR_NOT_IMPLEMENTED
while setting the sub protocol.

* engine-uiscserver.c (uiserver_new): Pass fdpassing flag to
assuan_socket_connect.
(set_recipients): Replace fingerprint by user id.

* engine-gpgsm.c (set_recipients): Fix non-terminating loop in
case of a missing key.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_new): Set default sub protocol.
* gpgme-tool.c: Implement get sub protocol.

* gpgme.h.in (gpgme_get_sub_protocol): Add prototype.
* gpgme.def, libgpgme.vers: Add gpgme_get_sub_protocol.
* context.h (struct gpgme_context): New member sub_protocol.
* gpgme.c (gpgme_set_sub_protocol): Set CTX->sub_protocol.
(gpgme_get_sub_protocol): New function.
* op-support.c (_gpgme_op_reset): Set sub protocol.

* Makefile.am (uiserver_components): New variable.
(main_sources):
Add it.
* ops.h, key.c (_gpgme_key_append_name): Take CONVERT argument,
implement it. Adjust callers.
(gpgme_key_from_uid): New function.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_DEFAULT.
(gpgme_encrypt_flags_t): Add GPGME_ENCRYPT_PREPARE,
GPGME_ENCRYPT_EXPECT_SIGN.
(gpgme_set_sub_protocol, gpgme_key_from_uid): New functions.
* libgpgme.vers, gpgme.def: Add new functions.
* gpgme.c (gpgme_set_protocol): Add UIServer protocol.
(gpgme_set_sub_protocol): New function.
(gpgme_get_protocol_name): Add UIServer and default protocol.
* assuan-support.c: Return correct error values, implement
socketpair for POSIX.
* priv-io.h, posix-io.c, w32-io.c, w32-glib-io.c,

w32-qt-io.cpp (`_gpgme_io_spawn`): Add `ATFORK` and `ATFORKVALUE` arguments. Implement it for POSIX. Adjust all callers.

- * `engine.h`, `engine-backend.h` (`_gpgme_engine_set_protocol`) (`_gpgme_engine_op_decrypt_verify`): New prototypes. Adjust all users.
- * `engine.c` (`engine_ops`, `gpgme_get_engine_info`): Add `UIServer` engine.
- (`_gpgme_engine_set_protocol`, `_gpgme_engine_op_decrypt_verify`): New function.
- * `decrypt-verify.c` (`decrypt_verify_start`): Call `_gpgme_engine_op_decrypt_verify`.
- * `util.h`, `posix-util.c`, `w32-util.c` (`_gpgme_get_uiserver_socket_path`): New function.
- * `engine-gpgsm.c` (`gpgsm_set_fd`): Fix `_gpgme_io_pipe` invocation.
- * `gpgme-tool.c`: Some support for `UIServer` protocol.
- * `engine-uiserver.c`: New file.

2009-11-09 Marcus Brinkmann <marcus@g10code.de>

- * `engine-gpgsm.c` (`gpgsm_new`): Close server side FDs.

2009-11-06 Marcus Brinkmann <marcus@g10code.de>

- * `gpgme-tool.c` (struct `gpgme_tool`): New members `write_data` and `write_data_hook`.
- (`gt_write_data`): New function.
- (`gt_result`): Output `vfs_mount` result.
- (`server_write_data`): New function.
- (`gpgme_server`): Initialize `write_data` members.

2009-11-05 Marcus Brinkmann <marcus@g10code.de>

- * `engine-g13.c` (struct `engine_g13`): Remove members `RESULT_CB` and `RESULT_CB_VALUE`.
- (`g13_assuan_simple_command`, `status_handler`): Don't use those anymore.
- (`g13_transact`): Remove them from argument list, too.
- * `vfs-mount.c` (`_gpgme_vfs_mount_status_handler`): New function.
- (`_gpgme_op_vfs_mount`): Pass it to `transact`.

- * `engine-assuan.c` (`lass_new`): Update use of `assuan_socket_connect`.
- * `engine-gpgsm.c` (`gpgsm_new`): Update use of `assuan_pipe_connect`.
- * `engine-g13.c` (`g13_new`): Likewise.

- * `priv-io.h` (`IOSPAWN_FLAG_NOCLOSE`): New flag.
- * `w32-io.c` (`_gpgme_io_spawn`): Implement this flag.
- * `posix-io.c` (`_gpgme_io_spawn`): Likewise.

- * w32-glib-io.c (_gpgme_io_spawn): Likewise.
- * assuan-support.c (my_spawn): Set this flag.

- * decrypt.c (gpgme_op_decrypt_start): Fix use of debug macro.
- * decrypt-verify.c (gpgme_op_decrypt_verify_start): Likewise.
- * delete.c (gpgme_op_delete_start): Likewise.
- * edit.c (gpgme_op_edit_start, gpgme_op_card_edit_start):
Likewise.
- * encrypt.c (gpgme_op_encrypt_start): Likewise.
- * encrypt-sign.c (gpgme_op_encrypt_sign_start): Likewise.
- * export.c (gpgme_op_export_start, gpgme_op_export_ext_start)
(gpgme_op_export_keys_start,
gpgme_op_export_keys): Likewise.
- * genkey.c (gpgme_op_genkey_start): Likewise.
- * getauditlog.c (gpgme_op_getauditlog_start): Likewise.
- * import.c (gpgme_op_import_start, gpgme_op_import_keys_start):
Likewise.
- * opassuan.c (gpgme_op_assuan_transact_start): Likewise.
- * sign.c (gpgme_op_sign_start): Likewise.
- * verify.c (gpgme_op_verify_start): Likewise.
- * vfs-create.c (gpgme_op_vfs_create): Likewise.
- * vfs-mount.c (gpgme_op_vfs_mount): Likewise.

2009-11-04 Marcus Brinkmann <marcus@g10code.de>

- * ath.h (ath_self): New prototype. Include <stdint.h>
- * ath.c, ath-pth.c, ath-pthread.c (ath_self): New function.
- * debug.h: Rewrite most macros to beautify debug output.
(_gpgme_debug_buffer): Remove tagname and tag argument.
(_gpgme_debug_frame_begin, _gpgme_debug_frame_end): New prototypes.
- * debug.c: Include <time.h>. Don't include assuan.h.
(frame_nr, FRAME_NR): New thread-specific variable and macro.
(debug_init): Do not initialize assuan.
Call _gpgme_debug after
initialization instead using printf directly.
(_gpgme_debug): Do not call debug_init (we now ensure proper
initialization by user). Add timestamp and thread/process ID.
(_gpgme_debug_buffer): Do not take tagname and tag argument.
(_gpgme_debug_frame_begin, _gpgme_debug_frame_end): New functions.
- * version.c (gpgme_check_version_internal, gpgme_check_version):
Fix debug string. Do not initialize assuan.
- * posix-io.c (get_max_fds): Use 0 not NULL (nicer debug output).

2009-11-04 Werner Koch <wk@g10code.com>

- * gpgme-tool.c (register_commands): Add HELP feature.

2009-11-03 Werner Koch <wk@g10code.com>

* gpgme.h.in (GPGME_PROTOCOL_UISEVER): New.

2009-11-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (main_sources): Change g13.c to vfs-mount.c. Add
vfs-create.c

* vfs-create.c: New file.

* g13.c: Renamed to ...

* vfs-mount.c: ... this new file.

* gpgme.h.in (gpgme_op_vfs_create): New prototype.

* gpgme.def, libgpgme.vers: Add gpgme_op_vfs_create.

*

gpgme-tool.c (gt_vfs_create, cmd_vfs_create): New functions.

(register_commands): Add VFS_CREATE and CREAET.

2009-11-02 Marcus Brinkmann <marcus@g10code.de>

* debug.h (_gpgme_debug_buffer): Make TAG argument const const.

* debug.c (_gpgme_debug_buffer): Likewise.

* gpgme-tool.c (input_notify, output_notify): Adjust type to new
assuan interface.

* decrypt.c (gpgme_op_decrypt_result): Remove unused variable.

* opassuan.c (gpgme_op_assuan_transact): Fix return value.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (noinst_PROGRAMS): New target gpgme-tool.

(gpgme_tool_LDADD): New variable.

* gpgme-tool.c: New file.

* ops.h (_gpgme_sig_notation_clearm _gpgme_signers_clear): New
prototypes.

* gpgme.c (gpgme_set_protocol): Allow GPGME_PROTOCOL_GPGCONF (when
had that gone missing?).

(_gpgme_sig_notation_clear): New function without debug output.

(gpgme_release): Call it and _gpgme_signers_clear.

* signers.c (_gpgme_signers_clear): New
function without debug output.

* g13.c (gpgme_op_vfs_mount): Add debug output.

* assuan-support.c (my_spawn): Allow fd_child_list to be NULL.

* conversion.c (_gpgme_encode_percent_string): Fix infinite loop.

* debug.h: Put tag in front of debug lines, should make for nicer
output.

* engine-assuan.c (lass_new): Use our new system hooks for libassuan.

* engine-g13.c (g13_new): Remove redundant assuan context allocation.

* version.c (gpgme_check_version_internal): Delay debug output
until after gpgme_check_version was called.

2009-10-28 Marcus Brinkmann <marcus@g10code.de>

* signers.c, encrypt-sign.c, encrypt.c, delete.c, keylist.c,
edit.c, import.c, export.c: Fix last change in debug output.

2009-10-27 Marcus Brinkmann <marcus@g10code.de>

* edit.c (gpgme_op_edit_start, gpgme_op_edit)
(gpgme_op_card_edit_start, gpgme_op_card_edit): Add debug output.
* encrypt-sign.c (gpgme_op_encrypt_sign_start)
(gpgme_op_encrypt_sign): Likewise.
* encrypt.c (gpgme_op_encrypt_start,
gpgme_op_encrypt)
(gpgme_op_encrypt_result): Likewise.
* export.c (gpgme_op_export_start, gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext)
(gpgme_op_export_keys_start, gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start, gpgme_op_genkey)
(gpgme_op_genkey_result): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start)
(gpgme_op_getauditlog): Likewise.
* import.c (gpgme_op_import_result, gpgme_op_import_start)
(gpgme_op_import): Likewise.
* keylist.c (gpgme_op_keylist_result, keylist_colon_handler)
(gpgme_op_keylist_start, gpgme_op_keylist_ext_start)
(gpgme_op_keylist_next, gpgme_op_keylist_end, gpgme_get_key): Likewise.
* opassuan.c (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact_ext, gpgme_op_assuan_result)
(gpgme_op_assuan_transact): Likewise.
* signers.c (gpgme_signers_add, gpgme_signers_clear): Likewise.
* trustlist.c (gpgme_op_trustlist_start)
(gpgme_op_trustlist_next, gpgme_op_trustlist_end): Likewise.
* verify.c (gpgme_op_verify_start,
gpgme_op_verify)
(gpgme_op_verify_result): Likewise.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (struct gpgme_io_event_done_data)
(gpgme_io_event_done_data_t): New types.
(struct _gpgme_op_assuan_result): Deprecate the err member.
(gpgme_op_assuan_result): Deprecate (for now).
(gpgme_op_assuan_transact_ext): New prototype.
(gpgme_op_assuan_transact): Deprecate.
(struct _gpgme_op_g13_result): Replace with ...
(struct _gpgme_op_vfs_mount_result): ... this.
(gpgme_op_g13_mount): Replace with ...
(gpgme_op_vfs_mount): ... this.

* gpgme.def (gpgme_op_assuan_transact_ext, gpgme_wait_ext)
(gpgme_op_vfs_mount_result, gpgme_op_vfs_mount): New.
(gpgme_op_g13_mount): Remove.

* libgpgme.vers: Likewise.

* engine-backend.h (struct engine_ops): Remove RESULT_CB and
RESULT_CB_VALUE args in opassuan_transact member. Add CANCEL_OP
member.

* ops.h (_gpgme_cancel_with_err, _gpgme_wait_on_condition): Add
OP_ERR argument.
(_gpgme_wait_one_ext):
New prototype.

* context.h (ctx_op_data_id_t): Add OPDATA_VFS_MOUNT.

* engine-g13.c (g13_cancel_op): New function.
(parse_status): Remove declaration.
(g13_assuan_simple_command): Do nothing with status lines for now.
(status_handler): Update opaque value access.
(_gpgme_engine_ops_g13): Add new cancel_op member.

* gpgme.c (_gpgme_cancel_with_err): Add new parameter OP_ERR.
Handle operational errors.
(gpgme_cancel, gpgme_io_read, gpgme_io_write): Add debug output.

* data.c (_gpgme_data_inbound_handler)
(_gpgme_data_outbound_handler): Adjust opaque value access.

* engine-gpg.c (command_handler, status_handler)
(colon_line_handler): Likewise.

* engine-gpgsm.c (status_handler): Likewise.

* engine-gpg.c (_gpgme_engine_ops_gpg): Add cancel_op member.

* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Likewise.

* g13.c: Rewritten (and will be rewritten again).

* engine.h (_gpgme_engine_op_assuan_transact): Remove result_cb
and result_cb_value parameters from prototype.
(_gpgme_engine_cancel_op):
New prototype.

* engine.c (engine_ops) [! ENABLE_ASSUAN]: Add missing comma.
(_gpgme_engine_op_assuan_transact): Remove result_cb and
result_cb_value parameter.
(_gpgme_engine_cancel_op): New function.

* wait.h (_gpgme_run_io_cb): Add new argument OP_ERR.
(struct io_cb_data): New struct to pass opaque data and get a
op_err return value. Needed because we can't modify I/O callback
handler signature because it is exposed to the user.

* wait.c (_gpgme_run_io_cb): Add OP_ERR parameter. Handle
operational errors.

* wait-user.c (_gpgme_user_io_cb_handler): Handle operational
errors.

* wait-private.c (_gpgme_wait_on_condition): New argument to
retrieve the operational result. Handle operational errors in
session based protocols.
(_gpgme_wait_one_ext): New function.

(_gpgme_wait_one): Pass argument in invocation of
_gpgme_wait_on_condition.
* wait-global.c (struct ctx_list_item): Add member OP_ERR.
(ctx_done): New argument OP_ERR.
(ctx_wait): New argument
OP_ERR.
(gpgme_wait_ext): New function based on gpgme_wait but handling
operational errors.
(gpgme_wait): Implement in term of gpgme_wait_ext.
* keylist.c (gpgme_op_keylist_next): Pass argument in invocation
of _gpgme_wait_on_condition.
* trustlist.c (gpgme_op_trustlist_next): Pass argument in
invocation of _gpgme_wait_on_condition.
* engine-assuan.c (struct engine_lllass): Replace members RESULT_CB
and RESULT_CB_VALUE by LAST_OP_ERR.
(_gpgme_engine_assuan_last_op_err): Add this hack function.
(llass_cancel_op): New function.
(_gpgme_engine_lllass_ops): Add cancel_op member.
(llass_status_handler): Update opaque value access.
(llass_transact): Remove RESULT_CB and RESULT_CB_VALUE arguments.
* opassuan.c: Move compat hacks to the end of file.
(opassuan_start): Do not set OPD->result.err.
Do not pass RESULT_Cb and CTX to _gpgme_engine_op_assuan_transact.
(gpgme_op_assuan_transact_ext): New function.

* debug.h (DEBUG_GLOBAL): New debug level.
* conversion.c (gnupg_errors,
_gpgme_map_gnupg_error): Removed.
* data-user.c (gpgme_data_new_from_cbs): Add debug output.
* data-fd.c (gpgme_data_new_from_fd): Likewise.
* data-stream.c (gpgme_data_new_from_stream): Likewise.
* decrypt.c (gpgme_op_decrypt_result, gpgme_op_decrypt_start)
(gpgme_op_decrypt): Likewise.
* delete.c (gpgme_op_delete_start, gpgme_op_delete): Likewise.
* decrypt-verify.c (gpgme_op_decrypt_verify_start)
(gpgme_op_decrypt_verify): Likewise.
* sign.c (gpgme_op_sign_result): Fix debug message.
* data-mem.c (gpgme_data_new): Improve debug output.
* verify.c (parse_trust): Use atoi instead of
_gpgme_map_gnupg_error.
* decrypt.c (_gpgme_decrypt_status_handler): Likewise.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am: Remove @NETLIBS@ from LIBADDs.
(g13_components): New variable.
(main_sources): Add \$(g13_components).
* g13.c, engine-g13.c: New files.

- * engine.c (engine_ops): Check for assuan for assuan engine, add g13 engine.
- * util.h (_gpgme_get_g13_path, _gpgme_encode_percent_string): New prototypes.
- * conversion.c (_gpgme_encode_percent_string): New function.
- * gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_G13. (struct_gpgme_op_g13_result, gpgme_g13_result_t): New types. (gpgme_op_g13_mount): New function.
- * gpgme.def, libgpgme.vers: Add gpgme_op_g13_mount.
- * gpgme.c (gpgme_set_protocol): Allow GPGME_PROTOCOL_G13. (gpgme_get_protocol_name): Add GPGME_PROTOCOL_G13.
- * posix-util.c (_gpgme_get_g13_path): New function.
- * w32-util.c (_gpgme_get_g13_path): New function.
- * engine-backend.h (_gpgme_engine_ops_g13): New declaration.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

- * gpgme-config.in (netlibs): Remove. (assuan_cflags, assuan_libs): Add.
- * Makefile.am (assuan_cppflags, assuan_libobjs): Removed. (gpgsm_components): Move engine-assuan.c to ... (assuan_components): ... this new variable. (main_sources): Add this new variable. (AM_CPPFLAGS): Remove \$(assuan_cppflags). (AM_CFLAGS): Add @LIBASSUAN_CFLAGS@. (libgpgme_la_DEPENDENCIES, libgpgme_pth_la_DEPENDENCIES) (libgpgme_glib_la_DEPENDENCIES, libgpgme_qt_la_DEPENDENCIES) (libgpgme_pthread_la_DEPENDENCIES): Remove \$(assuan_libobjs). (libgpgme_la_LIBADD, libgpgme_pth_la_LIBADD) (libgpgme_glib_la_LIBADD, libgpgme_qt_la_LIBADD)) (libgpgme_pthread_la_LIBADD): Replace \$(assuan_libobjs) by @LIBASSUAN_LIBS@.
- * priv-io.h (![HAVE_W32_SYSTEM]): Declare _gpgme_io_recvmsg, _gpgme_io_sendmsg, _gpgme_io_waitpid.
- * engine-backend.h: Define with [ENABLE_ASSUAN] instead of [ENABLE_GPGSM].
- * posix-io.c (_gpgme_io_waitpid): Make non-static.
- * util.h (ENABLE_ASSUAN): Declare _gpgme_assuan_system_hooks, _gpgme_assuan_malloc_hooks, _gpgme_assuan_log_cb.
- * engine-gpgsm.c: Don't map assuan error codes. Use assuan_release instead of assuan_disconnect. (map_assuan_error): Remove function. (gpgsm_new): Use new assuan context interface.
- * engine-assuan.c: Use assuan_release instead of assuan_disconnect.

(lclass_new): Use new assuan context interface.

2009-10-07 <wk@g10code.com>

* priv-io.h [W32]: Include windows.h instead of sys/socket.h.

2009-08-06 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_parse_inv_recp): Allow for no fingerprint.

* engine-gpgsm.c (gpgsm_sign): Hook up the status func for the SIGNER command.

* gpgme.h.in (GPGME_STATUS_INV_SGMR, GPGME_STATUS_NO_SGMR): New.

* sign.c (op_data_t): Add fields IGNORE_INV_RECP and INV_SGMR_SEEN.

(_gpgme_op_sign_init_result): Factor code out to ...

(sign_init_result): .. new. Init new fields.

(sign_start): Use sign_init_result.

(_gpgme_sign_status_handler): Take care of the new INV_SGMR.

Return an error if no signature has been created.

2009-07-07 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (struct engine_gpgsm): Add fields

input_helper_data and input_helper_memory.

(close_notify_handler): Release these new fields.

(gpgsm_import): Implement the keyarray feature.

* engine-gpg.c (gpg_import): Actually return GPG_ERR_INV_VALUE.

*

engine-gpgsm.c (gpgsm_import): Return an error for unknown data encodings.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

* debug.h: Everywhere, use %p instead of 0x%x to print pointer.

[HAVE_STDINT_H]: Include <stdint.h>.

(_TRACE, TRACE, TRACE0, TRACE1, TRACE2, TRACE3, TRACE6): Cast tag to (uintptr_t) before casting it to (void*) to silence GCC warning.

* gpgme.h.in (_GPGME_DEPRECATED_OUTSIDE_GPGME): New macro.

* sign.c (_GPGME_IN_GPGME): Define it.

* keylist.c (_GPGME_IN_GPGME): Define it.

* debug.c (_gpgme_debug_begin, _gpgme_debug_add): Handle error in vasprintf and asprintf.

* priv-io.h: Include <sys/socket.h>. Declare _gpgme_io_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (GPGME_CONF_PATHNAME): Revert last change, it's back! (GPA still uses it...).

* gpgme.def: Fix stupid typo.

* w32-io.c (_gpgme_io_pipe): Add missing declaration.

* gpgme.h.in (GPGME_CONF_PATHNAME): Remove obsolete macro.

* w32-io.c (_gpgme_io_pipe): Allocate reader/writer thread right away.

(_gpgme_io_read, _gpgme_io_write, _gpgme_io_select)

(_gpgme_io_dup): Never allocate threads here.

(find_writer, find_reader): Check return value of thread creation function.

* context.h (CTX_OP_DATA_MAGIC): New macro.

(struct ctx_op_data): New member MAGIC.

* op-support.c (_gpgme_op_data_lookup): Initialize magic.

* gpgme.c (gpgme_result_unref, gpgme_result_ref): Check magic.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_result_unref): Hot fix to release a lock.

* gpgme.c (result_ref_lock): New global variable.

(gpgme_result_ref, gpgme_result_unref): use it.

2009-06-16 Werner Koch <wk@g10code.com>

* version.c: Include stdlib.h.

* gpgme.h.in (gpgme_data_encoding_t): Add GPGME_DATA_ENCODING_URL, GPGME_DATA_ENCODING_URLESC, GPGME_DATA_ENCODING_URL0.

* data.c (gpgme_data_set_encoding): Adjust for new values.

* engine-gpg.c (string_from_data): New.

(gpg_import): Implement --fetch-key feature.

* gpgme.h.in

(gpgme_op_export_keys_start, gpgme_op_export_keys): New.

* gpgme.def, libgpgme.vers: Add them.

* export.c (gpgme_op_export_keys_start, gpgme_op_export_keys): New.

(export_keys_start): New.

* gpgme.h.in (gpgme_export_mode_t, GPGME_EXPORT_MODE_EXTERN): New.
(gpgme_op_export_start, gpgme_op_export, gpgme_op_export_ext_start)
(gpgme_op_export_ext): Change arg RESERVED to MODE of new
compatible type.
* export.c (gpgme_export_ext_start, gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext): Ditto.
(export_start): Ditto.
* engine.c (_gpgme_engine_op_export): Ditto.
* engine-backend.h (struct engine_ops): Ditto.
* engine-gpgsm.c (gpgsm_export, gpgsm_export_ext): Ditto.
* engine-gpg.c (gpg_export, gpg_export_ext): Ditto. Implement
mode EXTERN.
(gpg_export, gpg_export_ext): Factor common code out to ..
(export_common): .. this.

* gpgme.h.in (gpgme_op_import_keys_start, gpgme_op_import_keys): New.
* gpgme.def, libgpgme.vers: Add them.
* import.c (gpgme_op_import_keys_start,
gpgme_op_import_keys): New.
(_gpgme_op_import_keys_start): New.
* engine.c (_gpgme_engine_op_import): Add arg KEYARRAY.
* engine-backend.h (struct engine_ops): Ditto.
* engine-gpgsm.c (gpgsm_import): Ditto. Not functional.
* engine-gpg.c (gpg_import): Ditto. Implement it.

2009-06-15 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (gpgme_result_ref, gpgme_result_unref): Add
prototypes.
* gpgme.def, libgpgme.vers (gpgme_result_ref, gpgme_result_unref):
Add these.
* context.h (struct ctx_op_data): Add member "references".
* gpgme.c (gpgme_result_ref, gpgme_result_unref): New functions.
(_gpgme_release_result): Use gpgme_result_unref.
* op-support.c (_gpgme_op_data_lookup): Initialize references.

2009-06-12 Werner Koch <wk@g10code.com>

* gpgme-w32spawn.c (translate_get_from_file): Parse optional spawn
flags. Add new arg R_FLAGS. Fix segv on file w/o LF.
(translate_handles): Add new arg R_FLAGS. Avoid possible segv.
(main): Pass flags for my_spawn.
(my_spawn):
Add arg FLAGS and implement AllowSetForegroundWindow.

* priv-io.h (IOSPAWN_FLAG_ALLOW_SET_FG): New.
* w32-io.c (_gpgme_io_spawn): Add arg FLAGS and implement it.

- * w32-glib-io.c (_gpgme_io_spawn): Ditto.
- * w32-qt-io.cpp (_gpgme_io_spawn): Ditto.
- * posix-io.c (_gpgme_io_spawn): Add dummy arg FLAGS.
- * engine-gpg.c (start): Call spawn with new flag.

- * w32-util.c (_gpgme_allow_set_foreground_window): Rename to _gpgme_allow_set_foreground_window. Change all callers.
- * posix-util.c (_gpgme_allow_set_foreground_window): Ditto.

2009-06-10 Werner Koch <wk@g10code.com>

- * w32-util.c (_gpgme_allow_set_foreground_window): Add trace support.

2009-06-09 Werner Koch <wk@g10code.com>

- * engine-gpg.c (gpg_io_event): Test for cmd.fd.

- * version.c (gpgme_check_version_internal): Make result const.

- * gpgme.c: Include priv-io.h.
(gpgme_io_read, gpgme_io_write): New.
- * libgpgme.vers (GPGME_1.1): Add them.
- * gpgme.def: Ditto.

- * Makefile.am (main_sources): Remove gpgme.h.
(include_HEADERS):
Rename to nodist_include_HEADERS so that a
VPATH build won't use the distributed one.

- * util.h (GPG_ERR_NOT_OPERATIONAL): Define.

2009-05-28 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h.in (gpgme_check_version_internal): New prototype.
(gpgme_check_version): New macro, overriding function of the same
name.
- * libgpgme.vers, gpgme.def: Add gpgme_check_version_internal.o
- * context.h (_gpgme_selftest): New variable declaration.
- * version.c: Include "context.h".
(gpgme_check_version): Set _gpgme_selftest on success.
(gpgme_check_version_internal): New function.
- * gpgme.c (_gpgme_selftest): Define it.
- (gpgme_new): Check the selftest result.

2009-05-18 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h.in (gpgme_encrypt_flags_t): Add
GPGME_ENCRYPT_NO_ENCRYPT_TO.

* engine-gpg.c (gpg_encrypt): Pass --no-encrypt-to to gpg if GPGME_ENCRYPT_NO_ENCRYPT_TO flag is set.

2009-05-14 Werner Koch <wk@g10code.com>

* gpgme.h.in (gpgme_status_code_t):
Explicitly initialize for
better maintainability and to help debugging.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in: Add compile time check for _FILE_OFFSET_BITS.

2009-04-15 Marcus Brinkmann <marcus@g10code.de>

* posix-io.c (_gpgme_io_socket, _gpgme_io_connect): New functions.
* w32-io.c (_gpgme_io_connect): Fix stupid error.

2009-04-08 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c (giochannel_table): New members used, fd, socket.
(find_channel): Drop CREATE argument.
(new_dummy_channel_from_fd, new_channel_from_fd)
(new_channel_from_socket): New functions.
(_gpgm_io_fd2str): Implement for sockets.
(_gpgme_io_write, _gpgme_io_read): Translate EAGAIN errors
correctly.
(_gpgme_io_pipe): Fix for new channel bookkeeping.
(_gpgme_io_close, _gpgme_io_dup): Likewise.
(wsa2errno, _gpgme_io_socket, _gpgme_io_connect): New.
* w32-io.c (MAX_READERS, MAX_WRITERS): Bump up to 40.
(wsa2errno, _gpgme_io_socket, _gpgme_io_connect): New.
* w32-qt-io.cpp
(_gpgme_io_socket, _gpgme_io_connect): New stubs.
* version.c [HAVE_W32_SYSTEM]: Include "windows.h."
(do_subsystem_inits) [HAVE_W32_SYSTEM]: Call WSASStartup.
* engine-assuan.c (lass_status_handler): Ignore EAGAIN errors.

2009-03-18 Werner Koch <wk@g10code.com>

* gpgme.h.in (GPGME_KEYLIST_MODE_EPHEMERAL): New.
* engine-gpgsm.c (gpgsm_keylist): Send new option.

2009-03-13 Werner Koch <wk@g10code.com>

* gpgme-config.in: Make sure locale is set to C.

2009-02-24 Werner Koch <wk@g10code.com>

* gpgme.h.in (struct _gpgme_op_assuan_result): New.
(gpgme_assuan_result_t): New.
(gpgme_op_assuan_result): Change return type.
(struct _gpgme_assuan_sendfnc_ctx)
(gpgme_assuan_sendfnc_ctx_t, gpgme_assuan_sendfnc_t): Remove.
(gpgme_assuan_inquire_cb_t): Changed.
* opassuan.c (op_data_t): Make use of a result structure.
(gpgme_op_assuan_result): Change return type.
(opassuan_start): Use result structure.
(result_cb): Ditto.
* engine-assuan.c (struct _gpgme_assuan_sendfnc_ctx):
Remove.
(inquire_cb_sendfnc): Remove.
(inquire_cb): Change for new callback scheme. Not yet finished.
(lass_status_handler): Allow sending a CANCEL from the inquire CB.

2009-02-04 Werner Koch <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_spawn): Make ARGV argument const to
match prototype.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.

2009-02-03 Werner Koch <wk@g10code.com>

* gpgme.h.in (struct _gpgme_subkey): Add fields IS_CARDKEY and
CARD_NUMBER..
* key.c (gpgme_key_unref): Release field CARD_NUMBER.
* keylist.c (keylist_colon_handler): Factor common code out to ...
(parse_sec_field15): New. Set card number.

2009-01-26 Werner Koch <wk@g10code.com>

* opassuan.c, dirinfo.c, engine-assuan.c: New.
* Makefile.am: Add them.
* engine-backend.h: Add _gpgme_engine_ops_assuan.
(struct engine_ops): Add field OPASSUAN_TRANSACT. Update all
engine initializers.
* Makefile.am (gpgsm_components): Add engine-assuan.c.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_ASSUAN.
(gpgme_assuan_data_cb_t,
gpgme_assuan_sendfnc_ctx_t)
(gpgme_assuan_inquire_cb_t, gpgme_assuan_status_cb_t): New.
(gpgme_op_assuan_transact_start, gpgme_op_assuan_transact): New.
* gpgme.c (gpgme_get_protocol_name): Ditto.
(gpgme_set_protocol): Support it.
* engine.c (gpgme_get_engine_info): Ditto.
(engine_ops): Register it.

(_gpgme_engine_op_assuan_transact): New.
* libgpgme.vers (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact): New.
* gpgme.def (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact): New.
* engine-backend.h (struct engine_ops): Add GET_HOME_DIR and initialize to NULL for all engines.
* engine.c (engine_get_home_dir): New.
(gpgme_get_engine_info): Use it.
(_gpgme_set_engine_info): Use it.
* engine.h (engine_assuan_result_cb_t): New.
* context.h (ctx_op_data_id_t): Add OPDATA_ASSUAN.

* util.h (GPG_ERR_UNFINISHED): Define if not yet defined.

* version.c (gpgme_check_version): Protect trace arg against NULL.

2009-01-19 Werner

Koch <wk@g10code.com>

* runpg.c: Rename to engine-gpg.c
* Makefile.am (main_sources): Ditto.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (status-table.h): Use \$(builddir) to find gpgme.h.

2008-11-18 Werner Koch <wk@g10code.com>

* version.c (do_subsystem_inits): Always initialize I/O subsystem. Fixes regression from 2007-08-02.

* decrypt.c (_gpgme_decrypt_status_handler): Use _gpgme_map_gnupg_error to parse the error code for decrypt.algorithm.

2008-10-30 Marcus Brinkmann <marcus@g10code.de>

* wait-private.c (_gpgme_wait_on_condition): Remove unused variable IDX.
* wait-global.c: Include ops.h to silence gcc warning.
(_gpgme_wait_global_event_cb): Pass error value directly.
* wait-user.c: Include ops.h to silence gcc warning.

* posix-io.c (_gpgme_io_spawn): Make ARGV argument const to silence gcc warning. Cast argument to execv to silence warning.
* w32-io.c (_gpgme_io_spawn): Likewise.
* priv-io.h (_gpgme_io_spawn): Likewise for

prototype.

2008-10-24 Werner Koch <wk@g10code.com>

* `runpgg.c` (`gpg_keylist_preprocess`): Escape backslashes too.

2008-10-23 Marcus Brinkmann <marcus@g10code.de>

* `runpgg.c` (`gpg_keylist_preprocess`): Convert percent escaped string to C coded string.

2008-10-20 Werner Koch <wk@g10code.com>

* `Makefile.am` (`EXTRA_DIST`): Add `gpgme.h.in`.

* `gpgme.h`: Rename to `gpgme.h.in`.

* `gpgme.h.in` (`GPGME_VERSION`): Use `autoconf` substitution.

* `posix-io.c`: Include `sys/uio.h`. Fixes bug #818.

2008-10-18 Marcus Brinkmann <marcus@g10code.com>

* `w32-util.c` (`find_program_in_registry`): Don't define.

(`_gpgme_get_gpg_path`, `_gpgme_get_gpgsm_path`)

(`_gpgme_get_gpgconf_path`): Do not check for `fooProgram` in the registry anymore. It is now no longer possible to overwrite the default location in that way.

2008-10-17 Werner Koch <wk@g10code.com>

* `w32-glib-io.c` (`_gpgme_io_fd2str`): Use `"%d"` and not `"%ld"` to work around a bug in `mingw32`.

2008-09-23 Marcus Brinkmann <marcus@g10code.com>

*

`gpgme.c` (`gpgme_sig_notation_clear`): Clear `CTX->sig_notations`.

Submitted by "Daniel Mueller" <daniel@danm.de>

2008-09-16 Marcus Brinkmann <marcus@g10code.com>

* `runpgg.c` (`gpg_new`): Don't use `errno` with `ttynam_r`.

2008-08-11 Marcus Brinkmann <marcus@g10code.com>

* `runpgg.c` (`gpg_cancel`): Remove `cmd fd` before `status fd`.

* `gpgme.c` (`_gpgme_cancel_with_err`): New function.

(`gpgme_cancel`): Reimplement in terms of `_gpgme_cancel_with_err`.

* wait-private.c (_gpgme_wait_on_condition): Use
_gpgme_cancel_with_err.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.
* wait-global.c (_gpgme_wait_global_event_cb, gpgme_wait): Likewise.

2008-08-08 Marcus Brinkmann <marcus@g10code.com>

* runpgg.c (command_handler): Remove I/O callback on error, too.

2008-06-29 Marcus Brinkmann <marcus@g10code.com>

* gpgme.c (gpgme_cancel_async): Remove unused variable.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

* libgpgme.vers: Add gpgme_cancel_async.

* gpgme.def: Likewise.

* context.h:

Include "sema.h".

(struct gpgme_context): New members lock and canceled.

* gpgme.c (gpgme_new): Initialize lock.

(gpgme_release): Destroy lock.

(gpgme_cancel_async): New function.

* op-support.c (_gpgme_op_reset): Reset the canceled flag.

* wait-global.c (gpgme_wait): Check cancel flag before processing
any I/O callbacks.

* wait-private.c (_gpgme_wait_on_condition): Likewise.

* wait-user.c (_gpgme_user_io_cb_handler): Likewise.

2008-06-26 Werner Koch <wk@g10code.com>

* w32-util.c (_gpgme_mkstemp): Replace sprint by stpcpy.

(mkstemp): Need to use GetSystemTimeAsFileTime for better
compatibility.

2008-06-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme-w32spawn.c: New file.

* Makefile.am (libexec_PROGRAMS) [HAVE_W32_SYSTEM]: New variable
with gpgme-w32spawn.

* engine-gpgsm.c (gpgsm_new): Use server translated handles.

(gpgsm_set_locale): Return early if locale value is NULL.

* util.h (_gpgme_mkstemp)

(_gpgme_get_w32spawn_path) [HAVE_W32_SYSTEM]: New function
prototypes.

*

w32-util.c: Include <stdint.h>, <sys/stat.h> and <unistd.h>.
(letters, mkstemp, _gpgme_mkstemp, _gpgme_get_w32spawn_path): New functions.
* runpgg.c (gpg_decrypt, gpg_encrypt, gpg_encrypt_sign)
(gpg_genkey, gpg_import, gpg_verify, gpg_sign): Pass data over special filename FD rather than stdin.
(struct arg_and_data_s): Add member ARG_LOCP.
(struct fd_data_map_s): Add member ARG_LOC.
(struct engine_gpg): Add member ARG_LOC to status and colon.
(_add_arg, add_arg_with_locp): New function.
(add_arg_ext): Reimplement in terms of _add_arg.
(gpg_new): Remember argument location for status FD.
(build_argv): Set argument location if requested. Also set argument location of fd_data_map for data items.
(start): Adjust caller of _gpgme_io_spawn.
* priv-io.h (struct spawn_fd_item_s): Add members peer_name and arg_loc.
(_gpgme_io_spawn): Remove parent fd list argument.
* posix-io.c (get_max_fds): New function.
(_gpgme_io_dup): Add tracing.
(_gpgme_io_spawn):
Remove parent fd list. Change meaning of child fd list to contain all child fds that should be inherited. Close all other file descriptors after fork.
* w32-io.c, w32-glib-io.c, w32-qt-io.c(_gpgme_io_spawn): Remove parent fd list. Change meaning of child fd list to contain all child fds that should be inherited. Do not inherit any file descriptors, but DuplicateHandle them. Spawn process through wrapper process. Provide wrapper process with a temporary file containing handle translation data. Return translated handle names.
* w32-io.c (reader): Add more tracing output.
(_gpgme_io_read): Likewise.
* engine-gpgconf.c (gpgconf_read): Adjust caller of _gpgme_io_spawn.
* version.c (_gpgme_get_program_version): Likewise.

2008-06-20 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Change ARGV initialization for compatibility with old compilers. Fix amount of memmove. Fix CR removal.

2008-06-19 Werner Koch <wk@g10code.com>

* gpgme.h (GPGME_CONF_PATHNAME):
Replace by GPGME_CONF_FILENAME,
change all callers and provide compatibility macro.

(gpgme_conf_type_t): Add complex types 34..37.
* engine-gpgconf.c (gpgconf_parse_option, arg_to_data)
(_gpgme_conf_arg_new, _gpgme_conf_arg_release): Add new types.

2008-06-19 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_parse_option): Fix comma detection.

2008-05-09 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Do not pass empty lines to the callback.

2008-05-07 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_write): Change argv[0] to a self-explaining string. Needs a proper fix, though.

* runpg.c (gpg_keylist, gpg_keylist_ext): Factor common code out to ..

(gpg_build_keylist_options): .. new. Allow combination of extern and intern mode.

(gpg_new): DFT_TTYNAME is an array, thus check the first character.

2008-05-06 Werner Koch <wk@g10code.com>

* version.c (extract_version_string): New.

(_gpgme_get_program_version):

Use it to allow for suffixes in the version line.

2008-04-28 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Fixed segv. Avoid memmove for each line.

2008-04-22 Marcus Brinkmann <marcus@g10code.de>

* w32-qt-io.cpp, kdpipeiodevice.cpp: New versions from Frank Osterfeld, implement blocking select.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

* data.c (gpgme_data_read, gpgme_data_write): Retry on EINTR.

2008-03-06 Marcus Brinkmann <marcus@g10code.de>

* key.c (_gpgme_key_add_sig): Terminate UID in case SRC is NULL.

Reported by Marc Mutz.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

- * decrypt.c (release_op_data): Release OPD->result.recipients.
- * encrypt.c (release_op_data): Release invalid_recipient.

2008-02-15 Marcus Brinkmann <marcus@g10code.de>

- * engine-gpgconf.c (gpgconf_read): Fix end-of-line handline.

2008-02-14 Werner Koch <wk@g10code.com>

- * w32-io.c (_gpgme_io_spawn): Add arg R_PID to return the pid.
- * posix-io.c (_gpgme_io_spawn): Ditto.
- * w32-glib-io.c (_gpgme_io_spawn): Ditto.
- * w32-qt-io.cpp (_gpgme_io_spawn): Ditto.
- * priv-io.h (_gpgme_io_spawn): Adjust prototyp and change all callers.
- * runpg.c (start): Call _gpgme_allow_set_foreground_window.

- * w32-util.c (_gpgme_allow_set_foreground_window): New.
- * posix-util.c (_gpgme_allow_set_foreground_window): New.
- * engine-gpgsm.c (default_inq_cb): New.
- (gpgsm_new) [W32]: Enable pinentry notifications.
- (status_handler): Handle inquiries.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

- * kdpipelinedevice.cpp: New version by Frank Osterfeld, fixes race condition.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

- * engine-gpgsm.c (map_input_enc): Rename to ... (map_data_enc): ... this. Also change all callers.
- (gpgsm_encrypt, gpgsm_export, gpgsm_export_ext, gpgsm_genkey)
- (gpgsm_sign): Set encoding for output.

2008-01-28 Werner Koch <wk@g10code.com>

- * keylist.c (gpgme_get_key): Skip duplicated keys. Fixes bug 876.

2008-01-14

Marcus Brinkmann <marcus@g10code.de>

- * engine-gpgconf.c (gpgconf_config_load_cb): Fix program_name field.

2008-01-10 Marcus Brinkmann <marcus@g10code.de>

* kdpipelinedevice.cpp: New version from Frank Osterfeld.

* engine-gpgconf.c (gpgconf_config_load_cb2): Handle the flag NO_ARG_DESC.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgconf_components): New variable.

(main_sources): Add gpgconf.c.

* gpgme.h (gpgme_protocol_t): New protocol GPGME_PROTOCOL_GPGCONF.

(gpgme_conf_level_t, gpgme_conf_type_t, gpgme_conf_arg_t)

(gpgme_conf_opt_t, gpgme_conf_comp_t, gpgme_conf_arg_new)

(gpgme_conf_arg_release, gpgme_conf_opt_change)

(gpgme_conf_release, gpgme_op_conf_load, gpgme_op_conf_save): New types.

* gpgconf.c, engine-gpgconf.c: New files.

* engine.h: (_gpgme_engine_op_conf_load,

_gpgme_engine_op_conf_save): New prototypes.

* op-support.c (_gpgme_op_reset): Ignore not implemented locale function.

* posix-util.c (_gpgme_get_gpgconf_path): New function.

* w32-util.c (_gpgme_get_gpgconf_path): New function.

* engine-gpgsm.c:

(_gpgme_engine_ops_gpgsm): Add stubs for conf_load and conf_save.

* runpgg.c:

(_gpgme_engine_ops_gpg): Add stubs for conf_load and conf_save.

* gpgme.def: Add new gpgconf related interfaces.

* libgpgme.vers: Likewise.

* util.h (_gpgme_get_gpgconf_path): New prototype.

* gpgme.h (gpgme_protocol_t): Add GPGME_PROTOCOL_GPGCONF.

* engine-backend.h (_gpgme_engine_ops_gpgconf): New prototype.

(struct engine_ops): Add members for conf_load and conf_save.

* engine.c (engine_ops): Add _gpgme_engine_ops_gpgconf.

(_gpgme_engine_op_conf_load,

_gpgme_engine_op_conf_save): New functions.

(gpgme_get_engine_info): Allow protocol GPGME_PROTOCOL_GPGCONF.

2007-11-28 Marcus Brinkmann <marcus@g10code.de>

* w32-util.c (_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): Search for installation directory. Remove old fallback default.

(find_program_in_inst_dir): New function.

2007-11-26 Werner Koch <wk@g10code.com>

*
engine-gpgsm.c (struct engine_gpgsm): Add field INLINE_DATA and
always reset it before calling start.
(gpgsm_new): Clear it.
(status_handler): Implement it.
(gpgsm_getauditlog) [USE_DESCRIPTOR_PASSING]: Use INLINE_DATA.

2007-11-23 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_op_reset): Implement a no-reset flag.
* getauditlog.c (getauditlog_start): Use that flag.

2007-11-20 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_parse_inv_recp): Add new reason code 11.

2007-11-22 Werner Koch <wk@g10code.com>

* gpgme.h (gpgme_op_getauditlog_start, gpgme_op_getauditlog): New.
* libgpgme.vers: Ditto.
* gpgme.def: Ditto.
* getauditlog.c: New.
* engine-backend.h (struct engine_ops): Add member GETAUDITLOG.
* engine-gpgsm.c (gpgsm_getauditlog): New.
(_gpgme_engine_ops_gpgsm): Insert new function.
(gpgsm_new): Try to enable audit log support.
* runpgg.c (_gpgme_engine_ops_gpg): Insert dummy entry.

2007-11-12 Marcus Brinkmann <marcus@g10code.de>

*
kdpipelineio.cpp: New version from Frank Osterfeld.

2007-10-11 Marcus Brinkmann <marcus@g10code.de>

* kdpipelineio.cpp: New version from Frank Osterfeld.

2007-10-09 Marcus Brinkmann <marcus@g10code.de>

* kdpipelineio.cpp: New version from Frank Osterfeld and Marc
Mutz.

2007-10-05 Marcus Brinkmann <marcus@g10code.de>

* kdpipelineio.cpp, w32-qt-io.cpp: New versions from Frank
Osterfeld.

2007-10-04 Marcus Brinkmann <marcus@g10code.de>

* kdpipelineio.h, kdpipelineio.cpp, kdpipelineio.moc,
w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-02 Marcus Brinkmann <marcus@g10code.de>

* kdpipelineio.cpp, kdpipelineio.moc: New versions.
* w32-qt-io.cpp (_gpgme_io_fd2str): Print actual_fd if available.
(_gpgme_io_dup): Only acquire a reference, do not actually dup.
Submitted by Frank Osterfeld.

* priv-io.h, engine-gpgsm.c: Add comments.
* w32-qt-io.cpp (_gpgme_io_select): Remove code handling frozen FDs.
* w32-glib-io.c (_gpgme_io_close):
Always dereference the channel,
even if not primary.
(_gpgme_io_dup): Acquire a reference. Replace unused
implementation by assertion.

2007-09-28 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (iocb_data_t): Add SERVER_FD_STR.
(gpgsm_new): Set it.
(gpgsm_set_fd): Use it.

* w32-glib-io.c (find_channel): Add a new primary flag.
(_gpgme_io_close): Close channel only if primary.
(_gpgme_io_dup): Put newfd into the table as shallow copy.

* priv-io.h (struct io_select_fd_s): Remove member FROZEN.
* w32-io.c (_gpgme_io_select): Ditto.
* w32-glib-io.c (_gpgme_io_select): Ditto.

* posix-io.c (_gpgme_io_select): Ditto.
* runpg.c (read_status): Ditto.
* wait.c (fd_table_put): Ditto.

* runpg.c (gpg_io_event): Add tracing.
(start): Use gpg_io_event for sending the start event.
* engine-gpgsm.c (gpgsm_io_event): Add tracing.
(start): Use gpgsm_io_event for sending the start event.
* wait.c (_gpgme_add_io_cb, _gpgme_run_io_cb): Add tracing.

2007-09-28 Marcus Brinkmann
<marcus@g10code.de>

* kdpipelineio.moc, w32-qt-io.cpp, kdpipelineio.cpp: New

versions from Frank Osterfeld.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

- * w32-glib-io.c (_gpgme_io_spawn), w32-qt-io.cpp (_gpgme_io_spawn), w32-io.c (_gpgme_io_spawn): Close the process handle, return 0.
- * gpgme.h (gpgme_protocol_t): Add GPGME_PROTOCOL_UNKNOWN.
- * gpgme.c (gpgme_get_protocol_name): Implement support for GPGME_PROTOCOL_UNKNOWN.
- * kdpipelineio.h: Fix last change.
- * w32-glib-io.c (_gpgme_io_pipe), w32-qt-io.c (_gpgme_io_pipe), w32-io.c (_gpgme_io_pipe), posix-io.c (_gpgme_io_pipe): Fix debug output.

2007-09-25 Marcus Brinkmann <marcus@g10code.de>

- * conversion.c, keylist.c: Include <sys/types.h>.
- * kdpipelineio.h: Use namespace _gpgme_.
- * kdpipelineio.cpp: Use namespace _gpgme_.
- [Q_OS_WIN32 && NOMINMAX]: Do not define NOMINMAX again.
- * w32-qt-io.cpp: Change namespace of KDPipelineIODevice to _gpgme_::KDPipelineIODevice.

2007-09-17 Werner Koch <wk@g10code.com>

- *
rungpg.c (gpg_new): Make robust against undefined ttyname or ttytype.

2007-09-14 Werner Koch <wk@g10code.com>

- * data-mem.c (gpgme_data_release_and_get_mem): Fix tracing bug.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.c (gpgme_release): Call gpgme_sig_notation_clear.

2007-09-13 Marcus Brinkmann <marcus@g10code.de>

- * rungpg.c (gpg_new): Handle return value of _gpgme_getenv (fixes small memory leak).

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_qt_la_SOURCES): Move moc_kdpipeiodevice.cpp to EXTRA_DIST, as this is only included by another file (it's more like a header file than a cpp file, but automake doesn't know that).

* w32-qt-io.cpp (_gpgme_io_spawn): Fix several cast errors and typos.

* w32-io.c (_gpgme_io_write): Use TRACE_SYSRES instead of TRACE_SYS.

(libgpgme_qt_la_LIBADD): Add QT4_CORE_LIBS, not QT4_CORE_LIB.

* kdpipeiodevice.h, kdpipeiodevice.cpp, moc_kdpipeiodevice.cpp, kdpipeiodevice.moc, w32-qt-io.c:

New files.

* Makefile.am (ltlib_gpgme_extra): Rename to ltlib_gpgme_glib.

(ltlib_gpgme_qt): New variable.

(lib_LTLIBRARIES): Add \$(ltlib_gpgme_qt).

(libgpgme_qt_la_SOURCES): New variable.

(AM_CPPFLAGS): Add @QT4_CORE_INCLUDES@

(AM_CFLAGS): Add @QT4_CORE_CFLAGS@.

(libgpgme_qt_la_LDFLAGS, libgpgme_qt_la_DEPENDENCIES)

(libgpgme_qt_la_LIBADD): New variables.

* sema.h (struct critsect_s): Rename "private" to "priv" to make C++ users happy. Change users.

* posix-sema.c (_gpgme_sema_cs_enter, _gpgme_sema_cs_leave) (_gpgme_sema_cs_destroy): Likewise.

* w32-sema.c (critsect_init, _gpgme_sema_cs_enter)

(_gpgme_sema_cs_leave, _gpgme_sema_cs_destroy): Likewise.

* w32-glib-io.c (gpgme_get_giochannel): Change return type to void*.

(gpgme_get_fdptr): New function.

* w32-io.c (gpgme_get_fdptr): New function

* gpgme.def: Add gpgme_get_fdptr.

2007-08-22 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (_gpgme_io_write): Return early if COUNT is zero.

(writer): Remove superfluous check.

2007-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Move include of gpg-error.h out of extern "C".

2007-08-07 Werner Koch <wk@g10code.com>

* gpgme.h (struct _gpgme_signature): Add member CHAIN_MODEL.

* verify.c (parse_trust): Set Chain_MODEL.

2007-08-02 Werner Koch <wk@g10code.com>

- * w32-glib-io.c (`_gpgme_io_spawn`): Use `DETACHED_PROCESS` flag.
- * w32-io.c (`_gpgme_io_spawn`): Ditto.
- (`_gpgme_io_write`): Map `ERROR_NO_DATA` to `EPIPE`.
- * debug.c (`_gpgme_debug`): Enable assuan logging.
- (`_gpgme_debug_subsystem_init`): New.
- * version.c (`do_subsystem_inits`): Disable assuan logging and initialize the debug system.
- (`gpgme_check_version`): Do not trace before the subsystems are initialized.

2007-07-17 Marcus Brinkmann <marcus@g10code.de>

- * debug.c: Include `<errno.h>` and `"debug.h"`.
- (`_gpgme_debug`): Save and restore `ERRNO`.
- (`TOHEX`): New macro.
- (`_gpgme_debug_buffer`): New function.
- * conversion.c, data-compat.c, data-mem.c, data.c, engine-gpgsm.c, gpgme.c, keylist.c, posix-io.c, runpgg.c, sign.c, version.c, w32-io.c, wait.c: Replace `DEBUG` macros by `TRACE_*` variants. In most of these files, add many more tracepoints.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

- * engine-gpgsm.c (`status_handler`): Do not send `BYE` here.
- * w32-io.c (`struct reader_context_s`, `struct writer_context_s`): New members `REFCOUNT`.
- (`create_reader`, `create_writer`): Initialize `C->refcount` to 1.
- (`destroy_reader`, `destroy_writer`): Only destroy if `C->refcount` drops to 0.
- (`find_reader`, `find_writer`, `kill_reader`, `kill_writer`): Beautify.
- * priv-io.h (`_gpgme_io_dup`): New prototype.
- * posix-io.c (`_gpgme_io_dup`): New function.
- * w32-io.c (`_gpgme_io_dup`): Likewise.
- * w32-glib-io.c (`_gpgme_io_dup`): Likewise.
- * engine-gpgsm.c (`start`): Reverting to version 2007-07-10.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

- * data-user.c (`user_read`, `user_write`, `user_seek`): Set `errno` and return -1 instead returning the error code directly.
- * data-compat.c (`old_user_seek`): Likewise.
- * gpgme.c (`gpgme_sig_notation_add`): Return error properly.

* Revert the "close_notify_handler" returns int stuff. Always close in the _gpgme_io_close implementations.

* engine-gpgsm.c (status_handler): Try to terminate the connection in case of error.

* w32-io.c (_gpgme_io_read): Return C->error_code in ERRNO. (_gpgme_io_write): Likewise.

* priv-io.h (_gpgme_io_set_close_notify): Change type of HANDLER to _gpgme_close_notify_handler. (_gpgme_close_notify_handler): New type. (_gpgme_io_dup): Remove prototype.

* posix-io.c (notify_table, _gpgme_io_set_close_notify): Change type of HANDLER to _gpgme_close_notify_handler_t. (_gpgme_io_close): Do not close the FD if handler returns 0. (_gpgme_io_dup): Remove function.

* w32-io.c (notify_table, _gpgme_io_set_close_notify, _gpgme_io_close): Change type of HANDLER to _gpgme_close_notify_handler_t. (_gpgme_io_close): Do not close the FD if handler returns 0. (_gpgme_io_dup): Remove function.

* w32-glib-io.c (_gpgme_io_dup): Remove function. (_gpgme_io_set_close_notify, notify_table): Change type of HANDLER to _gpgme_close_notify_handler_t. (_gpgme_io_close): Do not close the FD if handler returns 0.

* runpgg.c (close_notify_handler): Change return type to int, return 1.

* engine-gpgsm.c (close_notify_handler): Change return type to int, return 0 for status FD and 1 for all other FDs. (start): Do not duplicate the status FD.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am: Replace implicit rule by suffix rule. Add SUFFIXES for that.

2007-07-12 Werner Koch <wk@g10code.com>

* version.c (do_subsystem_inits) [W32]: Make sure that the socket system has been started.

2007-07-10 Marcus Brinkmann <marcus@g10code.de>

* priv-io.h (_gpgme_io_dup): New prototype.
* posix-io.c (_gpgme_io_dup): New function.
* w32-io.c (_gpgme_io_dup): Likewise.
* w32-glib-io.c (_gpgme_io_dup): Likewise.

* engine-gpgsm.c (start): Use `_gpgme_dup()` instead of `dup()`.

2007-07-08

Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c [HAVE_W32_SYSTEM]: Enable the bunch of the file.

* funopen.c (funopen): Rename to `_gpgme_funopen`.

2007-04-30 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Fix error handling for `ttyname_r`.

* runpgg.c (gpg_new): Likewise.

Submitted by Stephen Tether.

2007-02-26 Werner Koch <wk@g10code.com>

* verify.c (op_data_t): New element `PLAINTEXT_SEEN`.

(`_gpgme_verify_status_handler`): Return an error if more than one plaintext has been seen.

(`parse_error`): New arg `SET_STATUS`. Also detect it based on an `ERROR` status (gpg > 1.4.6).

2007-01-26 Werner Koch <wk@g10code.com>

* w32-io.c (build_commandline): Fixed stupid quoting bug.

* w32-glib-io.c (build_commandline): Ditto.

* runpgg.c (gpg_set_locale): Avoid dangling pointer after free.

* gpgme-config.in: New options `--get-gpg` and `--get-gpgsm`.

2007-01-18 Marcus Brinkmann <marcus@g10code.de>

* data.h (`_gpgme_data_get_fd`): Add prototype.

(`gpgme_data_get_fd_cb`):

New type.

(`struct _gpgme_data_cbs`): New member `get_fd`.

* data.c (`_gpgme_data_get_fd`): New function.

* data-fd.c (`fd_get_fd`): New function.

(`fd_cbs`): Add `fd_get_fd`.

* data-stream.c (`stream_get_fd`): New function.

(`stream_cbs`): Add `stream_get_fd`.

* data-mem.c (`mem_cbs`): Add `NULL` for `get_fd` callback.

* data-user.c (`user_cbs`): Likewise.

* engine-gpgsm.c (`gpgsm_set_fd`) [USE_DESCRIPTOR_PASSING]: Try to short-cut by passing the data descriptor directly.

2007-01-17 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (build_commandline): Quote all command line arguments.

* w32-glib-io.c (build_commandline): Likewise.

2007-01-10 Werner Koch <wk@g10code.com>

* ttyname_r.c (ttyname_r) [W32]: Return a dummy name.

2007-01-08 Werner Koch <wk@g10code.com>

* version.c (do_subsystem_inits): Do assuan init only if building with Assuan.

* setenv.c: Include assuan-def.h only if building with Assuan support.

* op-support.c (_gpgme_op_reset): Set LC_MESSAGES only if if defined.

* engine-gpgsm.c (gpgsm_set_locale): Ditto.

* runpgg.c (gpg_set_locale): Ditto.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_set_protocol): Shut down the engine when switching protocols.

(gpgme_ctx_set_engine_info): Likewise for engine info.

* engine.h (_gpgme_engine_reset): New function prototype.

* engine.c (_gpgme_engine_reset): New function.

* engine-backend.h (struct engine_ops): New member RESET.

* runpgg.c (_gpgme_engine_ops_gpg): Add NULL for reset function.

* engine-gpgsm.c (_gpgme_engine_ops_gpgsm)

[USE_DESCRIPTOR_PASSING]: Add gpgsm_reset for reset.

(_gpgme_engine_ops_gpgsm) [!USE_DESCRIPTOR_PASSING]: Add NULL for reset function.

(gpgsm_reset) [USE_DESCRIPTOR_PASSING]: New function.

* op-support.c (_gpgme_op_reset): Try to use the engine's reset function if available.

* engine-gpgsm.c (gpgsm_new): Move code to dup status_fd to ... (start): ... here.

* posix-io.c (_gpgme_io_recvmsg, _gpgme_io_sendmsg): New functions.

*

engine.h (_gpgme_engine_new): Remove arguments lc_ctype and lc_messages from prototype.

(_gpgme_engine_set_locale): New prototype.

* engine.c (_gpgme_engine_set_locale): New function.

* op-support.c (_gpgme_op_reset): Call _gpgme_engine_set_locale.

* engine-backend.h (struct engine_ops): Add new member SET_LOCALE.

Remove arguments `lc_messages` and `lc_ctype` from member `NEW`.
* `engine-gpgsm.c` (struct `engine_gpgsm`): New members `lc_ctype_set` and `lc_messages_set`.
(`gpgsm_new`): Remove `lc_messages` and `lc_ctype` arguments.
(`gpgsm_set_locale`): New function.
(`_gpgme_engine_ops_gpgsm`): Add `gpgsm_set_locale`.
* `runpgg.c` (struct `engine_gpg`): Add new members `lc_messages` and `lc_ctype`.
(`gpg_release`): Release `lc_messages` and `lc_ctype` if set.
(`gpg_new`): Remove `lc_messages` and `lc_ctype` arguments.
(`gpg_set_locale`): New function.
(`_gpgme_engine_ops_gpg`): Add `gpg_set_locale`.
(`add_arg`): Implement in terms of:
(`add_arg_ext`): New function.
(`start`): Set `lc-messages` and `lc-ctype` arguments here.

2006-12-03

Marcus Brinkmann <marcus@g10code.de>

* `engine-gpgsm.c` (struct `engine_gpgsm`): Move members `input_fd_server`, `output_fd_server`, `message_fd_server` to ...
(`iocb_data`): ... here (as `server_fd`).
(`close_notify_handler`): Reset tags as well.
(`gpgsm_new`): Implement support for descriptor passing.
(`fd_type_t`): New type.
(`gpgsm_clear_fd`): New function. Use it instead of `_gpgsm_io_close` for unused communication channels.
(`gpgsm_set_fd`): Rewritten to support descriptor passing. All relevant callers adjusted as well (previously of `_gpgme_io_close`).

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

* `version.c`: Include "assuan.h".
(`do_subsystem_inits`): Call `assuan_set_assuan_err_source`.

2006-12-01 Marcus Brinkmann <marcus@g10code.de>

* `Makefile.am` (`libpggme_real_la_SOURCES`): Rename to `main_sources`.
(`libpggme_la_SOURCES`, `libpggme_pthread_la_SOURCES`, `libpggme_glib_la_SOURCES`, `libpggme_pth_la_SOURCES`): Add `$(main_sources)`.
(`libpggme_la_DEPENDENCIES`, `libpggme_la_LIBADD`, `libpggme_pthread_la_DEPENDENCIES`, `libpggme_pthread_la_LIBADD`, `libpggme_pth_la_DEPENDENCIES`, `libpggme_pth_la_LIBADD`, `libpggme_glib_la_DEPENDENCIES`, `libpggme_glib_la_LIBADD`): Remove

libpgpme-real.la.

(noinst_LTLIBRARIES): Removed.

(libpgpme_glib_la_CFLAGS, libpgpme_pth_la_CFLAGS): Removed.

(AM_CFLAGS): New variable.

2006-11-30 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Replace AssuanError with gpg_error_t and ASSUAN_CONTEXT with assuan_context_t.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Check return value of assuan_pipe_connect.

* runpg.c: Include <unistd.h>.

(gpg_new): Support --display, --ttyname, --ttytype, --lc-ctype and --lc-messages. Fixes issue 734.

2006-10-24 Marcus Brinkmann <marcus@g10code.de>

* trustlist.c (gpgme_op_trustlist_next): Return error if OPD is NULL.

2006-10-23 Marcus Brinkmann <marcus@g10code.de>

* wait-global.c (gpgme_wait): Unlock CTX_LIST_LOCK while calling _gpgme_engine_io_event().

*

keylist.c (gpgme_op_keylist_next): Return error if OPD is NULL.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c (gpgme_data_release_and_get_mem): Release the data object properly.

2006-09-22 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (keylist_colon_handler): Move debug output after initialising KEY.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in (Options): Add NETLIBS.

* Makefile.am (libpgpme_la_LIBADD, libpgpme_pthread_la_LIBADD, libpgpme_pth_la_LIBADD, libpgpme_glib_la_LIBADD): Add NETLIBS.

* `rungpg.c` (`read_status`): Fix comparison disguising as an assignment.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

* `gpgme.c` (`gpgme_set_locale`): Remove conditional on `HAVE_W32_SYSTEM`, and just check for `LC_MESSAGES`.

2006-07-16 Marcus Brinkmann <marcus@g10code.de>

* `rungpg.c` (`read_status`): Strip potential carriage return.
* `genkey.c` (`get_key_parameter`): Skip potential carriage return.
* `version.c` (`_gpgme_get_program_version`):
Strip potential carriage
return.

* `data.c` (`gpgme_data_set_file_name`): Allow to clear the file name by passing `NULL`.

2006-06-22 Marcus Brinkmann <marcus@g10code.de>

* `keylist.c` (`gpgme_get_key`): Also clone the engine info.

2006-03-06 Marcus Brinkmann <marcus@g10code.de>

* `gpgme-config.in` (`cflags_pth`): Revert accidental removal of `pthread` support with last change.

2006-02-28 Marcus Brinkmann <marcus@g10code.de>

* `w32-glib-io.c` (`O_BINARY`) [`!O_BINARY`]: New macro.
(`_gpgme_io_pipe`): Open pipes in binary mode.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

* `engine.c` (`gpgme_engine_check_version`): Reimplemented to allow checking the version correctly even after changing the engine information. Bug reported by Stphane Corthsy.

* `rungpg.c` (`read_colon_line`): Invoke colon preprocess handler if it is set.

(`colon_preprocessor_t`): New type.
(`struct engine_gpg`): New member `colon.preprocess_fnc`.
(`gpg_keylist_preprocess`): New function.
* `keylist.c`
(`keylist_colon_handler`): Allow short key IDs.

2006-02-15 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (create_writer): Make C->have_data a manually reset event.
(writer): Move code from end of if block to beginning, so it is also run the first time.
(_gpgme_io_write): Move assert check after error check. Reset the is_empty event, and also do it eagerly.
(_gpgme_io_select): Unconditionally wait for the is_empty event.

2006-01-26 Werner Koch <wk@g10code.com>

* w32-util.c (_gpgme_get_conf_int): New.
* posix-util.c (_gpgme_get_conf_int): New.
* w32-io.c (get_desired_thread_priority): New.
(create_reader, create_writer): Use it here.

2006-01-04 Werner Koch <wk@g10code.com>

* debug.h (_gpgme_debug_srcname): New. Use it with the debug macros.

* w32-glib-io.c (_gpgme_io_set_nonblocking): Add debug statements. Disable error return for failed nonblocking call.

2006-01-03 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_close): Only close fd if there is no channel for it.

2005-12-31 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c (find_channel): Set channel to unbuffered.
(_gpgme_io_select): Fix debug output.

2005-12-23 Werner Koch <wk@g10code.com>

* gpgme.h (struct _gpgme_signature): Append field PKA_ADDRESS.
* verify.c (release_op_data, _gpgme_verify_status_handler): Set this field.

2005-12-20 Werner Koch <wk@g10code.com>

* gpgme.h (gpgme_status_code_t): Added GPGME_STATUS_PKA_TRUST_BAD and GPGME_STATUS_PKA_TRUST_GOOD.
(struct _gpgme_signature): New field pka_trust.
* verify.c (_gpgme_verify_status_handler): Set pka_trust.

2005-12-06 Werner Koch <wk@g10code.com>

* keylist.c (keylist_colon_handler): Store fingerprints of the subkeys. Reset the secret flag of subkeys for stub secret keys.
(NR_FIELDS): Bumped up to 16

2005-11-27 Marcus Brinkmann <marcus@g10code.de>

* engine.c (_gpgme_set_engine_info): Use new_file_name in engine_get_version invocation. Reported by Stphane Corthsy.

2005-11-24

Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_fd2str): Remove debug printf.

2005-11-18 Werner Koch <wk@g10code.com>

* w32-glib-io.c: Include glib.h before windows to avoid a symbol shadowing warning.
(find_channel): Better use g_io_channel_win32_new_fd instead of the autodetection function g_io_channel_unix_new.
(_gpgme_io_select): Rewritten. It is now a fully working select implementation.

2005-11-18 Marcus Brinkmann <marcus@g10code.de>

* priv-io.h (_gpgme_io_fd2str): New prototype.
* posix-io.c (_gpgme_io_fd2str): New function.
* w32-io.c (_gpgme_io_fd2str): New function.
* runpgg.c: Use this new function.
* w32-glib-io.c (_gpgme_io_fd2str): Rewrote the file handle code again. Two's company, three's the musketeers.

* w32-glib-io.c: Rewrote the file handle code. We don't create system fds for every handle (doesn't work for inherited handles), but we create pseudo fds in a private namespace that designate a handle and potentially a giochannel.

2005-11-18 Werner Koch <wk@g10code.com>

* versioninfo.rc.in: Set file version to LT-version + Svn-revision.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c: New file.
* gpgme.def (gpgme_get_giochannel): Add symbol.
* Makefile.am (system_components) [HAVE_DOSISH_SYSTEM]: Remove

w32-io.c.

(ltlib_gpgme_extra): New variable.

(lib_LTLIBRARIES): Add \$(ltlib_gpgme_extra).

(system_components_not_extra): New variable.

(libgpgme_la_SOURCES, libgpgme_pthread_la_SOURCES,

libgpgme_pth_la_SOURCES): Add \$(system_components_not_extra).

(libgpgme_glib_la_LDFLAGS, libgpgme_glib_la_DEPENDENCIES,

libgpgme_glib_la_LIBADD, libgpgme_glib_la_CFLAGS)

[BUILD_W32_GLIB]: New variables.

* gpgme-config.in (glib): New option.

* gpgme.m4 (AM_PATH_GPGME_GLIB): New macro.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* priv-io.h (_gpgme_io_waitpid, _gpgme_io_kill): Removed.

* w32-io.c (_gpgme_io_waitpid, _gpgme_io_kill): Removed.

* posix-io.c (_gpgme_io_kill):

Removed.

(_gpgme_io_waitpid): Declare static.

2005-10-24 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (_gpgme_io_spawn): Don't minimize window, hide it.

2005-10-21 Werner Koch <wk@g10code.com>

* Makefile.am: Fixed cut+paste problem

2005-10-20 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am: Build versioninfo.lo, not versioninfo.o. Also, fix the whole mess.

2005-10-16 Marcus Brinkmann <marcus@g10code.de>

* runpg.c (gpg_edit): Don't add a key argument if in card edit mode.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgme.dll gpgme.dll.a): Use \$(srcdir) for gpgme.def.

* gpgme.h (gpgme_free): New prototype.

* data-mem.c (gpgme_free): New function.

* libgpgme.vers (GPGME_1.1): Add gpgme_free.

* gpgme.def: Add gpgme_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

- * util.h (_gpgme_decode_percent_string): Add new argument BINARY to prototype.
- * verify.c (parse_notation): Likewise for invocation.
- * conversion.c (_gpgme_decode_percent_string):
Likewise to
declaration. If set, do not replace '\0' characters with a
printable string.
- * gpgme.h (struct _gpgme_key_sig): New field notations.
- * ops.h (_gpgme_parse_notation): New prototype.
- * sig-notation.c (_gpgme_parse_notation): New function.
- * key.c (gpgme_key_unref): Free all signature notations.
- * keylist.c (op_data_t): New member tmp_keysig.
(finish_key): Clear OPD->tmp_keysig.
- * gpgme.c (gpgme_set_keylist_mode): Remove check.
- * runpgp.c (gpg_keylist): Support listing signature notations.
(gpg_keylist_ext): Likewise.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

- * engine.h (_gpgme_set_engine_info): Add prototype.
- * engine-backend.h (struct engine_ops): Change return type of
get_file_name() to const char * to silence gcc warning.
- * engine.c (engine_get_file_name): Change return type to const
char * to silence gcc warning.
(gpgme_get_engine_info): Use transitional variable to go from
const char * to char * to silence gcc warning.
(_gpgme_set_engine_info):
Likewise.
- * engine-gpgsm.c (struct engine_gpgsm): Change type of LINE to
char * to silence gcc warning.
(gpgsm_new): Make ARGV a pointer to const char.
(status_handler): Change type of SRC, END, DST, ALINE and NEWLINE
to char * to silence gcc warning.

- * gpgme.def: Add gpgme_data_set_file_name,
gpgme_data_get_file_name, gpgme_sig_notation_clear,
gpgme_sig_notation_add and gpgme_sig_notation_get.
- * libgpgme.vers: Add gpgme_sig_notation_clear,
gpgme_sig_notation_add and gpgme_sig_notation_get.
- * Makefile.am (libgpgme_real_la_SOURCES): Add sig-notation.c.
- * context.h (struct gpgme_context): New field sig_notations.
- * gpgme.h (struct _gpgme_sig_notation): New member value_len and
critical.
(GPGME_SIG_NOTATION_CRITICAL): New symbol.
(gpgme_sig_notation_flags_t): New type.
(gpgme_sig_notation_add, gpgme_sig_notation_clear,

gpgme_sig_notation_get): New prototypes.
* ops.h (_gpgme_sig_notation_create, _gpgme_sig_notation_free):
New prototypes.
*
sig-notation.c (_gpgme_sig_notation_free): New file.
* verify.c (parse_notation): Use support functions.
(release_op_data): Likewise.
* runpgg.c (append_args_from_sig_notations): New function.
(gpg_encrypt_sign, gpg_sign): Call it.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

* data.h (struct gpgme_data): New member file_name.
* data.c (gpgme_data_set_filename): New function.
(_gpgme_data_release): Free DH->filename if necessary.
(gpgme_data_get_filename): New function.
* runpgg.c (gpg_encrypt): Set filename option.
(gpg_encrypt_sign): Likewise.
(gpg_sign): Likewise.
* libgpgme.vers (GPGME_1.1): Add gpgme_data_set_file_name and
gpgme_data_get_file_name.

* decrypt.c, verify.c, gpgme.h: Replace plaintext_filename with
file_name.

2005-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_key): Add field is_qualified.
(struct _gpgme_subkey): Likewise.
* keylist.c (set_subkey_capability, set_mainkey_capability): Set
field is_qualified.

2005-09-23

Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_pipe): Removed use of environment variable
again.
(create_reader, create_writer): Set thread priority higher.

2005-09-19 Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_pipe): New environment variable to change
the size of the pipe buffer.

2005-09-13 Werner Koch <wk@g10code.com>

* ath.c: Changes to make it work under W32.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

- * Makefile.am (libpggme_la_SOURCES): Set to ath.h and ath.c.
- (ath_pth_src, ath_pthread_src): Removed.
- (w32_o_files): Replace ath-compat.o with ath.o.
- (libpggme_pth_la_CFLAGS): New variable.
- * ath-compat.c, ath-pthread-compat.c, ath-pth-compat.c: Removed.
- * ath.h (ath_pthread_available, ath_pth_available): Removed.
- (ath_init) [!_ATH_EXT_SYM_PREFIX]: Do not define macro.
- (struct ath_ops, ath_init) [_ATH_COMPAT]: Removed.
- (_ATH_COMPAT): Macro removed.
- * posix-sema.c (_gpgme_sema_subsystem_init): Do not call _gpgme_ath_init.

2005-09-12

Marcus Brinkmann <marcus@g10code.de>

- * keylist.c (release_op_data): Do not free opd->tmp_uid.

2005-09-07 Werner Koch <wk@g10code.com>

- * w32-io.c (build_commandline): Quote argv[0].

2005-08-26 Marcus Brinkmann <marcus@g10code.de>

- * runpgg.c (command_handler): Use _gpgme_io_write instead of write.
- * edit.c (command_handler): Do not depend on PROCESSED being available.
- * engine.h (engine_command_handler_t): Add new argument processed.
- * ops.h (_gpgme_passphrase_command_handler_internal): Rename prototype to ...
- (_gpgme_passphrase_command_handler): ... this one.
- * passphrase.c (_gpgme_passphrase_command_handler_internal): Rename to ...
- (_gpgme_passphrase_command_handler): ... this one.
- * edit.c (command_handler): Add new argument processed. Remove local variable with the same name. Always return processed as true.
- * runpgg.c (command_handler): Send a newline character if the handler did not.

2005-08-26 Werner Koch <wk@g10code.com>

- * w32-util.c (read_w32_registry_string): Updated from code used by GnuPG. This allows for expanding strings and features the

implicit fallback key.

(w32_shgetfolderpath, find_program_at_standard_place): New.

(_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): With no registry entry, locate the programs at the standard place.

(dlopen, dlsym, dlclose): New, so that we can keep on using what we are accustomed to.

* debug.c (debug_init): Use PATHSEP_C so that under W32 a semicolon is used which allows us to create files with drive letters.

* w32-io.c (_gpgme_io_read, _gpgme_io_write): Print content in debug mode too.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_status_code_t): Add GPGME_STATUS_PLAINTEXT.

(struct _gpgme_op_decrypt_result): New member plaintext_filename.

(struct _gpgme_op_verify_result): Likewise.

* ops.h (_gpgme_parse_plaintext): Add prototype.

* op-support.c (_gpgme_parse_plaintext): New function.

* decrypt.c (release_op_data): Release

OPD->result.plaintext_filename.

(_gpgme_decrypt_status_handler):

Handle GPGME_STATUS_PLAINTEXT.

* verify.c (release_op_data): Release

OPD->result.plaintext_filename.

(_gpgme_verify_status_handler): Handle GPGME_STATUS_PLAINTEXT.

2005-08-08 Werner Koch <wk@g10code.com>

* util.h (stpcpy): Renamed to ..

(_gpgme_stpcpy): .. this and made inline. This avoids duplicate definitions when linking statically.

* stpcpy.c: Removed.

2005-08-19 Werner Koch <wk@g10code.com>

* gpgme.def: New.

* versioninfo.rc.in: New.

* Makefile.am: Adds support for building a W32 DLL.

* ttyname_r.c (ttyname_r) [W32]: Return error.

* ath-compat.c [W32]: select and co are not yet supported; return error.

* data-stream.c (stream_seek): Use ftell if ftello is not available.

2005-07-26 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (gpgme_get_key): Allow key IDs.

2005-06-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.m4: Only call GPGME_CONFIG if found.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

*

gpgme.h (struct _gpgme_signature): New members pubkey_algo and hash_algo.

* verify.c (parse_valid_sig): Parse pubkey and hash algo numbers.

(parse_new_sig): Parse pubkey, hash algo and timestamp for ERRSIG.

(_gpgme_decrypt_status_handler): Fix last change.

* gpgme.h (struct _gpgme_recipient): New structure.

(gpgme_recipient_t): New type.

(struct _gpgme_op_decrypt_result): Add member recipients.

* decrypt.c (op_data_t): New member last_recipient_p.

(_gpgme_op_decrypt_init_result): Initialize last_recipient_p.

(parse_enc_to): New function.

(_gpgme_decrypt_status_handler): Handle status ENC_TO and NO_SECKEY.

* wait-global.c (gpgme_wait): Break out of the fd processing loop after an error.

Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-06-02 Marcus Brinkmann <marcus@g10code.de>

* wait.h (_gpgme_run_io_cb): New prototype.

* wait.c (_gpgme_run_io_cb): New function.

* wait-global.c (gpgme_wait): Call it.

* wait-user.c (_gpgme_user_io_cb_handler): Likewise.

*

wait-private.c (_gpgme_wait_on_condition): Likewise.

2005-06-02 Werner Koch <wk@g10code.com>

* passphrase.c (_gpgme_passphrase_status_handler): Take care of GPGME_STATUS_NEED_PASSPHRASE_PIN.

(_gpgme_passphrase_command_handler_internal): Also act on the key "passphrase.pin.ask".

* gpgme.h: Added status codes GPGME_STATUS_SIG_SUBPACKET, GPGME_STATUS_NEED_PASSPHRASE_PIN, GPGME_STATUS_SC_OP_FAILURE,

GPGME_STATUS_SC_OP_SUCCESS, GPGME_STATUS_CARDCTRL,
GPGME_STATUS_BACKUP_KEY_CREATED.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* data-user.c: Include <errno.h>.

2005-05-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_new): Set the CTX->include_certs default to the default.

2005-05-11 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (_gpgme_io_select): Fix loop increment.

2005-05-05 Marcus Brinkmann <marcus@g10code.de>

* data-user.c (user_release): Only call user hook if provided.
(user_seek): Return EBADF if no user hook is provided.
(user_read):
Likewise.
(user_write): Likewise.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (GPGME_INCLUDE_CERTS_DEFAULT): New macro.
* engine-gpgsm.c (gpgsm_sign): Send the include-certs option after the reset, just for cleanliness, and do not sent it at all if the default is requested.
* gpgme.c (gpgme_set_include_certs): Allow to use GPGME_INCLUDE_CERTS_DEFAULT.

2005-04-21 Werner Koch <wk@g10code.com>

* verify.c (calc_sig_summary): Set the key revoked bit.

2005-04-14 Marcus Brinkmann <marcus@g10code.de>

* wait-global.c (gpgme_wait): Use LI->ctx when checking a context in the list, not the user-provided CTX.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

* wait-global.c (gpgme_wait): If no context is found, and we should not hang, set *status to 0 and return NULL.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

* data.h (EOPNOTSUPP) [_WIN32]: Remove definition.
* data.c (EOPNOTSUPP) [HAVE_W32_SYSTEM]:
Remove definition.
(gpgme_data_read, gpgme_data_write, gpgme_data_seek): Return
ENOSYS instead EOPNOTSUPP.
* data-compat.c (EOPNOTSUPP) [HAVE_W32_SYSTEM]: Remove definition.
(gpgme_error_to_errno): Map GPG_ERR_NOT_SUPPORTED
to ENOSYS.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

* io.h: Rename to ...
* priv-io.h: ... this.
* Makefile.am (libgpgme_real_la_SOURCES): Change io.h to priv-io.h.
* data.c, engine-gpgsm.c, posix-io.c, runpgg.c, version.c,
w32-io.c, wait-private.c, wait-global.c, wait-user.c, wait.c:
Change all includes of "io.h" to "priv-io.h"

2005-03-09 Werner Koch <wk@g10code.com>

* w32-util.c (_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): Do not
cast away type checks.

* io.h [W32]: Do not include stdio.h. If it is needed do it at
the right place.

* data.h [W32]: Removed kludge for EOPNOTSUP.
* data.c, data-compat.c [W32]: Explicitly test for it here.

Replaced use of _WIN32 by HAVE_W32_SYSTEM except for public header
files.

2005-03-07

Timo Schulz <twoaday@g10code.de>

* gpgme.h: [_WIN32] Removed ssize_t typedef.
* ath.h: [_WIN32] Added some (dummy) types.
* io.h: [_WIN32] include stdio.h.
* data.h: [_WIN32] Define EOPNOTSUPP.
* w32-io.c [_WIN32] (_gpgme_io_subsystem_init): New.
* gpgme.c [_WIN32] (gpgme_set_locale): Disabled.

2004-12-12 Marcus Brinkmann <marcus@g10code.de>

* engine.c (_gpgme_set_engine_info): Fix assertion.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

* util.h [HAVE_CONFIG_H && HAVE_TTYNAME_R] (ttyname_r): Define prototype.
* ttyname_r.c: New file.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* putc_unlocked.c, funopen.c: I just claim copyright on these files and change their license to LGPL, because they are totally trivial wrapper functions.
* isascii.c: Change copyright notice to the one from ctype/ctype.h in the GNU C Library (CVS Head 2004-10-10), where isascii is defined as a macro doing exactly the same as the function in this file.
* memrchr.c: Update from the GNU C Library (CVS Head 2001-07-06).
* stpcpy.c: Update from the GNU C Library (CVS Head 2004-10-10).
* ath.c, ath-compat.c, ath.h, ath-pth.c, ath-pth-compat.c, ath-pthread.c, ath-pthread-compat.c, context.h, conversion.c, data.c, data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c, data-user.c, debug.c, debug.h, decrypt.c, decrypt-verify.c, delete.c, edit.c, encrypt.c, encrypt-sign.c, engine-backend.h, engine.c, engine-gpgsm.c, engine.h, error.c, export.c, genkey.c, get-env.c, gpgme.c, gpgme.h, import.c, io.h, key.c, keylist.c, mkstatus, Makefile.am, ops.h, op-support.c, passphrase.c, posix-io.c, posix-sema.c, posix-util.c, progress.c, runpg.c, sema.h, sign.c, signers.c, trust-item.c, trustlist.c, util.h, verify.c, version.c, w32-io.c, w32-sema.c, w32-util.c, wait.c, wait-global.c, wait.h, wait-private.c, wait-user.c: Change license to LGPL.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* libgpgme.vers
(GPGME_1.1): New version.
* engine-backend.h (struct engine_ops): Add argument FILE_NAME to member get_version(). Add arguments FILE_NAME and HOME_DIR to member new(). Change return type of get_file_name and get_version to char *.
* engine-gpgsm.c (gpgsm_get_version): Change return type to char pointer. Do not cache result.
(gpgsm_new): Add file_name and home_dir argument, and use them instead of the defaults, if set.
* runpg.c (struct engine_gpg): New member file_name.
(gpg_get_version): Change return type to char pointer, and do not cache result.
(gpg_release): Free gpg->file_name.
(gpg_new): Take new arguments file_name and home_dir. Set the

--homedir argument if HOME_DIR is not NULL. Set gpg->file_name.
(start): Use gpg->file_name instead _gpgme_get_gpg_path, if set.
* engine.h (_gpgme_engine_info_copy, _gpgme_engine_info_release):
New prototypes.
(_gpgme_engine_new): Change first argument to gpgme_engine_info_t
info.
* engine.c: Include <assert.h>.
(gpgme_get_engine_info):
Set *INFO within the lock. Move
ENGINE_INFO and ENGINE_INFO_LOCK to
(engine_info, engine_info_lock): ... here. New static variables.
(engine_get_version): Add file_name argument to
get_version invocation. Change return type to char pointer.
(gpgme_engine_check_version): Rewritten to free() the return value
of engine_get_version after using it.
(_gpgme_engine_info_release): New function.
(gpgme_get_engine_info): Rewritten.
(_gpgme_engine_info_copy): New function.
(_gpgme_set_engine_info): New function.
(gpgme_set_engine_info): New function.
(_gpgme_engine_new): Change first argument to gpgme_engine_info_t
info, and use that.
* gpgme.h (struct _gpgme_engine_info): Change type of file_name
and version to char * (remove the const). New member home_dir.
(gpgme_set_engine_info, gpgme_ctx_get_engine_info,
gpgme_ctx_set_engine_info): New prototypes.
* context.h (struct gpgme_context): New member engine_info.
* gpgme.c (gpgme_new): Allocate CTX->engine_info.
(gpgme_release):
Deallocate CTX->engine_info.
(gpgme_ctx_get_engine_info, gpgme_ctx_set_engine_info): New
functions.
* op-support.c (_gpgme_op_reset): Look for correct engine info and
pass it to _gpgme_engine_new.
* version.c (gpgme_check_version): Adjust to
_gpgme_compare_versions returning an int.
(_gpgme_compare_versions): Return an int value, not a const char
pointer.
* ops.h (_gpgme_compare_versions): Same for prototype.

2004-10-03 Marcus Brinkmann <marcus@g10code.de>

* verify.c (parse_trust): If no reason is provided, set
SIG->validity_reason to 0.
(calc_sig_summary): Set GPGME_SIGSUM_CRL_TOO_OLD if appropriate.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Return 0 if ERR is 0.
(start): Call map_assuan_error on return value of
assuan_write_line.

2004-10-05 Marcus Brinkmann <marcus@g10code.de>

* op-support.c (_gpgme_op_data_lookup): Use char pointer for
pointer arithmetic.

2004-09-30 Marcus Brinkmann
<marcus@g10code.de>

* gpgme.m4: Implement the --api-version check.

* runpg.c (read_status): Move the polling of the output data pipe
to just before removing the command fd, from just before adding
it. This avoids buffering problems.

* data.c (_gpgme_data_inbound_handler): Use _gpgme_io_read, not
read, to improve debug output.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (GPGME_IMPORT_NEW, GPGME_IMPORT_UID, GPGME_IMPORT_SIG,
GPGME_IMPORT_SUBKEY, GPGME_IMPORT_SECRET,
(GPGME_KEYLIST_MODE_LOCAL, GPGME_KEYLIST_MODERN_EXTERN,
GPGME_KEYLIST_MODE_SIGS, GPGME_KEYLIST_MODE_VALIDATE): Change from
enum to macros.

(gpgme_keylist_mode_t): Define as unsigned int.

(gpgme_key_t): Change type of keylist_mode to
gpgme_keylist_mode_t.

2004-09-23 Marcus Brinkmann <marcus@g10code.de>

* data.c (_gpgme_data_outbound_handler): Close the file descriptor
if we get an EPIPE.

* data-stream.c (stream_seek): Call ftello and return the current
offset.

* data.h (struct
gpgme_data): Change type of data.mem.offset to
off_t.

* data.c (gpgme_data_seek): Check dh->cbs->seek callback, not read
callback. If SEEK_CUR, adjust the offset by the pending buffer
size. Clear pending buffer on success.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.m4: Add copyright notice.

2004-08-18 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c (`_gpgme_passphrase_status_handler`): Always run the status handler.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

* `runpgp.c` (`build_argv`): Use `--no-sk-comment`, not `--no-comment`.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

* `key.c` (`_gpgme_key_append_name`): Make sure tail points to the byte following the uid.
(`_gpgme_key_add_sig`): Likewise. Don't use `calloc`, but `malloc` and `memset`.

2004-06-02 Marcus Brinkmann <marcus@g10code.de>

* `libpgpgme.vers`: Remove C-style comment, which is not supported by older `binutils`.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

* `gpgme-config.in` (Options):
Support `--api-version`.

* `libpgpgme.vers`: List all `gpgme` symbols under version `GPGME_1.0`.

* `decrypt.c` (`_gpgme_decrypt_status_handler`): Fix last change.

* `verify.c` (`parse_error`): Likewise.

* `verify.c` (`parse_error`): Do not skip location of where token.

* `gpgme.h` (`gpgme_status_code_t`): Add `GPGME_STATUS_REVKEYSIG`.

* `verify.c` (`_gpgme_verify_status_handler`): Add handling of `GPGME_STATUS_REVKEYSIG`.
(`parse_trust`): Likewise.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

* `gpgme.h` (`struct _gpgme_decrypt_result`): New fields `wrong_key_usage` and `_unused`.

* `decrypt.c` (`_gpgme_decrypt_status_handler`): Don't skip over character after a matched string, as in a protocol error this could skip over the trailing binary zero.

Handle decrypt.keyusage error notifications.

- * gpgme.h (struct _gpgme_key): New member keylist_mode.
- * keylist.c (keylist_colon_handler): Set the keylist_mode of KEY.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_signature):
Change member WRONG_KEY_USAGE
to unsigned int. Same for member _unused.

- * keylist.c (set_mainkey_trust_info): Rewritten.
- (set_subkey_capability): Handle 'd' (disabled).
- (set_mainkey_capability): Rewritten.

2004-04-22 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.m4: Quote first argument to AC_DEFUN.

2004-04-21 Werner Koch <wk@gnupg.org>

- * key.c (gpgme_key_unref): Allow passing NULL like free does.
The rule of least surprise.

2004-04-15 Werner Koch <wk@gnupg.org>

- * verify.c (prepare_new_sig, _gpgme_verify_status_handler): Remove
unused result.signatures items.

- * keylist.c (gpgme_get_key): Return an error if FPR is NULL.

2004-04-08 Werner Koch <wk@gnupg.org>

- * verify.c (_gpgme_verify_status_handler): Ignore the error status
if we can't process it.
- * decrypt-verify.c (decrypt_verify_status_handler): Backed out
yesterday's hack. It is not any longer required.

2004-04-07 Werner Koch <wk@gnupg.org>

- * decrypt-verify.c (decrypt_verify_status_handler):
Hack to cope
with meaningless error codes from the verify status function.

2004-04-05 Werner Koch <wk@gnupg.org>

- * gpgme.h: Add GPGME_STATUS_NEWSIG.

* verify.c (parse_error): Compare only the last part of the where token.

(prepare_new_sig): New.

(parse_new_sig): Use prepare_new_sig when required.

(_gpgme_verify_status_handler): Handle STATUS_NEWSIG.

* engine-gpgsm.c (gpgsm_keylist_ext): Send with-validation option. Fixed pattern construction.

(status_handler): Add debugging output.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Protect _only_ tty related code with isatty(). Submitted by Bernhard Herzog.

2004-03-11 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Protect all tty related code with isatty().

* runpgp.c (gpg_cancel): Set GPG->fd_data_map to NULL after releasing it.

* engine-gpgsm.c (gpgsm_cancel): Only call assuan_disconnect if GPGSM->assuan_ctx is not NULL. Set it to NULL afterwards.

2004-03-07

Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in: Do not emit include and lib directory for prefix "/usr" or "".

2004-03-03 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (gpgsm_export_ext): Properly insert a space between patterns.

2004-02-18 Werner Koch <wk@gnupg.org>

* gpgme-config.in: Ignore setting of --prefix.

2004-02-25 Marcus Brinkmann <marcus@g10code.de>

* runpgp.c (gpg_cancel): New function.

(gpg_release): Call it here.

(_gpgme_engine_ops_gpg): Add it here.

* engine-gpgsm.c (gpgsm_cancel): Fix last change.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.c (gpgme_cancel): New function.
- * engine-backend.h (struct engine_ops): New member cancel.
- * engine.h (_gpgme_engine_cancel): New prototype.
- * engine.c (_gpgme_engine_cancel): New function.
- * engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Add new member cancel. (gpgsm_cancel): New function. (gpgsm_release): Use it.
- * runpg.c (_gpgme_engine_ops_gpg): Add new member cancel.

2004-02-17

Werner Koch <wk@gnupg.org>

- * gpgme.h: Add GPGME_KEYLIST_MODE_VALIDATE.
- * engine-gpgsm.c (gpgsm_keylist): Send this to gpgsm.

2004-02-15 Werner Koch <wk@gnupg.org>

- * memchr.c (memchr): Fixed implementation. Problem pointed out by Adriaan de Groot.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

- * runpg.c (build_argv): Use --no-comment, not --comment "".
- * data-compat.c (gpgme_data_new_from_filepart): Call fseeko if available.
- * data-stream.c (stream_seek): Likewise.

2004-01-16 Werner Koch <wk@gnupg.org>

- * conversion.c (_gpgme_map_gnupg_error): Handle numerical codes as used by GnuPG 1.9.x

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h (struct _gpgme_key_sig): Fix comment on REVOKED.

2004-01-12 Werner Koch <wk@gnupg.org>

- * sign.c: Include util.h for prototype of _gpgme_parse_timestamp.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h (_GPGME_D_CLASS): Revert this change. (struct _gpgme_key_sig): For C++ compilers, rename class member to _obsolete_class. Add new member sig_class.

(struct _gpgme_new_signature): Same here.

* key.c (gpgme_key_sig_get_ulong_attr): Use CERTSIG->sig_class, not CERTSIG->class.

* keylist.c (keylist_colon_handler): Likewise for KEYSIG, but keep setting KEYSIG->class, too. Rename variable CLASS to SIG_CLASS.

* sign.c (parse_sig_created): Set SIG->sig_class.

2003-12-22 Werner Koch <wk@gnupg.org>

* gpgme.h (_GPGME_D_CLASS): Kludge for C++ compatibility without changing the C API.

2003-11-19 Werner Koch <wk@gnupg.org>

* conversion.c (_gpgme_parse_timestamp): New.

(atoi_1, atoi_2, atoi_4): New.

* keylist.c (parse_timestamp): Removed. Changed all callers to use the new function.

* verify.c (parse_valid_sig): Ditto. Repalced the errno check.

* sign.c (parse_sig_created): Ditto.

2003-10-31 Werner Koch <wk@gnupg.org>

* keylist.c (parse_timestamp): Detect ISO 8601 timestamps and try to convert them.

2003-10-10 Marcus Brinkmann <marcus@g10code.de>

*

genkey.c (get_key_parameter): Make a copy of the key parameters. Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

* data-compat.c: Include <sys/time.h> before <sys/stat.h> for broken systems.

* engine-gpgsm.c (map_assuan_error): If ERR is -1, return sensible error.

* io.h (_gpgme_io_subsystem_init): New prototype.

* posix-io.c (_gpgme_io_subsystem_init): Add function.

(_gpgme_io_spawn): Do not fixup signal handler here.

* version.c (do_subsystem_inits): Call _gpgme_io_subsystem_init.

* debug.c (debug_init): Drop const qualifier from E.

* ath.h (struct ath_ops): Make ADDR argument of CONNECT prototype

const.
(ath_connect): Make ADDR argument const.
* ath-pthread.c (ath_connect): Likewise.
* ath-pth.c (ath_connect): Likewise.
* ath-compatible.c (ath_connect): Likewise.
* ath.c (ath_connect): Likewise.

* ath.h [HAVE_SYS_SELECT_H]: Include <sys/select.h> for fd_set.
[!HAVE_SYS_SELECT_H]: Include <sys/time.h>.

*
conversion.c (_gpgme_hextobyte): Drop "unsigned" from type of SRC argument.
* util.h (_gpgme_hextobyte): Likewise for prototype.

* gpgme.h: Remove trailing comma in enum.

* runpgg.c: Do not include <time.h>, <sys/time.h>, <sys/types.h>, <signal.h>, <fcntl.h>, or "unistd.h".

2003-10-02 Marcus Brinkmann <marcus@g10code.de>

* engine-backend.h (struct engine_ops): Add argument TYPE.
* engine.c (_gpgme_engine_op_edit): Likewise.
* engine.h: Likewise.
* runpgg.c (gpg_edit): Likewise. Use it.
* edit.c (edit_start): Likewise. Pass it on.
(gpgme_op_edit_start, gpgme_op_edit): Likewise.
(gpgme_op_card_edit_start, gpgme_op_card_edit): New functions.

2003-09-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpg_strerror_r): Change prototype to match gpg_strerror_r change.
* error.c (gpg_strerror_r): Likewise, also update implementation.

* gpgme.c (gpgme_hash_algo_name): Change name of RMD160 to RIPEMD160, name of TIGER to TIGER192, name of CRC32-RFC1510 to CRC32RFC1510,
and name of CRC24-RFC2440 to CRC24RFC2440.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_set_locale.

* gpgme.h: Define macro _GPGME_INLINE depending on the compiler characteristics and use that instead __inline__.

- * context.h (struct gpgme_context): New members lc_ctype and lc_messages.
- * gpgme.c: Include <locale.h>.
- (def_lc_lock, def_lc_ctype, def_lc_messages): New static variables.
- (gpgme_set_locale): New function.
- * engine.c (_gpgme_engine_new): Add arguments lc_ctype and lc_messages.
- * engine.h (_gpgme_engine_new): Likewise.
- * engine-gpgsm.c (gpgsm_new): Likewise.
- * runpgg.c (gpg_new): Likewise.
- * engine-backend.h (struct engine_ops): Likewise to NEW.
- * op-support.c (_gpgme_op_reset): Likewise to invocation of _gpgme_engine_new.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h (gpgme_strerror_r): New prototype.
- * error.c (gpgme_strerror_r): New function.

- * get-env.c: New file.
- * util.h (_gpgme_getenv):
Add prototype.
- * Makefile.am (libgpgme_real_la_SOURCES): Add get-env.c.
- * runpgg.c (build_argv): Use _gpgme_getenv.
- * debug.c (debug_init): Likewise.
- * engine-gpgsm.c (gpgsm_new): Likewise.
(gpgsm_new): Use ttyname_r.
- * w32-io.c (_gpgme_io_spawn): Disable debugging for now.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

- * gpgme-config.in: Use \$libdir, not @libdir@, for the echo command.

- * gpgme-config.in: Rewritten.
- * gpgme.m4: Rewritten.

2003-08-19 Marcus Brinkmann <marcus@g10code.de>

The ath files (ath.h, ath.c, ath-pth.c, ath-pthread.c, ath-compat.c, ath-pth-compat.c and ath-pthread-compat.c) have been updated to have better thread support, and the Makefile.am was changed to reflect that.

- * util.h [!HAVE_FOPENCOOKIE]: Remove fopencookie declaration.
- * engine-gpgsm.c (gpgsm_assuan_simple_command): Set ERR to return value of status_fnc.

* `runpgg.c` (start): Return `SAVED_ERRNO`, not `errno`.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* `runpgg.c` (start):

Use `saved_errno` instead `errno`.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* `funopen.c`, `putc_unlocked.c`, `isascii.c`, `memchr.c`: New files.

* `fopencookie.c`: File removed.

2003-08-15 Marcus Brinkmann <marcus@g10code.de>

* `gpgme-config.in`: Put `gpg-error` related flags after `gpgme`'s.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* `gpgme.h` (struct `_gpgme_new_signature`): Rename member `CLASS` to `_OBSOLETE_CLASS`, add member `CLASS` with type `unsigned int`.

* `sign.c` (`parse_sig_created`): Also set `SIG->unused_class` for backward compatibility.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

* `verify.c` (`parse_new_sig`): Fix status parsing case.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* `gpgme.h` (struct `_gpgme_subkey`): Add flag `CAN_AUTHENTICATE`.

Lower `_UNUSED` to 23 bits.

(struct `_gpgme_key`): Likewise.

* `keylist.c` (`set_mainkey_capability`): Support 'a' and 'A'.

(`set_subkey_capability`): Support 'a'.

* `keylist.c` (`gpgme_get_key`): Check if there is more than one key

listed, and return `GPG_ERR_AMBIGUOUS_NAME` in that case.

* `util.h` (`_gpgme_decode_c_string`): Change type of `LEN` argument to `size_t`.

(`_gpgme_decode_percent_string`): Likewise.

* `conversion.c` (`_gpgme_decode_c_string`): Likewise.

(`_gpgme_decode_percent_string`): Likewise.

(`_gpgme_map_gnupg_error`): Change type of `I` to `unsigned int`.

* `signers.c` (`gpgme_signers_clear`): Likewise.

(`gpgme_signers_enum`): New `unsigned` variable `SEQNO`, set to `SEQ`.

Use `SEQNO` instead `SEQ`.

* wait.c (fd_table_put): Change type of I and J to unsigned int.
* wait-global.c (_gpgme_wait_global_event_cb): Change type of IDX to unsigned int.
(gpgme_wait): Change type of I and IDX to unsigned int.
* wait-private.c (_gpgme_wait_on_condition): Change type of IDX and I to unsigned int.
* posix-io.c (_gpgme_io_close): Cast return value of macro DIM to int to suppress gcc warning.
(_gpgme_io_set_close_notify): Likewise.
(_gpgme_io_select): Change type of I to unsigned int.
* engine.c (gpgme_get_engine_info):
Change type of PROTO to unsigned int.
* wait-user.c (_gpgme_user_io_cb_handler): Change type of IDX and I to unsigned int.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* decrypt-verify.c (decrypt_verify_status_handler): Expand silly and wrong expression.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* encrypt.c (encrypt_sym_status_handler): Likewise.
* sign.c (sign_status_handler): Likewise.
* verify.c (verify_status_handler): Likewise.
* decrypt.c (decrypt_status_handler): Likewise.

* engine.c (gpgme_get_engine_info): Initialize NULL.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in (gpg_error_libs): Quote GPG_ERROR_CFLAGS and GPG_ERROR_LIBS when setting the corresponding variables.
Reported by Stphane Corthsy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (set_recipients): Move declaration of NEWLEN to the beginning of the block.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c (mem_write):
Copy original buffer content.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_user_ids_release, gpgme_user_ids_append): Remove prototypes.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (AM_CPPFLAGS): Add @GPG_ERROR_CFLAGS@.
* gpgme-config.in (gpg_error_libs, gpg_error_cflags): New variables.
Print them.

* op-support.c (_gpgme_parse_inv_userid): Rename to
_gpgme_parse_inv_recip and change to new datatype.
* ops.h (_gpgme_parse_inv_key): Fix prototype.
* gpgme.h (struct _gpgme_invalid_user_id): Rename to
__gpgme_invalid_key. Rename field ID to KEY.
(gpgme_invalid_user_id_t): Rename to gpgme_invalid_key_t.
(struct _gpgme_op_encrypt_result): Here, too.
(struct _gpgme_op_sign_result): Likewise.
* encrypt.c (struct op_data): Likewise.
(release_op_data): Likewise.
* sign.c (struct op_data): Likewise.
(release_op_data): Likewise.

* posix-io.c (_gpgme_io_read): Save errno across debug calls.
(_gpgme_io_write): Likewise.
(_gpgme_io_pipe):
Likewise.
(_gpgme_io_select): Likewise.

* runpgg.c (struct engine_gpg): Remove arg_error.
(add_arg): Don't set arg_error.
(add_data): Likewise.
(start): Don't check arg_error.
(gpg_new): Check return value of add_arg.
* verify.c (parse_notation): Free allocated memory at error.

2003-06-05 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

* Makefile.am (EXTRA_DIST): Remove mkerrors.
(BUILT_SOURCES): Remove errors.c.
(MOSTLYCLEANFILES): Likewise.
(libgpgme_la_SOURCES): Likewise. Add error.c.
(errors.c): Remove target.
* mkerrors: File removed.
* error.c: New file.

* gpgme.h (gpgme_error_t): Change to type gpg_error_t.
(gpgme_err_code_t, gpgme_err_source_t): New types.
(gpgme_err_code, gpgme_err_source, gpgme_error, gpgme_err_make):

New static inline functions.

(gpgme_strsource, gpgme_err_code_from_errno,
gpgme_err_code_to_errno, gpgme_err_make_from_errno,
gpgme_error_from_errno): New prototypes.

2003-05-29 Marcus

Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_op_export_start): Change second arg to const char *.

(gpgme_op_export): Likewise.

(gpgme_op_export_ext_start): New prototype.

(gpgme_op_export_ext): Likewise.

* engine.h: Likewise for _gpgme_engine_op_export and
_gpgme_engine_op_export_ext.

* engine-backend.h (struct engine_ops): Change second argument of
prototype of export to const char *, and add reserved int as
third argument. Add prototype for export_ext.

* engine.c (_gpgme_engine_op_export_ext): New function.

(_gpgme_engine_op_export): Change second argument of prototype of
export to const char *, and add reserved int as third argument.

* runpgg.c (gpg_export): Change second argument of prototype of
export to const char *, and add reserved int as third argument.

(gpg_export_ext): New function.

(gpg_keylist_ext): Break loop at error.

(_gpgme_engine_ops_gpg): Add gpg_export_ext.

* engine-gpgsm.c (gpgsm_export): Change second argument of
prototype of export to const
char *, and add reserved int as
third argument.

(gpgsm_export_ext): New function.

(_gpgme_engine_ops_gpgsm): Add gpgsm_export_ext.

* export.c (export_start): Change second argument of prototype of
export to const char *, and add reserved int as third argument.

(gpgme_op_export_start): Likewise.

(export_ext_start): New function.

(gpgme_op_export_ext_start): Likewise.

(gpgme_op_export_ext): Likewise.

* gpgme.h (gpgme_keylist_mode_t): New type for anonymous enum.

(gpgme_sigsum_t): New type for anonymous enum.

* encrypt-sign.c (encrypt_sign_start): Check for errors earlier,
and return an error if RECP is not set.

* Makefile.am (libgpgme_la_SOURCES): Remove user-id.c.

* user-id.c: Remove file.

* ops.h: Remove prototype for _gpgme_user_ids_all_valid.

* gpgme.h (gpgme_encrypt_flags_t): New type.

(gpgme_op_encrypt_start): Change second parameter to type gpgme_key_t[], and add third parameter.
(gpgme_op_encrypt): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign): Likewise.
Likewise.
* encrypt.c (encrypt_start): Likewise.
(gpgme_op_encrypt_start): Likewise.
(gpgme_op_encrypt): Likewise. Pass flags to engine.
* encrypt-sign.c (encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign): Likewise.
* engine-backend.h (struct engine_ops): Likewise for prototypes of encrypt and encrypt_sign.
* engine.h: Likewise for prototypes of _gpgme_engine_op_encrypt and _gpgme_engine_op_encrypt_sign.
* engine.c (_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_encrypt_sign): Likewise.
* runpgg.c (gpg_encrypt): Likewise.
(gpg_encrypt_sign): Likewise.
* runpgg.c (gpg_encrypt): Check flags for always trust option.
* engine-gpgsm.c (gpgsm_encrypt): Likewise.
(set_recipients): Rewritten to use keys instead user IDs.
* runpgg.c (append_args_from_recipients): Rewritten to use keys instead user IDs.
* encrypt.c (_gpgme_encrypt_status_handler): Change errors returned to GPGME_Invalid_Key and GPGME_General_Error.

2003-05-28

Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Rename GpgsmObject to engine_gpgsm_t.
(struct gpgsm_object_s): Rename to struct engine_gpgsm.
* runpgg.c: Rename GpgObject to engine_gpg_t.
(struct gpg_object_s): Rename to struct engine_gpg.

* context.h (struct gpgme_context): Change EngineObject to engine_object_t.
(enum ctx_op_data_type): Rename to ctx_op_data_id_t.
(ctx_op_data_t): New type.
(struct gpgme_context): Use it.
* ops.h (_gpgme_op_data_lookup): Use new type name.
* op-support.c (_gpgme_op_data_lookup): Likewise.
* engine.c: Rename EngineObject to engine_t in the file. Also EngineStatusHandler to engine_status_handler_t, EngineCommandHandler to engine_command_handler_t and EngineColonLineHandler to engine_colon_line_handler.
* runpgg.c (start): Likewise.

- * engine-gpgsm.c: Likewise.
- * engine-backend.h (struct engine_ops): Likewise
- * engine.h (struct engine_object_s): Rename to struct engine.
- (EngineObject): Rename to engine_t. Also everywhere else in the file.
- (EngineStatusHandler): Rename to engine_status_handler_t.
- (EngineColonLineHandler): Rename to engine_colon_line_handler_t.
- (EngineCommandHandler): Rename to engine_command_handler_t.

- * engine-gpgsm.c (gpgsm_export): Fix bug in last change.

- * Makefile.am (libpggme_la_SOURCES): Remove recipient.c, add user-id.c.
- * gpgme.h (gpgme_recipients_t): Removed.
- (gpgme_recipients_new, gpgme_recipients_release, gpgme_recipients_add_name, gpgme_recipients_add_name_with_validity, gpgme_recipients_count, gpgme_recipients_enum_open, gpgme_recipients_enum_read, gpgme_recipients_enum_close): Removed.
- (gpgme_op_encrypt, gpgme_op_encrypt_start, gpgme_op_encrypt_sign, gpgme_op_encrypt_sign_start, gpgme_op_export_start, gpgme_op_export): Change second argument to gpgme_user_id_t.
- (gpgme_user_ids_release): New prototype.
- (gpgme_user_ids_append): Likewise.
- * ops.h (_gpgme_recipients_all_valid): Remove.
- (_gpgme_user_ids_all_valid): Add.
- * context.h
- (struct gpgme_recipients): Removed.
- * user-id.c: New file.
- * recipient.c: Removed file.
- * runpg.c (append_args_from_recipients): Change last arg to gpgme_user_id_t. Reimplement.
- (gpg_encrypt): Change second arg to gpgme_user_id_t.
- (gpg_encrypt_sign): Likewise.
- (gpg_export): Likewise. Rewrite user ID list code.
- * engine.c (_gpgme_engine_op_encrypt): Change second arg to gpgme_user_id_t.
- (_gpgme_engine_op_encrypt_sign): Likewise.
- (_gpgme_engine_op_export): Likewise.
- * engine.h (_gpgme_engine_op_encrypt, _gpgme_engine_op_encrypt_sign, _gpgme_engine_op_export): Likewise.
- * engine-gpgsm.c (set_recipients): Likewise. Rewrite loop code.
- (gpgsm_encrypt): Likewise.
- (gpgsm_export): Likewise.
- * engine-backend.h (struct engine_ops): Likewise for members ENCRYPT, ENCRYPT_SIGN and EXPORT.
- * export.c (export_start, gpgme_op_export_start, gpgme_op_export):

Likewise.

* encrypt.c (encrypt_start): Likewise. Don't check for count of recipients.

(gpgme_op_encrypt_start): Likewise.

(gpgme_op_encrypt):

Likewise.

* encrypt-sign.c (encrypt_sign_start): Likewise.

(gpgme_op_encrypt_sign): Likewise.

(gpgme_op_encrypt_sign_start): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_op_import_result): Add skipped_new_keys.

* import.c (parse_import_res): Add skipped_new_keys parser.

* op-support.c (_gpgme_parse_inv_userid): Add missing break statements.

* encrypt.c (gpgme_op_encrypt): Use gpgme_error_t instead of int.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* encrypt.c (gpgme_op_encrypt_result): Use intermediate variable HOOK to avoid compiler warning. Don't ask, you don't want to know.

(_gpgme_encrypt_status_handler): Likewise.

(_gpgme_op_encrypt_init_result): Likewise.

* decrypt.c (gpgme_op_decrypt_result): Likewise.

(_gpgme_decrypt_status_handler): Likewise.

(_gpgme_op_decrypt_init_result): Likewise.

* verify.c (gpgme_op_verify_result): Likewise.

(_gpgme_verify_status_handler): Likewise.

(_gpgme_op_verify_init_result):

Likewise.

* edit.c (edit_status_handler): Likewise.

(command_handler): Likewise.

(edit_start): Likewise.

* genkey.c (gpgme_op_genkey_result): Likewise.

(genkey_status_handler): Likewise.

(genkey_start): Likewise.

* import.c (gpgme_op_import_result): Likewise.

(import_status_handler): Likewise.

(_gpgme_op_import_start): Likewise.

* trustlist.c (gpgme_op_trustlist_next): Likewise.

(_gpgme_op_trustlist_event_cb): Likewise.

(gpgme_op_trustlist_start): Likewise.

* keylist.c (gpgme_op_keylist_result): Likewise.

(keylist_colon_handler): Likewise.

(keylist_status_handler): Likewise.

(_gpgme_op_keylist_event_cb): Likewise.

(gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_next): Likewise.
* passphrase.c (_gpgme_passphrase_status_handler): Likewise.
(_gpgme_passphrase_command_handler_internal): Likewise.
* sign.c (gpgme_op_sign_result): Likewise.
(_gpgme_sign_status_handler): Likewise.
(_gpgme_op_sign_init_result):
Likewise.

* passphrase.c (_gpgme_passphrase_command_handler_internal): Fix
access to pointer type.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

* engine.h (EngineCommandHandler): Change last argument to int fd.
* gpgme.h (gpgme_passphrase_cb_t): Rewritten to take parts of the
description and fd.
(gpgme_edit_cb_t): Change last argument to int fd.
* ops.h (_gpgme_passphrase_command_handler_internal): New prototype.
* passphrase.c: Include <assert.h>.
(op_data_t): Rename userid_hint to uid_hint, remove last_pw_handle.
(release_op_data): Check values before calling free.
(_gpgme_passphrase_status_handler): Likewise.
(_gpgme_passphrase_command_handler_internal): New function.
(_gpgme_passphrase_command_handler): Rewritten.
* edit.c (edit_status_handler): Pass -1 as fd argument.
(command_handler): Update prototype. New variable processed. Use
it to store return value of
_gpgme_passphrase_command_handler_internal which is now used
instead _gpgme_passphrase_command_handler.
Use it also to check
if we should call the user's edit function. Pass fd to user's
edit function.
* runpg.c (struct gpg_object_s): Change type of cmd.cb_data to
void *.
(gpg_release): Check value before calling free. Do not release
cmd.cb_data.
(command_cb): Function removed.
(command_handler): New function. Thus we don't use a data object
for command handler stuff anymore, but handle it directly. This
allows proper error reporting (cancel of passphrase requests, for
example). Also all callbacks work via direct writes to the file
descriptor (so that passphrases are not kept in insecure memory).
(gpg_set_command_handler): Rewritten to use even more ugly hacks.
(read_status): Check cmd.keyword before calling free. Install
command_handler as the I/O callback handler with GPG as private
data.

* `runpgg.c` (`gpg_new`): Add `--enable-progress-filter` to `gpg` invocation.

* `decrypt-verify.c` (`_gpgme_op_decrypt_verify_start`): Rename to `decrypt_verify_start`.

(`gpgme_op_decrypt_verify_start`):
Call `decrypt_verify_start`.

(`gpgme_op_decrypt_verify`): Likewise.

* `verify.c` (`verify_status_handler`): New function that also calls progress status handler.

(`_gpgme_op_verify_start`): Set status handler to `verify_status_handler`.
Rename to (`verify_start`).

(`gpgme_op_verify_start`): Call `verify_start`.

(`gpgme_op_verify`): Likewise.

* `encrypt.c` (`encrypt_status_handler`): New function.

(`_gpgme_encrypt_sym_status_handler`): Call progress status handler.
Make static. Rename to `encrypt_sym_status_handler`.

(`encrypt_start`): Set status handler to `encrypt_sym_status_handler` or `encrypt_status_handler`.

* `sign.c` (`sign_status_handler`): New function.

(`sign_start`): Set status handler to `sign_status_handler`.

* `decrypt.c` (`decrypt_status_handler`): New function that also calls progress status handler.

(`decrypt_start`): Set status handler to `decrypt_status_handler`.

* `encrypt-sign.c` (`encrypt_sign_status_handler`): Likewise.

* `decrypt-verify.c` (`decrypt_verify_status_handler`):
Call
`_gpgme_progress_status_handler`.

* `conversion.c` (`_gpgme_decode_c_string`): Add missing break statement.

* `recipient.c` (`gpgme_recipients_add_name_with_validity`): Add one to buffer to allocate.

2003-05-19 Marcus Brinkmann <marcus@g10code.de>

* `verify.c` (`parse_new_sig`): Fix ERRSIG case.
Submitted by Benjamin Lee <benjaminlee@users.sf.net>.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* `gpgme.h`: The following types are renamed. The old name is kept as a deprecated typedef.

(`GpgmeCtx`): Rename to `gpgme_ctx_t`.

(`GpgmeData`): Rename to `gpgme_data_t`.

(`GpgmeRecipients`): Rename to `gpgme_recipients_t`.

(`GpgmeError`): Rename to `gpgme_error_t`.

(GpgmeDataEncoding): Rename to gpgme_data_encoding_t.
(GpgmePubKeyAlgo): Rename to gpgme_pubkey_algo_t.
(GpgmeHashAlgo): Rename to gpgme_hash_algo_t.
(GpgmeSigStat): Rename to gpgme_sig_stat_t.
(GpgmeSigMode): Rename to gpgme_sig_mode_t.
(GpgmeAttr): Rename to gpgme_attr_t.
(GpgmeValidity): Rename to gpgme_validity_t.
(GpgmeProtocol):
Rename to gpgme_protocol_t.
(GpgmeStatusCode): Rename to gpgme_status_code_t.
(GpgmeEngineInfo): Rename to gpgme_engine_info_t.
(GpgmeSubkey): Rename to gpgme_subkey_t.
(GpgmeKeySig): Rename to gpgme_keysig_t.
(GpgmeUserID): Rename to gpgme_user_id_t.
(GpgmePassphraseCb): Rename to gpgme_passphrase_cb_t.
(GpgmeProgressCb): Rename to gpgme_progress_cb_t.
(GpgmeEditCb): Rename to gpgme_edit_cb_t.
(GpgmeIOCb): Rename to gpgme_io_cb_t.
(GpgmeRegisterIOCb): Rename to gpgme_register_io_cb_t.
(GpgmeRemoveIOCb): Rename to gpgme_remove_io_cb_t.
(GpgmeEventIO): Rename to gpgme_event_io_t.
(GpgmeEventIOCb): Rename to gpgme_event_io_cb_t.
(GpgmeIOCBs): Rename to gpgme_io_cbs.
(gpgme_io_cbs_t): New type.
(GpgmeDataReadCb): Rename to gpgme_data_read_cb_t.
(GpgmeDataWriteCb): Rename to gpgme_data_write_cb_t.
(GpgmeDataSeekCb): Rename to gpgme_data_seek_cb_t.
(GpgmeDataReleaseCb): Rename to gpgme_data_release_cb_t.
(GpgmeDataCbs): Rename to gpgme_data_cbs.
(gpgme_data_cbs_t):
New type.
(GpgmeInvalidUserID): Rename to gpgme_invalid_user_id_t.
(GpgmeEncryptResult): Rename to gpgme_encrypt_result_t.
(GpgmeDecryptResult): Rename to gpgme_decrypt_result_t.
(GpgmeNewSignature): Rename to gpgme_new_signature_t.
(GpgmeSignResult): Rename to gpgme_sign_result_t.
(GpgmeSigNotation): Rename to gpgme_sig_notation_t.
(GpgmeSignature): Rename to gpgme_signature_t.
(GpgmeVerifyResult): Rename to gpgme_verify_result_t.
(GpgmeImportStatus): Rename to gpgme_import_status_t.
(GpgmeImportResult): Rename to gpgme_import_result_t.
(GpgmeGenKeyResult): Rename to gpgme_genkey_result_t.
(GpgmeKeyListResult): Rename to gpgme_keylist_result_t.
(GpgmeTrustItem): Rename to gpgme_trust_item_t.
* gpgme.h (gpgme_deprecated_error_t): New type, swallowing macros
GPGME_No_Recipients, GPGME_Invalid_Recipient and
GPGME_No_Passphrase.
* data.h (struct gpgme_data_s): Rename to struct gpgme_data.

* context.h (struct gpgme_context_s): Rename to struct gpgme_context.
(struct gpgme_recipients_s): Rename to gpgme_recipients.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (finish_key): Clear OPD->tmp_uid.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Return GPGME_No_Data for NODATA status without signatures.

2003-05-05 Marcus Brinkmann <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Use decoded string to parse user id.
(_gpgme_key_add_sig): Likewise.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

* context.h (struct gpgme_context_s): Remove member op_info.

* key.c (_gpgme_key_add_sig): Initialize SIG->uid.

* gpgme.h (GpgmeError): Add deprecated values for GPGME_Invalid_Type and GPGME_Invalid_Mode.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_get_op_info): Remove prototype.

* ops.h (_gpgme_set_op_info,
_gpgme_data_release_and_return_string, _gpgme_data_get_as_string,
_gpgme_data_append, _gpgme_data_append_string,
_gpgme_data_append_string_for_xml,
_gpgme_data_append_for_xml,
_gpgme_data_append_percentstring_for_xml): Likewise.

(_gpgme_progress_status_handler): Change first arg to void *.

* progress.c (_gpgme_progress_status_handler): Likewise.

* conversion.c: Do not include <string.h>, <errno.h>, <ctype.h>, and <sys/types.h>, but <string.h>.

(_gpgme_data_append): Remove function.

(_gpgme_data_append_string): Likewise.

(_gpgme_data_append_for_xml): Likewise.

(_gpgme_data_append_string_for_xml): Likewise.

(_gpgme_data_append_percentstring_for_xml): Likewise.

* data-mem.c (_gpgme_data_get_as_string): Likewise.

(_gpgme_data_release_and_return_string): Likewise.

* gpgme.c (gpgme_get_op_info): Likewise.
 (_gpgme_set_op_info): Likewise.

* gpgme.h (struct _gpgme_key): New structure.
 (GpgmeKey): Define using _gpgme_key.
 (struct _gpgme_subkey): New structure.
 (GpgmeSubKey): New type.
 (struct _gpgme_key_sig): New structure.
 (GpgmeKeySig): New type.
 (struct _gpgme_user_id): New structure.
 (GpgmeUserID):
 New type.
 (struct _gpgme_op_keylist_result): New structure.
 (GpgmeKeyListResult): New type.
 (gpgme_op_keylist_result): New function.
 (gpgme_key_get_as_xml): Remove prototype.

* context.h (struct gpgme_context_s): Remove members tmp_key,
 tmp_uid, key_cond and key_queue.
 (struct key_queue_item_s): Remove structure.
 (struct user_id_s): Remove structure.
 (struct gpgme_recipients_s): Replace with simple
 GpgmeUserID list.

* gpgme.c (gpgme_release): Do not release CTX->tmp_key.
 * ops.h (_gpgme_key_add_subkey, _gpgme_key_append_name,
 _gpgme_key_add_sig, _gpgme_trust_item_new): New prototypes.
 * runpg.c (command_cb): Return GpgmeError instead int.
 New variable ERR. Use it to hold return value of cmd handler.
 (gpg_delete): Access fingerprint of key directly.
 (append_args_from_signers): Likewise.
 (gpg_edit): Likewise.
 (append_args_from_recipients): Use GpgmeUserID for recipient list.

* engine-gpgsm.c: Do not include "key.h".
 (gpgsm_delete): Access fingerprint of key
 directly.
 (gpgsm_sign): Likewise.
 (set_recipients): Use GpgmeUserID for recipients. Invert invalid
 user ID flag.

* key.h: File removed.
 * key.c: Completely reworked to use exposed GpgmeKey data types.
 * keylist.c: Likewise.
 * recipient.c: Completely reworked to use GpgmeUserID.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_get_key): Remove force_update argument.
 * key-cache.c: File removed.
 * Makefile.am (libgpgme_la_SOURCES): Remove key-cache.c.
 * ops.h (_gpgme_key_cache_add, _gpgme_key_cache_get): Remove

prototypes.

* keylist.c (`_gpgme_op_keylist_event_cb`): Don't call `_gpgme_key_cache_add`.

(`gpgme_get_key`): New function.

* verify.c (`gpgme_get_sig_key`): Remove last argument to `gpgme_get_key` invocation.

* gpgme.h (struct `_gpgme_trust_item`): New structure.

(`GpgmeTrustItem`): New type.

(`gpgme_trust_item_ref`, `gpgme_trust_item_unref`): New prototypes.

* context.h (struct `trust_queue_item_s`): Remove structure.

(struct `gpgme_context_s`): Remove `trust_queue` member.

* Makefile.am (libgpgme_la_SOURCES): Add `trust-item.c`.

* `trust-item.c`: New file.

* `trustlist.c`: Do not include `<stdio.h>` or `<time.h>`, but `"gpgme.h"`.

(struct `trust_queue_item_s`): Change to new type `op_data_t`.

(`trust_status_handler`): Change first argument to `void *`.

(`trust_colon_handler`): Likewise.

(`_gpgme_op_trustlist_event_cb`): Use `op_data_t` type.

(`gpgme_op_trustlist_start`): Use `op_data_t` and rework error handling.

(`gpgme_op_trustlist_next`): Use `op_data_t`.

(`gpgme_trust_item_release`): Remove function.

(`gpgme_trust_item_get_string_attr`): Likewise.

(`gpgme_trust_item_get_int_attr`): Likewise.

* verify.c (`calc_sig_summary`): Do not set `GPGME_SIGSUM_SYS_ERROR` for bad signatures.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* context.h: Remove `OPDATA_VERIFY_COLLECTING`.

(struct `gpgme_context_s`): Remove member notation.

* gpgme.h: Make enum for `GPGME_KEYLIST_MODE_*` values.

* gpgme.h (struct `_gpgme_sig_notation`): New structure.

(`GpgmeSigNotation`): New type.

(struct `_gpgme_signature`): New structure.

(`GpgmeSignature`): New type.

(struct `_gpgme_op_verify_result`): New structure.

(`GpgmeVerifyResult`): New type.

(`gpgme_op_verify_result`): New prototype.

(`gpgme_get_notation`): Remove prototype.

* ops.h (`_gpgme_op_verify_init_result`): New prototype.

(`_gpgme_verify_status_handler`): Change first argument to `void *`.

* util.h (_gpgme_decode_percent_string, _gpgme_map_gnupg_error):

New prototypes.

* conversion.c (_gpgme_decode_percent_string): New function.

(gnupg_errors): New static global.

(_gpgme_map_gnupg_error): New function.

* gpgme.c (gpgme_release): Don't release CTX->notation.

(gpgme_get_notation): Remove function.

* decrypt-verify.c (_gpgme_op_decrypt_verify_start): Call
_gpgme_op_verify_init_result.

* verify.c: Do not include <stdio.h>, <assert.h> and "key.h", but
do include "gpgme.h".

(struct verify_result): Replace with ...

(op_data_t): ... this type.

(release_verify_result): Remove function.

(release_op_data):

New function.

(is_token): Remove function.

(skip_token): Remove function.

(copy_token): Remove function.

(gpgme_op_verify_result): New function.

(calc_sig_summary): Rewritten.

(finish_sig): Remove function.

(parse_new_sig): New function.

(parse_valid_sig): New function.

(parse_notation): New function.

(parse_trust): New function.

(parse_error): New function.

(_gpgme_verify_status_handler): Rewritten. Change first argument
to void *.

(_gpgme_op_verify_start): Rework error handling. Call
_gpgme_op_verify_init_result.

(gpgme_op_verify): Do not release or clear CTX->notation.

(gpgme_get_sig_status): Rewritten.

(gpgme_get_sig_string_attr): Likewise.

(gpgme_get_sig_ulong_attr): Likewise.

(gpgme_get_sig_key): Likewise.

* gpgme.h (struct _gpgme_op_decrypt_result): New structure.

(GpgmeDecryptResult): New type.

(gpgme_op_decrypt_result): New prototype.

* ops.h (_gpgme_op_decrypt_init_result): New prototype.

(_gpgme_decrypt_status_handler): Fix prototype.

(_gpgme_decrypt_start):

Remove prototype.

* decrypt-verify.c: Do not include <stdio.h>, <stdlib.h>,
<string.h> and <assert.h>, "util.h" and "context.h", but
"gpgme.h".

(decrypt_verify_status_handler): Change first argument to void *,

and rework error handling.
(_gpgme_op_decrypt_verify_start): New function.
(gpgme_op_decrypt_verify_start): Rewrite using
_gpgme_op_decrypt_verify_start.
(gpgme_op_decrypt_verify): Likewise.
* decrypt.c: Include <string.h>, "gpgme.h" and "util.h".
(struct decrypt_result): Change to typedef op_data_t, rewritten.
(is_token): Remove function.
(release_op_data): New function.
(skip_token): Remove function.
(gpgme_op_decrypt_result): New function.
(_gpgme_decrypt_status_handler): Change first argument to void *.
Rework error handling.
(_gpgme_decrypt_start): Rename to ...
(decrypt_start): ... this. Call _gpgme_op_decrypt_init_result.
(_gpgme_op_decrypt_init_result): New function.
(gpgme_op_decrypt_start): Use decrypt_start.
(gpgme_op_decrypt): Likewise.

2003-04-27

Marcus Brinkmann <marcus@g10code.de>

* encrypt-sign.c: Do not include <stddef.h>, <stdio.h>,
<stdlib.h>, <string.h>, <assert.h> and "util.h", but "gpgme.h".
(_gpgme_op_encrypt_sign_start): Rename to ...
(encrypt_sign_start): ... this.
(gpgme_op_encrypt_sign_start): Use encrypt_sign_start, not
_gpgme_op_encrypt_sign_start.
(gpgme_op_encrypt_sign): Likewise.

* gpgme.h (GpgmeEncryptResult): New data type.
(gpgme_op_encrypt_result): New prototype.
* ops.h (_gpgme_op_encrypt_init_result): New prototype.
(_gpgme_op_encrypt_status_handler): Fix prototype.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Call
_gpgme_op_encrypt_init_result.
* encrypt.c: Do not include <stdio.h>, <assert.h>, "util.h" and
"wait.h". Include <errno.h> and "gpgme.h".
(SKIP_TOKEN_OR_RETURN): Remove macro.
(struct encrypt_result): Rename to ...
(op_data_t): ... new data type. Rewrite for user result data.
(append_xml_encinfo): Remove function.
(release_op_data): New function.
(gpgme_op_encrypt_result):
New function.
(_gpgme_op_encrypt_status_handler): Change first argument to void *.
Rework result parsing.
(_gpgme_op_encrypt_sym_status_handler): Change first argument to

void *.

(_gpgme_op_encrypt_init_result): New function.

(_gpgme_op_encrypt_start): Rename to ...

(encrypt_start): ... this.

(gpgme_op_encrypt_start): Use encrypt_start, not gpgme_op_encrypt_start.

(gpgme_op_encrypt): Likewise.

* gpgme.h (GpgmePubKeyAlgo, GpgmeHashAlgo, GpgmeInvalidUserID, GpgmeNewSignature, GpgmeSignResult): New data types.

(gpgme_op_sign_result, gpgme_pubkey_algo_name, gpgme_hash_algo_name): New prototypes.

* gpgme.c (gpgme_pubkey_algo_name): New function.

(gpgme_hash_algo_name): Likewise.

* ops.h (_gpgme_parse_inv_userid, _gpgme_op_sign_init_result): New prototype.

(_gpgme_op_sign_status_handler): Fix prototype.

* op-support.c: Include <errno.h> and <string.h>.

(_gpgme_parse_inv_userid): New function.

* sign.c: Include <errno.h> and "gpgme.h", but not <stdio.h>, <assert.h> and "util.h".

(SKIP_TOKEN_OR_RETURN): Remove macro.

(struct sign_result): Change to op_data_t type and rework it.

(release_sign_result): Rename to ...

(release_op_data): ... this and rewrite it.

(append_xml_info): Remove function.

(gpgme_op_sign_result): New function.

(parse_sig_created): New function.

(_gpgme_sign_status_handler): Change first argument to void *.

Rewrite the function to use the new result structure and functions.

(_gpgme_op_sign_init_result): New function.

(_gpgme_op_sign_start): Rename to ...

(sign_start): ... this. Call _gpgme_op_sign_init_result.

(gpgme_op_sign_start): Use sign_start instead _gpgme_op_sign_start.

(gpgme_op_sign): Likewise.

* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Call _gpgme_op_sign_init_result.

* delete.c: Include <errno.h> and "gpgme.h", but not "util.h" or "key.h".

(enum delete_problem): Move into function delete_status_handler.

(delete_status_handler): Change first argument to void *. Parse delete problem with strtol instead atoi. Return better error values.

(_gpgme_op_delete_start): Rename to ...

(delete_start): ... this. Rework error handling.

(gpgme_op_delete_start): Use delete_start instead
_gpgme_op_delete_start.
(gpgme_op_delete): Likewise.
* gpgme.h (GpgmeDataType): Removed.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Change GPGME_IMPORT_PRIVATE to GPGME_IMPORT_SECRET.
* import.c (parse_import_res): Parse unchanged field.

* gpgme.h: New enum for GPGME_IMPORT_NEW, GPGME_IMPORT_UID,
GPGME_IMPORT_SIG, GPGME_IMPORT_SUBKEY, GPGME_IMPORT_PRIVATE.
(GpgmeError): GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key added
as new error codes.

(struct _gpgme_import_status): New structure.
(GpgmeImportStatus): New type.
(struct _gpgme_op_import_result): New structure.
(GpgmeImportResult): New type.
(gpgme_op_import_result): New function.
* import.c: Include <errno.h> and "gpgme.h", but not "util.h".
(struct import_result): Change to type op_data_t.
(release_import_result): Rename to ...
(release_op_data): ... this.
(append_xml_impinfo): Function removed.
(gpgme_op_import_result): New function.
(parse_import): New function.
(parse_import_res): Likewise.
(import_status_handler): Change first argument to void *. Rewrite
to use new functions.
(_gpgme_op_import_start): Rework error handling.

* edit.c: Do not include <assert.h>, "util.h", but "gpgme.h".
(edit_resut): Change to typedef for op_data_t.
(edit_status_handler): Change first argument to void *.
Rework error handling.
(command_handler): Rework error handling.
(_gpgme_op_edit_start): Rename to ...
(edit_start): ... this. Rework
error handling.
(gpgme_op_edit_start): Rewrite using edit_start.
(gpgme_op_edit): Likewise.

* ops.h (_gpgme_passphrase_start): Remove prototype.

* passphrase.c: Do not include <assert.h>, "util.h" or "debug.h", but "gpgme.h".

(struct passphrase_result): Change to typedef for op_data_t.

(release_passphrase_result): Rename to release_op_data.

(_gpgme_passphrase_status_handler): Change first argument to void *.

Use new op_data_t type.

(_gpgme_passphrase_command_handler): Use new op_data_t type.

(_gpgme_passphrase_start): Remove function.

* decrypt.c (_gpgme_decrypt_start): Rewrite error handling. Do not call _gpgme_passphrase_start, but install command handler.

* encrypt.c (_gpgme_op_encrypt_start): Likewise.

* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.

* sign.c (_gpgme_op_sign_start): Likewise.

* context.h (struct gpgme_context_s): Remove member initialized, use_cms and help_data_1. Add member protocol. Make use_armor and use_textmode bit flags.

Make keylist_mode, include_certs, signers_len and signers_size unsigned.

* gpgme.c (gpgme_new): Initialize CTX->protocol.

(gpgme_set_protocol): Do not check CTX. Use CTX->protocol.

(gpgme_get_protocol): Likewise.

(gpgme_release): Do not release CTX->help_data_1.

* op-support.c (_gpgme_op_reset): Use CTX->protocol.

* wait-private.c (_gpgme_wait_private_event_cb): Remove variable CTX.

* data.c: Do not include <assert.h>, but "gpgme.h".

(_gpgme_data_inbound_handler): Expand _gpgme_data_append, because it will go. Do not assert DH.

(_gpgme_data_outbound_handler): Do not assert DH.

* export.c: Do not include <stdlib.h>, "debug.h" and "util.h", but "gpgme.h".

(export_status_handler): Change type of first argument to void *.

(_gpgme_op_export_start): Rename to ...

(export_start): ... this. Rework error handling.

(gpgme_op_export_start): Rewritten to use export_start instead _gpgme_op_export_start.

(gpgme_op_export): Likewise.

* gpgme.h (GpgmeError): Add GPGME_Busy, GPGME_No_Request.

(GPGME_No_Recipients, GPGME_Invalid_Recipient, GPGME_No_Passphrase): New macros.

* key.c (gpgme_key_get_string_attr): Fix validity attribute.

- * gpgme.h (struct _gpgme_op_genkey_result): New structure.
- (GpgmeGenKeyResult): New type.
- (gpgme_op_genkey): Drop last argument.
- (gpgme_op_genkey_result): New function.
- * genkey.c: Do not include "util.h", but "gpgme.h".
- (struct genkey_result): Replace with ...
- (op_data_t): ... this new type.
- (release_genkey_result): Replace with ...
- (release_op_data): ... this new function.
- (gpgme_op_genkey_result): New function.
- (genkey_status_handler): Rewritten using new op_data_t type.
- (get_key_parameter): New function.
- (_gpgme_op_genkey_start): Renamed to
- (genkey_start): ... this and rewritten.
- (gpgme_op_genkey_start): Use genkey_start instead
- _gpgme_op_genkey_start.
- (gpgme_op_genkey): Rewritten. Remove FPR argument.

- * context.h (struct gpgme_context_s): Remove member
- verbosity.
- * gpgme.c (gpgme_new): Do not set member verbosity.
- * engine.h (_gpgme_engine_set_verbosity): Remove prototype.
- * engine.c (_gpgme_engine_set_verbosity): Remove function.
- * engine-backend.h (struct engine_ops): Remove set_verbosity.
- * engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Remove set_verbosity member.
- * runpgp.c (_gpgme_engine_ops_gpg): Likewise.
- (gpg_set_verbosity): Remove function.
- * decrypt.c (_gpgme_decrypt_start): Don't call
- _gpgme_engine_set_verbosity.
- * delete.c (_gpgme_op_delete_start): Likewise.
- * edit.c (_gpgme_op_edit_start): Likewise.
- * encrypt.c (_gpgme_op_encrypt_start): Likewise.
- * encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
- * export.c (_gpgme_op_export_start): Likewise.
- * genkey.c (_gpgme_op_genkey_start): Likewise.
- * import.c (_gpgme_op_import_start): Likewise.
- * keylist.c (gpgme_op_keylist_start): Likewise.
- (gpgme_op_keylist_ext_start): Likewise.
- * sign.c (_gpgme_op_sign_start): Likewise.
- * verify.c (_gpgme_op_verify_start):
- Likewise.

- * Makefile.am (libgpgme_la_SOURCES): Add key-cache.c.
- * key.c (key_cache_initialized, key_cache_size,
- key_cache_max_chain_length,): Removed.

(struct key_cache_item_s, key_cache_lock, key_cache, key_cache_unused_items, hash_key, _gpgme_key_cache_add, _gpgme_key_cache_get, gpgme_get_key): Moved to ...

- * key-cache.c: ... here. New file.
- * key.h (_gpgme_key_cache_init): Remove prototypes.
- (_gpgme_key_cache_add, _gpgme_key_cache_get): Move to ...
- * ops.h: ... here.
- * version.c: Do not include "key.h".
- (do_subsystem_inits): Do not call _gpgme_key_cache_init.

- * mkstatus: Strip trailing comma.
- * gpgme.h (GpgmeStatus): Pretty print.

- * gpgme.h (GpgmeError): Rename GPGME_No_Passphrase to GPGME_Bad_Passphrase.
- * passphrase.c (_gpgme_passphrase_status_handler): Use GPGME_Bad_Passphrase instead GPGME_No_Passphrase.

- * gpgme.h (GpgmeError): Rename GPGME_No_Recipients to GPGME_No_UserID and GPGME_Invalid_Recipient to GPGME_Invalid_UserID.
- * encrypt.c (_gpgme_encrypt_status_handler): Use GPGME_No_UserID instead GPGME_No_Recipients and GPGME_Invalid_UserID instead GPGME_Invalid_Recipient.
- (_gpgme_op_encrypt_start): Likewise.

- * gpgme.h (GpgmeError): Remove GPGME_Busy and GPGME_No_Request.
- * wait-user.c (_gpgme_wait_user_event_cb): Don't clear CTX->pending.
- * wait-private.c (_gpgme_wait_private_event_cb): Likewise.
- * wait-global.c (gpgme_wait): Likewise.
- * verify.c (_gpgme_op_verify_start): Likewise.
- (gpgme_get_sig_status): Don't check pending flag.
- (gpgme_get_sig_string_attr): Likewise.
- (gpgme_get_sig_ulong_attr): Likewise.
- (gpgme_get_sig_key): Likewise.
- * op-support.c (_gpgme_op_reset): Likewise.
- * trustlist.c (gpgme_op_trustlist_start): Don't clear pending flag.
- (gpgme_op_trustlist_next): Don't check or clear pending flag.
- (gpgme_op_trustlist_end): Likewise.
- * sign.c (_gpgme_op_sign_start): Likewise.
- * context.h (struct gpgme_context_s): Remove member PENDING.
- * decrypt.c (_gpgme_decrypt_start): Likewise.
- * delete.c (_gpgme_op_delete_start): Likewise.
- * edit.c (_gpgme_op_edit_start): Likewise.
- * encrypt.c (_gpgme_op_encrypt_start): Likewise.
- * encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.

- * export.c (_gpgme_op_export_start): Likewise.
- * genkey.c (_gpgme_op_genkey_start): Likewise.
- * import.c (_gpgme_op_import_start): Likewise.
- * key.c (gpgme_get_key): Likewise.
- * keylist.c (gpgme_op_keylist_start): Likewise.
- (gpgme_op_keylist_ext_start): Likewise.
- (gpgme_op_keylist_next): Likewise.
- (gpgme_op_keylist_end): Likewise.
- * data-compat.c (gpgme_error_to_errno): Don't convert EBUSY.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h (GpgmePassphraseCb): Change type to return GpgmeError, and add argument for returning the result string.
- (gpgme_cancel): Remove prototype.
- * gpgme.c (gpgme_cancel): Remove function.
- * context.h (struct gpgme_context_s): Remove member cancel.
- * passphrase.c (_gpgme_passphrase_command_handler): Call the passphrase callback in the new way.

2003-01-30

Marcus Brinkmann <marcus@g10code.de>

- * edit.c (_gpgme_edit_status_handler): Call the progress status handler.

2003-02-05 Marcus Brinkmann <marcus@g10code.de>

- * wait-user.c (_gpgme_wait_user_remove_io_cb): Move check for no I/O handlers left to ...
- (_gpgme_user_io_cb_handler): ... here.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

- * trustlist.c (trustlist_colon_handler): Release ITEM if name could not be allocated.
- (gpgme_trust_item_release): Only release name if it is allocated.
- Reported by Marc Mutz <Marc.Mutz@uni-bielefeld.de>.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

- * runpgp.c (read_status): If the status handler returns an error, return it.
- (status_handler): If read_status fails, just return the error.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

- * engine-gpgsm.c (start): Handle all errors, not only most of

them.

(xtoi_1, xtoi_2): Remove macro.

(status_handler): Replace use of xtoi_2 with _gpgme_hextobyte.

2003-02-01 Marcus

Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Replace

ASSUAN_Bad_Certificate_Path with ASSUAN_Bad_Certificate_Chain.

(gpgsm_new): Use assuan_pipe_connect instead assuan_pipe_connect2.

* util.h (DIMof): Remove macro.

* ops.h (_gpgme_op_event_cb, _gpgme_op_event_cb_user,

_gpgme_data_unread): Prototypes removed.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* types.h: File removed.

* Makefile.am (libgpgme_la_SOURCES): Remove types.h.

* io.h (struct spawn_fd_item_s): Do not include "types.h".

* key.h: Likewise.

* context.h: Likewise.

* engine-gpgsm.h: Likewise.

* engine.h: Include "gpgme.h" instead "types.h". Add prototypes for EngineStatusHandler, EngineColonLineHandler and EngineCommandHandler.

(_gpgme_engine_set_status_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.

(_gpgme_engine_set_command_handler): Change parameter type from GpgmeCommandHandler to EngineCommandHandler.

(_gpgme_engine_set_colon_line_handler):

Change parameter type from

GpgmeColonLineHandler to EngineColonLineHandler.

* engine-backend.h: Include "engine.h" instead "types.h".

(struct engine_ops): Change Gpgme*Handler parameters in members set_command_handler, set_colon_line_handler and set_status_handler to Engine*Handler.

* engine.c (_gpgme_engine_set_status_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.

(_gpgme_engine_set_command_handler): Change parameter type from GpgmeCommandHandler to EngineCommandHandler.

(_gpgme_engine_set_colon_line_handler): Change parameter type from GpgmeColonLineHandler to EngineColonLineHandler.

* runpgg.c (struct gpg_object_s): Change type of member status.fnc from GpgmeStatusHandler to EngineStatusHandler. Change type of member colon.fnc from GpgmeColonLineHandler to

EngineColonLineHandler. Change type of member cmd.fnc from

GpgmeCommandHandler to EngineCommandHandler.
 * engine-gpgsm.c (struct gpgsm_object_s): Likewise.
 * runpgg.c
 (gpg_set_status_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.
 * engine-gpgsm.c (gpgsm_set_status_handler): Likewise.
 (assuan_simple_command): Likewise.
 * runpgg.c (gpg_set_colon_line_handler): Change parameter type from GpgmeColonLineHandler to EngineColonLineHandler.
 * engine-gpgsm.c (gpgsm_set_colon_line_handler): Likewise.
 * runpgg.c (gpg_set_command_handler): Change parameter type from GpgmeCommandHandler to EngineCommandHandler.

* engine-gpgsm.c (status_handler): Do not close status fd at end of function.

* ops.h (_gpgme_op_data_lookup): Add prototype.
 * op-support.c: Include <stdlib.h>.
 (_gpgme_op_data_lookup): New function.
 * decrypt.c (_gpgme_release_decrypt_result): Function removed.
 (struct decrypt_result_s): Rename to ...
 (struct decrypt_result): ... this.
 (DecryptResult): New type.
 (_gpgme_decrypt_status_handler): Don't use test_and_allocate_result, but use _gpgme_op_data_lookup to retrieve result data object.
 * sign.c
 (_gpgme_release_sign_result): Function removed.
 (release_sign_result): New function.
 (struct sign_result_s): Rename to ...
 (struct sign_result): ... this.
 (SignResult): New type.
 (_gpgme_sign_status_handler): Don't use test_and_allocate_result, but use _gpgme_op_data_lookup to retrieve result data object.
 * encrypt.c (struct encrypt_result_s): Rename to ...
 (struct encrypt_result): ... this.
 (_gpgme_release_encrypt_result): Function removed.
 (release_encrypt_result): New function.
 (_gpgme_encrypt_status_handler): Don't use test_and_allocate_result, but use _gpgme_op_data_lookup to retrieve result data object.
 * verify.c (struct verify_result_s): Rename to ...
 (struct verify_result): ... this. Remove member next.
 (VerifyResult): New type.
 (_gpgme_release_verify_result): Function removed.
 (release_verify_result): New function.
 (finish_sig): Change first argument to type VerifyResult. Diddle

the type of the `op_data` structure.

(`add_notation`): Change first argument to type `VerifyResult`.

(`_gpgme_verify_status_handler`): Don't use `test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

* `passphrase.c` (struct `passphrase_result_s`): Rename to ... (struct `passphrase_result`): ... this. Remove member `next`.

(`PassphraseResult`): New type.

(`_gpgme_release_passphrase_result`): Function removed.

(`release_passphrase_result`): New function.

(`_gpgme_passphrase_status_handler`): Don't use `test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

(`_gpgme_passphrase_command_handler`): Likewise.

* `keylist.c` (struct `keylist_result_s`): Rename to ... (struct `keylist_result`): ... this. Remove member `next`.

(`KeylistResult`): New type.

(`_gpgme_release_keylist_result`): Function removed.

(`release_keylist_result`): New function.

(`keylist_status_handler`): Don't use `test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

* `edit.c` (struct `edit_result_s`): Rename to ... (struct `edit_result`): ... this. Remove member `next`.

(`EditResult`): New type.

(`_gpgme_release_edit_result`): Function removed.

(`release_edit_result`): New function.

(`edit_status_handler`): Don't use `test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

(`command_handler`): Likewise.

* `types.h` (`DecryptResult`, `SignResult`, `EncryptResult`, `PassphraseResult`, `ImportResult`, `DeleteResult`, `GenKeyResult`, `KeylistResult`, `EditResult`): Types removed.

* `ops.h`: Don't include "types.h", but "gpgme.h" and "context.h".

(`test_and_allocate_result`): Remove macro.

(`_gpgme_release_decrypt_result`): Remove prototype.

(`_gpgme_decrypt_result`): Remove prototype.

(`_gpgme_release_sign_result`): Remove prototype.

(`_gpgme_release_encrypt_result`): Remove prototype.

(`_gpgme_release_passphrase_result`): Remove prototype.

(`_gpgme_release_import_result`): Remove prototype.

(`_gpgme_release_delete_result`): Remove prototype.

(`_gpgme_release_genkey_result`): Remove prototype.

(`_gpgme_release_keylist_result`):

Remove prototype.
(_gpgme_release_edit_result): Remove prototype.
(_gpgme_release_verify_result): Remove prototype.
* gpgme.c (_gpgme_release_result): Rewritten.
* context.h (enum ctx_op_data_type): New enum.
(struct ctx_op_data): New structure.
(struct gpgme_context_s): Replace the member result with a member op_data.
(fail_on_pending_request): Remove macro.
* op-support.c (_gpgme_op_reset): Expand macro fail_on_pending_request.
* util.h: Don't include "types.h" or "debug.h", but include "gpgme.h".

2003-01-19 Marcus Brinkmann <marcus@g10code.de>

* runpg.c (_gpgme_engine_ops_gpg): Remove gpg_start.
(gpg_start): Rename to ...
(start): ... this function. Change arguments to GpgObject.
(gpg_decrypt): Call start.
(gpg_edit): Likewise.
(gpg_encrypt): Likewise.
(gpg_encrypt_sign): Likewise.
(gpg_export): Likewise.
(gpg_import): Likewise.
(gpg_keylist): Likewise.
(gpg_keylist_ext): Likewise.
(gpg_trustlist): Likewise.
(gpg_verify): Likewise.

*
engine-gpgsm.c (_gpgme_engine_ops_encrypt): Remove gpgsm_start.
(gpgsm_start): Rename to ...
(struct gpgsm_object_s): Remove member command.
(gpgsm_release): Don't free command.
(start): ... this function. Change arguments to GpgsmObject and const char *.
(gpgsm_decrypt): Call start.
(gpgsm_delete): Likewise.
(gpgsm_encrypt): Likewise.
(gpgsm_export): Likewise.
(gpgsm_genkey): Likewise.
(gpgsm_import): Likewise.
(gpgsm_keylist): Likewise.
(gpgsm_keylist_ext): Likewise.
(gpgsm_verify): Likewise.

* decrypt.c (_gpgme_decrypt_start): Don't call _gpgme_engine_start.

- * delete.c (_gpgme_op_delete_start): Likewise.
- * edit.c (_gpgme_op_edit_start): Likewise.
- * encrypt.c (_gpgme_op_encrypt_start):
- * encrypt-sign.c (_gpgme_op_encrypt_sign_start):
- * export.c (_gpgme_op_export_start): Likewise.
- * genkey.c (_gpgme_op_genkey_start): Likewise.
- * import.c (_gpgme_op_import_start): Likewise.
- * keylist.c (gpgme_op_keylist_ext_start): Likewise.
- (gpgme_op_keylist_start):
Likewise.
- * sign.c (_gpgme_op_sign_start): Likewise.
- * trustlist.c (gpgme_op_trustlist_start): Likewise.
- * verify.c (_gpgme_op_verify_start): Likewise.

- * engine-backend.h (struct engine_ops): Remove member start.

- * engine.h (_gpgme_engine_start): Remove prototype.
- * engine.c (_gpgme_engine_start): Remove function.

2003-01-19 Miguel Coca <mcoca@gnu.org>

- * w32-io.c (_gpgme_io_select): Add missing argument in calls to
DEBUG_BEGIN.
- * w32-util.c: Include "sema.h".
- (find_program_in_registry): Change DEBUG1 to DEBUG2, fixes compilation
error.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

- * types.h: Remove byte and ulong types.
- * util.h (_gpgme_hextobyte): Change prototype to unsigned char
instead byte.
- * conversion.c (_gpgme_hextobyte): Change argument to unsigned
char instead byte.
- (_gpgme_decode_c_string): Likewise, and beautify. Also support a
few more escaped characters. Be more strict about buffer size.
- (_gpgme_data_append_percentstring_for_xml): Change
type of SRC,
BUF and DST to unsigned char instead byte.
- * progress.c (_gpgme_progress_status_handler): Use unsigned char
instead byte.
- * debug.c (trim_spaces): Likewise.

- * util.h (mk_error): Remove macro.
- * conversion.c, data.c, data-compat.c, decrypt.c, delete.c,
edit.c, encrypt.c, encrypt-sign.c, engine.c, engine-gpgsm.c,
export.c, genkey.c, gpgme.c, import.c, key.c, keylist.c,
passphrase.c, progress.c, recipient.c, runpgg.c, sign.c,

signers.c, trustlist.c, verify.c, wait.c, wait-global.c,
wait-private (literally everywhere): Expand the mk_error macro.

* context.h (wait_on_request_or_fail): Remove macro.

* context.h (gpgme_context_s): Remove member ERROR.

* types.h (GpgmeStatusHandler): Change return type to GpgmeError.

(GpgmeCommandHandler): Change return type to GpgmeError and add
new argument RESULT.

* gpgme.h (GpgmeIOCb): Change return type to GpgmeError.

(GpgmeEventIO): New event GPGME_EVENT_START.

(GpgmeIdleFunc): Remove type.

(gpgme_register_idle): Remove

prototype.

* data.c: Include <assert.h>.

(_gpgme_data_inbound_handler): Change return type to GpgmeError.

Return any error instead ignoring it, don't close file descriptor
on error.

(_gpgme_data_outbound_handler): Likewise.

* decrypt.c: Do not include <stdio.h>, <string.h> and <assert.h>.

(_gpgme_decrypt_status_handler): Change return type to GpgmeError.

Return error instead setting ctx->error. Return success at end of
function.

(gpgme_op_decrypt): Don't work around the old kludge anymore.

* decrypt-verify.c (decrypt_verify_status_handler): Change return
type to GpgmeError. Return possible errors.

* delete.c: Do not include <stdio.h>, <string.h>, <time.h> and
<assert.h>.

(delete_status_handler): Change return type to GpgmeError. Return

error instead setting ctx->error. Return success at end of
function.

* edit.c: Do not include <stdio.h> and <string.h>.

(_gpgme_edit_status_handler): Change type to GpgmeError,

make static and rename to ...

(edit_status_handler):

... this. Return error directly.

(command_handler): Change return type to GpgmeError, add result

argument. Return error directly.

* encrypt.c (status_handler_finish): Remove function.

(_gpgme_encrypt_status_handler): Change return type to GpgmeError.

Return error directly.

(_gpgme_encrypt_sym_status_handler): Likewise.

* encrypt-sign.c (encrypt_sign_status_handler): Likewise.

* engine-gpgsm.c (close_notify_handler): Do not signal done event
anymore.

(status_handler): Change return type to GpgmeError. Diddle things
around a bit to return errors directly.

(start): Send start event.

* export.c: Do not include <stdio.h>, <string.h> and <assert.h>.
 (export_status_handler): Change return type to GpgmeError. Don't check ctx->error.

* genkey.c: Do not include <stdio.h> and <assert.h>.
 (genkey_status_handler): Change return type to GpgmeError. Don't check ctx->error. Return errors directly.

* gpgme.c (_gpgme_release_result): Do not initialize ctx->error.
 (_gpgme_op_event_cb):
 Function removed.
 (_gpgme_op_event_cb_user): Likewise.

* import.c: Do not include <stdio.h>, <string.h> and <assert.h>.
 (import_status_handler): Change return type to GpgmeError. Don't check ctx->error.

* keylist.c (keylist_colon_handler, keylist_status_handler, finish_key):
 Change return type to GpgmeError, return error directly.

* Makefile (libgpgme_la_SOURCES): Add wait-global.c, wait-private.c and wait-user.c

* ops.h (test_and_allocate_result): Return error instead setting ctx->error.
 (_gpgme_data_inbound_handler, _gpgme_data_outbound_handler, _gpgme_verify_status_handler, _gpgme_decrypt_status_handler, _gpgme_sign_status_handler, _gpgme_encrypt_status_handler, _gpgme_passphrase_status_handler, _gpgme_progress_status_handler):
 Change return type to GpgmeError.

(_gpgme_passphrase_command_handler): Change return type to GpgmeError and add new argument RESULT.

* op-support.c: Use new callback functions, and change private data to ctx everywhere.

* passphrase.c
 (_gpgme_passphrase_status_handler): Change return type to GpgmeError, return error directly.
 (_gpgme_passphrase_command_handler): Change return type to GpgmeError, add result argument. Return results accordingly.

* progress.c (_gpgme_progress_status_handler): Change return type to GpgmeError, return errors directly.

* runpg.c (status_handler): Change return type to GpgmeError. Return error directly.
 (close_notify_handler): Don't send done event.
 (colon_line_handler): Change return type to GpgmeError, return errors directly.

* runpg.c (start): Send start event.

* sign.c (_gpgme_sign_status_handler): Change return type to GpgmeError, return errors directly.

* trustlist.c (trustlist_status_handler): Change return type to GpgmeError. Return 0.
 (trustlist_colon_handler): Change return type GpgmeError. Return errors directly.

* verify.c (add_notation): Change return type to GpgmeError,

return errors directly.
(_gpgme_verify_status_handler): Likewise.
* wait.h
(struct fd_table): Remove lock member.
(struct wait_item_s): Moved here from wait.c.
(struct tag): New structure.
(_gpgme_wait_event_cb): Remove prototype.
(_gpgme_wait_private_event_cb, _gpgme_wait_global_event_cb,
_gpgme_wait_user_add_io_cb, _gpgme_wait_user_remove_io_cb,
_gpgme_wait_user_event_io_cb): New prototypes.
* wait.c: Don't include <stdio.h>.
(fd_global, ctx_done_list, ctx_done_list_size,
ctx_done_list_length, ctx_done_list_lock, idle_function): Remove
global variable.
(gpgme_register_idle, do_select, _gpgme_wait_event_cb): Remove
function.
(gpgme_wait): Move to file wait-global.c.
(_gpgme_add_io_cb): Take ctx as private argument, initialize ctx
member in wait item and tag.
(_gpgme_remove_io_cb): Take ctx from tag. Don't use FDT lock.
(_gpgme_wait_one, _gpgme_wait_on_condition): Move to
wait-private.c.
(gpgme_fd_table_init): Don't initialize FDT->lock.
(gpgme_fd_table_deinit): Don't destroy FDT->lock.
(_gpgme_fd_table_put): Make static and rename to
...
(fd_table_put): ... this function. Don't use FDT->lock.
(struct wait_item_s): Move to wait.h.
* wait-global.c: New file.
* wait-private.c: New file.
* wait-user.c: New file.

* key.c (gpgme_key_sig_get_string_attr): Use validity_to_string
instead of trust_to_string to calculate validity.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* types.h (EngineObject): Move typedef to ...
* engine.h: ... here.
* types.h (GpgObject): Move typedef to ...
* runpg.c: ... here.
* types.h (GpgsmObject): Move typedef to ...
* engine-gpgsm.c: ... here.

* util.h (return_if_fail, return_null_if_fail,
return_val_if_fail): Remove macro.
* gpgme.c (gpgme_cancel): Don't use return_if_fail.
* key.c (gpgme_key_ref): Likewise.

* signers.c (gpgme_signers_enum): Likewise.
(gpgme_signers_clear): Likewise.

* engine-backend.h (struct engine_ops): Rename get_path to
get_file_name.
* gpgme.h (struct _gpgme_engine_info): Rename member path to
file_name.
* version.c: Do not include <stdio.h>,
<stdlib.h>, context.h and
util.h. Other clean ups.
(parse_version_number): Protect more seriously against
overflow.
(gpgme_get_engine_info): Move to ...
* engine.c (gpgme_get_engine_info): ... here.
(_gpgme_engine_get_info): Function removed.
(_gpgme_engine_get_path): Make static and rename to ...
(engine_get_file_name): .. this.
(_gpgme_engine_get_version): Make static and rename to ...
(engine_get_version): ... this.
(_gpgme_engine_get_req_version): Make static and rename to ...
(engine_get_req_version): ... this.
* engine.h (_gpgme_engine_get_path, _gpgme_engine_get_version,
_gpgme_engine_req_version, _gpgme_engine_get_info.): Remove
prototypes.

* gpgme.h (enum GpgmeProtocol): Remove GPGME_PROTOCOL_AUTO.
* gpgme.c (gpgme_set_protocol): Don't handle GPGME_PROTOCOL_AUTO.
(gpgme_get_protocol_name): New function.

* engine-backend.h (struct engine_ops): New member
get_req_version, remove member check_version.
* engine.h (_gpgme_Engine_get_version): New prototype.
*

rungpg.c (gpg_get_req_version): New function.
(gpg_check_version): Function removed.
(_gpgme_engine_ops_gpg): Add gpg_get_req_version, remove
gpg_check_version.
* engine-gpgsm.c (gpgsm_get_req_version): New function.
(gpgsm_check_version): Function removed.
(_gpgme_engine_ops_gpgsm): Add gpgsm_get_req_version, remove
gpgsm_check_version.
* engine.c: Include ops.h.
(_gpgme_engine_get_req_version): New function.
(gpgme_engine_check_version): Rewritten.
* version.c (gpgme_get_engine_info): Rewritten.
* gpgme.h (gpgme_engine_info): New structure.
(GpgmeEngineInfo): New type.

2003-01-06 Werner Koch <wk@gnupg.org>

* keylist.c (set_mainkey_capability): Handle 'd' and 'D' used since gpg 1.3 to denote disabled keys.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c: Include <string.h>.
* engine.c: Likewise.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libpgpme_la_DEPENDENCIES): Correct bug in last change.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_op_verify, gpgme_op_decrypt_verify): Drop R_STAT argument.
* decrypt-verify.c (gpgme_op_decrypt_verify): Drop R_STAT argument.
* verify.c (gpgme_op_verify): Drop R_STAT argument.
(_gpgme_intersect_stati): Function removed.
* ops.h (_gpgme_intersect_stati): Remove prototype.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* libpgpme.vers: New file.
* Makefile.am (EXTRA_DIST): Add libpgpme.vers.
(libpgpme_version_script_cmd): New variable.
(libpgpme_la_LDFLAGS): Add libpgpme_version_script_cmd here.
(libpgpme_la_DEPENDENCIES): New variable.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* key.c (gpgme_key_get_string_attr): Don't accept GPGME_ATTR_IS_SECRET.
(otrust_to_string): New function.
(gpgme_key_get_as_xml): Use it.
(validity_to_string): New function.
(gpgme_key_get_string_attr): Beautify using above functions.
(gpgme_key_get_ulong_attr): Likewise.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c
(mem_release): Fix gcc warning.
* data-user.c (user_release): Likewise.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

- * data.h (gpgme_data_release_cb): Change return type to void.
- (gpgme_data_read_cb): Change return type to ssize_t.
- * data.c (gpgme_data_read): Likewise.
- * data-stream.c (stream_read): Likewise.
- * data-fd.c (fd_read): Likewise.
- * data-mem.c (mem_read): Likewise.
- (mem_release): Change return type to void.
- * data-user.c (user_read): Change return type to ssize_t.
- (user_release): Change return type to void.
- * data-compat.c (old_user_read): Change return type to ssize_t.
- * gpgme.h (GpgmeDataReadCb): Likewise.
- (gpgme_data_read): Likewise.
- (GpgmeDataSeekCb): Change return type to off_t.

2002-12-04 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h: Add prototype for gpgme_get_key.
- * key.c (gpgme_get_key): New function.
- * verify.c (gpgme_get_sig_key): Rewrite using gpgme_get_key.

- * gpgme.h: Add prototypes for new interfaces
gpgme_key_sig_get_string_attr
and gpgme_key_get_ulong_attr.
(enum GpgmeAttr): New attribute GPGME_ATTR_SIG_CLASS.
- * gpgme.c (gpgme_set_keylist_mode): Allow GPGME_KEYLIST_MODE_SIGS.
- * key.h (struct certsig_s): New members ALGO, NAME_PART,
EMAIL_PART, COMMENT_PART, NAME, SIG_STAT and SIG_CLASS.

- * conversion.c (_gpgme_decode_c_string): Add new parameter LEN.
Use that to determine if allocation is desired or not.
- * util.h: Adjust prototype of _gpgme_decode_c_string.
- * keylist.c (keylist_colon_handler): Adjust caller of
_gpgme_decode_c_string.

- * key.h (struct gpgme_key_s): New member last_uid.
- * key.c (_gpgme_key_append_name): Rewritten using
_gpgme_decode_c_string and the last_uid pointer.
- (my_isdigit): Macro removed.
- (ALLOC_CHUNK): Likewise.
- * keylist.c (set_userid_flags): Use last_uid member of KEY.

- * context.h (struct user_id_s): New member last_certsig.
- * key.h: Add prototype for _gpgme_key_add_certsig.
- * key.c (_gpgme_key_add_certsig): New function.
- (set_user_id_part): Move function

before `_gpgme_key_add_certsig`.
(`parse_user_id`): Change first argument to SRC, add new arguments NAME, EMAIL and COMMENT. Change code to use these arguments instead going through UID. Move function before `_gpgme_add_certsig`.
(`parse_x509_user_id`): Likewise.
(`_gpgme_key_append_name`): Adjust arguments to `parse_x509_user_id` and `parse_user_id` invocation.
(`one_certsig_as_xml`): New function.
(`one_uid_as_xml`): Print signatures.
* `context.h` (struct `gpgme_context_s`): New member `TMP_UID`.
* `keylist.c` (`keylist_colon_handler`): Rewritten, implement "sig" record entries.

* `key.c` (`get_certsig`): New function.
(`gpgme_key_sig_get_string_attr`): Likewise.
(`gpgme_key_sig_get_ulong_attr`): Likewise.

* `keylist.c`: Include `<ctype.h>`.
(`my_isdigit`): Macro removed.
(`set_mainkey_trust_info`): Use `isdigit`, not `my_isdigit`.
(`set_userid_flags`): Likewise.
(`set_subkey_trust_info`): Likewise.
(`set_ownertrust`): Likewise.
(`finish_key`): Move function up a bit and remove prototype.

* `rungpg.c` (`gpg_keylist_ext`):
Correct precedence of signature listing mode.
(`gpg_keylist_ext`): Implement signature listing mode.

2002-11-25 Marcus Brinkmann <marcus@g10code.de>

* `rungpg.c` (`_gpgme_gpg_spawn`): Do not set parent fds to -1.
* `posix-io.c` (`_gpgme_io_spawn`): Call `_gpgme_io_close` instead close for parent fds.
* `w32-io.c` (`_gpgme_io_spawn`): Call `_gpgme_io_close` instead `CloseHandle` for parent fds.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

* `gpgme.h` [`_MSC_VER`]: Define `ssize_t` as long.

2002-11-22 Werner Koch <wk@gnupg.org>

* `engine-gpgsm.c` (`_gpgme_gpgsm_new`): Save the result of a first `setlocale` before doing another `setlocale`.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* decrypt.c: Some beautification.

* verify.c (_gpgme_verify_status_handler): Treat
GPGME_STATUS_UNEXPECTED like GPGME_STATUS_NODATA.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* genkey.c: Only include <config.h> if [HAVE_CONFIG_H].
(struct
genkey_result_s): Add new member FPR.
(_gpgme_release_genkey_result): Free RESULT->fpr if set.
(genkey_status_handler): Extract the fingerprint from the status
line.
(gpgme_op_genkey): Add new argument FPR and return the fingerprint
in it.
* gpgme.h: Adjust prototype of gpgme_op_genkey.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* runpg.c (gpg_keylist): Add --with-fingerprint to gpg invocation
twice, to get fingerprints on subkeys. Suggested by Timo Schulz
<twoaday@freakmail.de>.
(gpg_keylist_ext): Likewise.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

* import.c (append_xml_impinfo): Use
_gpgme_data_append_string_for_xml rather than
_gpgme_data_append_string for the field content.
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

* runpg.h, engine-gpgsm.h: File removed.
* engine-backend.h: New file.
* Makefile.am (gpgsm_components): New variable, set depending on
automake conditional HAVE_GPGSM.
(libgpgme_la_SOURCES):
Add engine-backend.h, remove runpg.h and
engine-gpgsm.h. Replace engine-gpgsm.c with \${gpgsm_components}.
(status-table.h): Depend on gpgme.h, not runpg.h.
* conversion.c: Include <stdlib.h>.
* engine-gpgsm.c: Do not set ENABLE_GPGSM here. Include
"engine-backend.h" instead "engine-gpgsm.h". Reorder some
functions and remove all function prototypes.

(_gpgme_gpgsm_get_version): Make static and rename to ...
(gpgsm_get_version): ... this.
(_gpgme_gpgsm_check_version): Make static and rename to ...
(gpgsm_check_version): ... this.
(_gpgme_gpgsm_new): Make static. Change argument type from GpgsmObject * to void **. Call gpgsm_release instead
_gpgme_gpgsm_release.
(_gpgme_gpgsm_op_decrypt): Make static and rename to ...
(gpgsm_check_decrypt): ... this.
(_gpgme_gpgsm_op_delete): Make static and rename to ...
(gpgsm_check_delete): ... this.
(_gpgme_gpgsm_set_recipients): Make static and rename to ...
(gpgsm_check_set_recipients): ... this.
(_gpgme_gpgsm_op_encrypt):
Make static and rename to ...
(gpgsm_encrypt): ... this.
(_gpgme_gpgsm_op_export): Make static and rename to ...
(gpgsm_export): ... this.
(_gpgme_gpgsm_op_genkey): Make static and rename to ...
(gpgsm_genkey): ... this.
(_gpgme_gpgsm_op_import): Make static and rename to ...
(gpgsm_import): ... this.
(_gpgme_gpgsm_op_keylist): Make static and rename to ...
(gpgsm_keylist): ... this.
(_gpgme_gpgsm_op_keylist_ext): Make static and rename to ...
(gpgsm_keylist_ext): ... this.
(_gpgme_gpgsm_op_sign): Make static and rename to ...
(gpgsm_sign): ... this.
(_gpgme_gpgsm_op_trustlist): Make static and rename to ...
(gpgsm_trustlist): ... this.
(_gpgme_gpgsm_op_verify): Make static and rename to ...
(gpgsm_verify): ... this.
(gpgsm_status_handler): Rename to ...
(status_handler): ... this.
(_gpgme_gpgsm_set_status_handler): Make static and rename to ...
(gpgsm_set_status_handler): ... this.
(_gpgme_gpgsm_set_colon_line_handler): Make static
and rename to ...
(gpgsm_set_colon_line_handler): ... this.
(_gpgme_gpgsm_add_io_cb): Rename to ...
(add_io_cb): ... this.
(_gpgme_gpgsm_start): Make static and rename to ...
(gpgsm_start): ... this.
(_gpgme_gpgsm_set_io_cb): Make static and rename to ...
(gpgsm_set_io_cb): ... this.
(_gpgme_gpgsm_io_event): Make static and rename to ...
(gpgsm_io_event): ... this.
(struct _gpgme_engine_ops_gpgsm): New variable.

[!ENABLE_GPGSM]: Removed.

* engine.c: Do not include <time.h>, <sys/types.h>, <string.h>, <assert.h>, "io.h", "runggpg.h" and "engine-gpgsm.h". Include <stdlib.h> and "engine-backend.h".

(struct engine_object_s): Rewritten.

(engine_ops): New variable.

* engine.c (_gpgme_engine_get_path, _gpgme_engine_get_version, _gpgme_engine_check_version, _gpgme_engine_new, _gpgme_engine_release, _gpgme_engine_set_verbosity, _gpgme_engine_set_status_handler, _gpgme_engine_set_command_handler, _gpgme_engine_set_colon_line_handler, _gpgme_engine_op_decrypt, _gpgme_engine_op_delete, _gpgme_engine_op_edit, _gpgme_engine_op_encrypt, _gpgme_engine_op_encrypt_sign, _gpgme_engine_op_export, _gpgme_engine_op_genkey, _gpgme_engine_op_import, _gpgme_engine_op_keylist, _gpgme_engine_op_keylist_ext, _gpgme_engine_op_sign, _gpgme_engine_op_trustlist, _gpgme_engine_op_verify, _gpgme_engine_start, _gpgme_engine_set_io_cbs, _gpgme_engine_io_event): Reimplement.

* engine.h: Fix a few comments and a variable name in a prototype.

* ops.h: Do not include "runggpg.h".

* passphrase.c: Include config.h only if [HAVE_CONFIG_H]. Do not include "runggpg.h".

* recipient.c: Likewise.

* signers.c: Likewise.

* version.c: Likewise.

* runngpg.c: Likewise. Include "engine-backend.h". Reorder functions and remove prototypes.

(_gpgme_gpg_get_version): Make static and rename to ...

(gpg_get_version): ... this.

(_gpgme_gpg_check_version): Make static and rename to ...

(gpg_check_version): ... this.

(_gpgme_gpg_new): Make static. Change argument type from GpgObject

* to void **. Call gpg_release instead

_gpgme_gpg_release.

(_gpgme_gpg_op_decrypt): Make static and rename to ...

(gpg_check_decrypt): ... this.

(_gpgme_gpg_op_delete): Make static and rename to ...

(gpg_check_delete): ... this.

(_gpgme_gpg_set_recipients): Make static and rename to ...

(gpg_check_set_recipients): ... this.

(_gpgme_gpg_op_encrypt): Make static and rename to ...

(gpg_encrypt): ... this.

(_gpgme_gpg_op_export): Make static and rename to ...

(gpg_export): ... this.

(_gpgme_gpg_op_genkey): Make static and rename to ...
(gpg_genkey): ... this.
(_gpgme_gpg_op_import): Make static and rename to ...
(gpg_import): ... this.
(_gpgme_gpg_op_keylist): Make static and rename to ...
(gpg_keylist): ... this.
(_gpgme_gpg_op_keylist_ext): Make static and rename to ...
(gpg_keylist_ext): ... this.
(_gpgme_gpg_op_sign): Make static and rename to ...
(gpg_sign): ... this.
(_gpgme_gpg_op_trustlist): Make static and rename to ...
(gpg_trustlist): ... this.
(_gpgme_gpg_op_verify):
Make static and rename to ...
(gpg_verify): ... this.
(gpg_status_handler): Rename to ...
(status_handler): ... this.
(_gpgme_gpg_set_status_handler): Make static and rename to ...
(gpg_set_status_handler): ... this.
(_gpgme_gpg_set_colon_line_handler): Make static and rename to ...
(gpg_set_colon_line_handler): ... this.
(gpgme_gpg_add_io_cb): Rename to ...
(add_io_cb): ... this.
(_gpgme_gpg_start): Make static and rename to ...
(gpg_start): ... this.
(_gpgme_gpg_set_io_cb): Make static and rename to ...
(gpg_set_io_cb): ... this.
(_gpgme_gpg_io_event): Make static and rename to ...
(gpg_io_event): ... this.
(struct _gpgme_engine_ops_gpg): New variable.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify) [ENABLE_GPGSM]: Add missing argument.

2002-10-09 Marcus Brinkmann <marcus@g10code.de>

* data.h, data-user.c, data-stream.c, data-mem.c, data-fd.c, data-compat.c: New file. Really check them in this time, completes

2002-10-08 change.

* rungpg.h (GpgStatusHandler): Rename type to GpgmeStatusHandler and move to ...

* types.h (GpgmeStatusHandler): ... here.

* rungpg.h (GpgColonLineHandler): Rename type to GpgmeColonLineHandler. and move to ...

* types.h (GpgmeColonLineHandler): ... here.

* runpgg.h (GpgCommandHandler): Rename type to GpgmeCommandHandler.
and move to ...

* types.h (GpgmeCommandHandler): ... here.

* engine.h: Don't include "runpgg.h".

(_gpgme_engine_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.

(_gpgme_engine_set_colon_line_handler): Change type of
argument from GpgColonLineHandler to GpgmeColonLineHandler.

(_gpgme_engine_set_command_handler): Change type of
argument from GpgCommandHandler to GpgmeCommandHandler.

* engine-gpgsm.h: Don't include "runpgg.h".

(_gpgme_gpgsm_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.

(_gpgme_gpgsm_set_colon_line_handler): Change type
of
argument from GpgColonLineHandler to GpgmeColonLineHandler.

* engine-gpgsm.c: Do not include "runpgg.h".

(struct gpgsm_object_s): Change type of
status.fnc to GpgmeStatusHandler. Change type of colon.fnc to
GpgmeColonLineHandler.

(gpgsm_assuan_simple_command): Change type of argument from
GpgStatusHandler to GpgmeStatusHandler.

(_gpgme_gpgsm_set_status_handler): Likewise.

(_gpgme_gpgsm_set_colon_line_handler): Change type of argument from
GpgColonLineHandler to GpgmeColonLineHandler.

* runpgg.h (_gpgme_gpg_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.

(_gpgme_gpg_set_colon_line_handler): Change type of
argument from GpgColonLineHandler to GpgmeColonLineHandler.

(_gpgme_gpg_set_command_handler): Change type of
argument from GpgCommandHandler to GpgmeCommandHandler.

* runpgg.c (struct gpg_object_s): Change type of status.fnc to
GpgmeStatusHandler. Change type of colon.fnc to
GpgmeColonLineHandler. Change type of cmd.fnc
to
GpgmeCommandLineHandler.

(_gpgme_gpg_set_status_handler): Change type of argument FNC to
GpgmeStatusHandler.

(_gpgme_gpg_set_colon_line_handler): Change type of argument FNC
to GpgmeColonLineHandler.

(_gpgme_gpg_set_command_handler): Change type of argument FNC to
GpgmeCommandHandler.

* engine.c (_gpgme_engine_set_status_handler): Change type of
argument FNC to GpgmeStatusHandler.

(_gpgme_engine_set_colon_line_handler): Change type of argument FNC
to GpgmeColonLineHandler.

(_gpgme_engine_set_command_handler): Change type of argument FNC to

GpgmeCommandHandler.

* `rungpg.h` (`_gpgme_gpg_enable_pipemode`): Remove prototype.

* `rungpg.c` (`struct gpg_object_s`): Remove PM.

(`pipemode_cb`): Prototype removed.

(`add_pm_data`): Function removed.

(`_gpgme_gpg_enable_pipemode`): Likewise.

(`pipemode_copy`): Likewise.

(`pipemode_cb`): Likewise.

(`add_arg`): Don't check for pipemode.

(`add_data`): Likewise.

(`_gpgme_gpg_set_status_handler`): Likewise.

(`_gpgme_gpg_set_colon_line_handler`):
Likewise.

(`_gpgme_gpg_set_command_handler`): Likewise.

(`_gpgme_gpg_spawn`): Likewise.

(`_gpgme_gpg_spawn`): Don't set PM.active.

(`_gpgme_gpg_op_verify`): Remove pipemode case.

* `verify.c` (`_gpgme_op_verify_start`): Remove pipemode case.

* `rungpg.h` (`_gpgme_gpg_add_arg`, `_gpgme_gpg_add_data`,
`_gpgme_gpg_add_pm_data`, `_gpgme_gpg_housecleaning`,
`_gpgme_gpg_set_simple_line_handler`): Prototype removed.

(`_gpgme_gpg_set_verbosity`): New prototype.

* `rungpg.c` (`_gpgme_gpg_add_data`): Make static and rename to ...

(`add_data`): ... this.

(`_gpgme_gpg_add_pm_data`): Call `add_data`, not `_gpgme_gpg_add_data`.

(`_gpgme_gpg_set_command_handler`): Likewise.

(`_gpgme_gpg_op_decrypt`, `_gpgme_gpg_op_edit`, `_gpgme_gpg_op_encrypt`,
`_gpgme_gpg_op_encrypt_sign`, `_gpgme_gpg_op_export`,
`_gpgme_gpg_op_genkey`, `_gpgme_gpg_op_import`, `_gpgme_gpg_op_sign`,
`_gpgme_gpg_op_verify`): Likewise.

(`_gpgme_gpg_add_pm_data`): Rename to ...

(`add_pm_data`): ... this.

(`_gpgme_gpg_op_verify`): Call `add_pm_data`, not
`_gpgme_gpg_add_pm_data`.

(`_gpgme_gpg_add_arg`):
Make static and rename to ...

(`add_arg`): ... this.

(`_gpgme_gpg_set_command_handler`, `_gpgme_gpg_new`,
`_gpgme_gpg_op_decrypt`, `_gpgme_gpg_op_delete`,
`_gpgme_append_gpg_args_from_signers`, `_gpgme_gpg_op_edit`,
`_gpgme_append_gpg_args_from_recipients`, `_gpgme_gpg_op_encrypt`,
`_gpgme_gpg_op_encrypt_sign`, `_gpgme_gpg_op_export`,
`_gpgme_gpg_op_genkey`, `_gpgme_gpg_op_import`, `_gpgme_gpg_op_keylist`,
`_gpgme_gpg_op_keylist_ext`, `_gpgme_gpg_op_trustlist`,
`_gpgme_gpg_op_sign`, `_gpgme_gpg_op_verify`): Use `add_arg`, not
`_gpgme_gpg_add_arg`.

(_gpgme_gpg_set_verbosity): New function.
(struct gpg_object_s): Remove member simple from colon.
(_gpgme_gpg_set_colon_line_handler): Don't initialize simple.
(_gpgme_gpg_set_simple_line_handler): Removed function.
(read_colon_line): Don't check the GPG->colon.simple.
* engine.c (_gpgme_engine_set_verbosity): Call
_gpgme_gpg_set_verbosity instead _gpgme_gpg_add_arg.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

* util.h (_gpgme_malloc,
_gpgme_realloc, _gpgme_calloc,
_gpgme_strdup, _gpgme_free): Remove prototypes.
(xtrymalloc, xtrycalloc, xtryrealloc, xtrystrdup, xfree): Remove
macros.
* util.c: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove util.h.
* conversion.c (_gpgme_decode_c_string): Use malloc instead of
xtrymalloc, realloc instead of xtryrealloc, calloc instead of
xtrycalloc, free instead of xfree.
(_gpgme_data_append_percentstring_for_xml): Likewise.
* data.c (_gpgme_data_new, _gpgme_data_release): Likewise.
* data-compat.c (gpgme_data_new_from_filepart): Likewise.
* data-mem.c (mem_write, mem_release, gpgme_data_new_from_mem,
_gpgme_data_get_as_string): Likewise.
* debug.c (debug_init): Likewise.
* decrypt.c (_gpgme_release_decrypt_result): Likewise.
* delete.c (_gpgme_release_delete_result): Likewise.
* edit.c (_gpgme_release_edit_result, _gpgme_op_edit_start):
Likewise.
* encrypt.c (_gpgme_release_encrypt_result): Likewise.
* engine.c (_gpgme_engine_get_info, _gpgme_engine_new,
_gpgme_engine_release):
Likewise.
* engine-gpgsm.c (_gpgme_gpgsm_new, _gpgme_gpgsm_release,
_gpgme_gpgsm_op_decrypt, _gpgme_gpgsm_op_delete,
gpgsm_set_recipients, _gpgme_gpgsm_op_encrypt,
_gpgme_gpgsm_op_export, _gpgme_gpgsm_op_genkey,
_gpgme_gpgsm_op_import, _gpgme_gpgsm_op_keylist,
_gpgme_gpgsm_op_keylist_ext, _gpgme_gpgsm_op_sign,
_gpgme_gpgsm_op_verify, gpgsm_status_handler): Likewise.
* genkey.c (_gpgme_release_genkey_result): Likewise.
* gpgme.c (gpgme_new, gpgme_release): Likewise.
* import.c (_gpgme_release_import_result): Likewise.
* key.c (_gpgme_key_cache_init, _gpgme_key_cache_add, key_new,
add_subkey, gpgme_key_release, _gpgme_key_append_name): Likewise.
* keylist.c (_gpgme_release_keylist_result, keylist_colon_handler,
_gpgme_op_keylist_event_cb, gpgme_op_keylist_next): Likewise.

- * ops.h (test_and_allocate_result): Likewise.
- * passphrase.c (_gpgme_release_passphrase_result, _gpgme_passphrase_status_handler, _gpgme_passphrase_command_handler): Likewise.
- *
- progress.c (_gpgme_progress_status_handler): Likewise.
- * recipient.c (gpgme_recipients_new, gpgme_recipients_release, gpgme_recipients_add_name_with_validity): Likewise.
- * runpgc.c (_gpgme_gpg_new, _gpgme_gpg_release, _gpgme_gpg_add_arg, _gpgme_gpg_add_data, _gpgme_gpg_set_colon_line_handler, free_argv, free_fd_data_map, build_argv, _gpgme_gpg_spawn, read_status, read_colon_line): Likewise.
- * sign.c (_gpgme_release_sign_result): Likewise.
- * signers.c (_gpgme_signers_add): Likewise.
- * trustlist.c (trust_item_new, trustlist_colon_handler, _gpgme_op_trustlist_event_cb, gpgme_op_trustlist_next, gpgme_trustitem_release): Likewise.
- * verify.c (_gpgme_release_verify_result, finish_sig): Likewise.
- * version.c (gpgme_get_engine_info, _gpgme_get_program_version): Likewise.
- * w32-io.c (create_reader, create_writer, destroy_reader, destroy_writer, build_commandline, _gpgme_io_spawn): Likewise.
- * w32-sema.c (critsect_init, _gpgme_sema_cs_destroy): Likewise.
- * w32-util.c (read_w32_registry_string): Likewise.
- * wait.c (_gpgme_fd_table_deinit, _gpgme_fd_table_put, _gpgme_wait_event_cb, _gpgme_add_io_cb, _gpgme_remove_io_cb)
- * data-compat.c: Include <stdlib.h>.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

New data object component:

- * gpgme.h (GpgmeDataReadCb, GpgmeDataWriteCb, GpgmeDataSeekCb, GpgmeDataReleaseCb): New types.
- (struct GpgmeDataCbs): New structure.
- (gpgme_data_read): Changed prototype to match that of read() closely.
- (gpgme_data_write): Similar for write().
- (gpgme_data_seek, gpgme_data_new_from_cbs, gpgme_data_new_from_fd, gpgme_data_new_from_stream): New prototypes.
- (gpgme_data_get_type, gpgme_check_engine): Prototype removed.
- * Makefile.am (libgpgme_la_SOURCES): Add data.h, data-fd.c, data-stream.c, data-mem.c, data-user.c and data-compat.c.
- * data.c: Reimplemented from scratch.
- * (data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c, data-user.c): New file.

- * context.h (struct gpgme_data_s): Removed.
- * conversion.c:
- Include <errno.h> and <sys/types.h>.
- (_gpgme_data_append): New function.
- * data.c (_gpgme_data_append_string): Move to ...
- * conversion.c (_gpgme_data_append_string): ... here.
- * data.c (_gpgme_data_append_for_xml): Move to ...
- * conversion.c (_gpgme_data_append_for_xml): ... here.
- * data.c (_gpgme_data_append_string_for_xml): Move to ...
- * conversion.c (_gpgme_data_append_string_for_xml): ... here.
- * data.c (_gpgme_data_append_percentstring_for_xml): Move to ...
- * conversion.c (_gpgme_data_append_percentstring_for_xml): ... here.

- * ops.h (_gpgme_data_get_mode, _gpgme_data_set_mode): Prototype removed.
- * types.h (GpgmeDataMode): Type removed.

- * decrypt.c (_gpgme_decrypt_start): Don't check data type or mode.
- * edit.c (_gpgme_op_edit_start): Likewise.
- * encrypt.c (_gpgme_op_encrypt_start): Likewise.
- * encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
- * encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
- * export.c (_gpgme_op_export_start): Likewise.
- *
- genkey.c (_gpgme_op_genkey_start): Likewise.
- * import.c (_gpgme_op_import_start): Likewise.
- * sign.c (_gpgme_op_sign_start): Likewise.
- * verify.c (_gpgme_op_verify_start): Likewise.

- * encrypt.c (gpgme_op_encrypt): Remove hack that returns invalid no recipient if no data was returned.
- * encrypt-sign.c (gpgme_op_encrypt_sign): Remove hack that returns no recipient if no data was returned.
- * encrypt-sign.c (gpgme_op_encrypt_sign): Remove hack that returns no recipient if no data was returned.

- * engine.c (_gpgme_engine_op_verify): Add new argument to differentiate detached from normal signatures.
- * engine.h (_gpgme_engine_op_verify): Likewise for prototype.
- * engine-gpgsm.c (_gpgme_gpgsm_op_verify): Likewise. Don't check mode of data argument.
- * engine-gpgsm.h (_gpgme_gpgsm_op_verify): Likewise for prototype.
- * gpgme.h (gpgme_op_verify_start): Likewise for prototype.
- (gpgme_op_verify): Likewise for prototype.
- * runpg.c (_gpgme_gpg_op_verify): Likewise.
- * runpg.h
- (_gpgme_gpg_op_verify): Likewise for prototype.
- * verify.c (_gpgme_op_verify_start): Likewise.

(gpgme_op_verify_start): Likewise.

(gpgme_op_verify): Likewise.

* `runpgg.c` (struct `arg_and_data_s`): New member `INBOUND` to hold direction of data object.

(`_gpgme_gpg_add_data`): Add new argument `INBOUND`. Use it to determine direction of data object.

(`_gpgme_gpg_add_pm_data`, `_gpgme_gpg_set_command_handler`, `_gpgme_gpg_op_decrypt`, `_gpgme_gpg_op_edit`, `_gpgme_gpg_op_encrypt`, `_gpgme_gpg_op_encrypt_sign`, `_gpgme_gpg_op_export`, `_gpgme_gpg_op_genkey`, `_gpgme_gpg_op_import`, `_gpgme_gpg_op_sign`, `_gpgme_gpg_op_verify`): Add new argument to `_gpgme_gpg_add_data` invocation.

(`build_argv`): Use new member `INBOUND` to determine direction of file descriptor. Don't check the data type.

* `runpgg.h` (`_gpgme_gpg_add_data`): Add new argument to prototype.

* `gpgme.c` (`gpgme_get_op_info`): Don't call `_gpgme_data_get_as_string` if `CTX->op_info` is `NULL`.

* `version.c` (`gpgme_check_engine`): Function removed.

2002-09-30

Werner Koch <wk@gnupg.org>

* `keylist.c` (`keylist_colon_handler`): Take care when printing a `NULL` with the `DEBUG`.

* `engine-gpgsm.c` (struct `gpgsm_object_s`): New member `ANY`.
(`gpgsm_status_handler`): Run the colon function to indicate EOF.
(`_gpgme_gpgsm_set_colon_line_handler`): Better reset `ANY` here.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

* `conversion.c` (`_gpgme_hextobyte`): Prevent superfluous multiplication with base. Reported by Stphane Corthisy.

* `keylist.c` (`gpgme_op_keylist_ext_start`): Use private asynchronous operation type in invocation of `_gpgme_op_reset`.

2002-09-20 Werner Koch <wk@gnupg.org>

* `ath.c`: Include `sys/time.h` if `sys/select.h` is not available.

2002-09-13 Marcus Brinkmann <marcus@g10code.de>

* `keylist.c` (`keylist_status_handler`): Do not call `finish_key()` here.

(`gpgme_op_keylist_ext_start`): Set `CTX->tmp_key` to `NULL`.

2002-09-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (assuan_libobjs): Remove @LTLIBOBJS@ as we link them into gpgme unconditionally.
(libgpgme_la_LIBADD): Change @LIBOBJS@ into @LTLIBOBJS@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (assuan_libobjs): Use @LTLIBOBJS@ instead @LIBOBJS@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* debug.c (_gpgme_debug_add): Test *LINE, not LINE.
(_gpgme_debug_end): Likewise.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* posix-io.c (_gpgme_io_select): Don't use a non-constant struct initializer.
* version.c (_gpgme_get_program_version): Likewise.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* conversion.c (_gpgme_decode_c_string): Set DESTP before modifying DEST.

* conversion.c (_gpgme_decode_c_string): Fix off by one error in last change.
* runpg.c (_gpgme_append_gpg_args_from_signers): Move before _gpgme_op_edit so its prototype is known early on.

* conversion.c: New file.
* util.h: Add prototypes for _gpgme_decode_c_string and _gpgme_hextobyte.
* keylist.c (keylist_colon_handler): Call _gpgme_decode_c_string on issuer name.
* Makefile.am (libgpgme_la_SOURCES): Add conversion.c
* key.c (_gpgme_key_append_name): Replace calls to hextobyte by calls to _gpgme_hextobyte.
(hash_key): Likewise.

2002-09-01 Marcus Brinkmann <marcus@g10code.de>

* op-support.c (_gpgme_op_reset): Set CTX->pending after calling _gpgme_engine_release, as this will reset pending to zero in the event done callback on cancelled operations.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

* runpgg.c (_gpgme_gpg_op_edit): Add args from signers.
Suggested by Miguel Coca <e970095@zipi.fi.upm.es>.

* runpgg.c (_gpgme_gpg_op_edit): Add bogus ctx argument.
* runpgg.h: Also to prototype.
* engine.c (_gpgme_engine_op_edit): Likewise.
* engine.h: Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.

2002-08-29 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign):
Implement signer
selection.
* vasprintf.c (va_copy): Define macro if not yet defined.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Reset
CTX->result.passphrase->no_passphrase if passphrase is given (good
or bad). Submitted by Jean DIRAISON <jean.diraison@free.fr>.

2002-08-28 Marcus Brinkmann <marcus@g10code.de>

* posix-io.c (_gpgme_io_spawn): Use a double-fork approach.
Return 0 on success, -1 on error.
* version.c (_gpgme_get_program_version): Don't wait for the child.
* engine.c (_gpgme_engine_housecleaning): Function removed.
(do_reaping): Likewise.
(_gpgme_engine_add_child_to_reap_list): Likewise.
(struct reap_s): Removed.
(reap_list): Likewise.
(reap_list_lock): Likewise.
* engine.h (_gpgme_engine_io_event): Remove prototypes for
_gpgme_engine_housecleaning and
_gpgme_engine_add_child_to_reap_list.
* runpgg.c (_gpgme_gpg_release): Don't add child to reap list.
(struct gpg_object_s): Remove
PID member.
(_gpgme_gpg_new): Don't initialize GPG->pid.
(_gpgme_gpg_spawn): Don't set GPG->pid.
* wait.c (run_idle): Removed.

(gpgme_wait): Run idle_function directly.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* encrypt-sign.c (encrypt_sign_status_handler): Remove dead variables encrypt_info and encrypt_info_len.

* trustlist.c (gpgme_op_trustlist_start): Set colon line handler.

* posix-sema.c (sema_fatal): Remove function.

All these reported by Stphane Corthsy.

2002-08-23 Werner Koch <wk@gnupg.org>

* gpgme-config.in: Made --prefix work for --libs.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* ath.h: Update list of symbols that get a prefix: Rename the ath_mutex_*_available symbols to ath_*_available.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* stpcpy.c: New file from gnulib.

* Makefile.am (assuan_libobjs): Remove jnlib.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_op_import_ext.

* import.c

(struct import_result_s): New member `nr_considered'.

Rename `any_imported' to `nr_imported'.

(import_status_handler): Increment nr_imported. Set nr_considered if appropriate.

(gpgme_op_import_ext): New function.

(gpgme_op_import): Implement in terms of gpgme_op_import_ext.

2002-08-20 Werner Koch <wk@gnupg.org>

* gpgme.m4: Replaced with a new and faster version. This does not anymore try to build test programs. If we really need test programs, we should add an option to gpgme-config to do so.

* vasprintf.c (int_vasprintf): Hack to handle NULL passed for %s.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (_gpgme_set_op_info): Append data on subsequent calls.

* encrypt-sign.c (encrypt_sign_status_handler): Remove op_info handling.

2002-08-19 Werner Koch <wk@gnupg.org>

- * decrypt.c (is_token, skip_token): Duplicated from verify.c
- (gpgme_op_decrypt): Hack to properly return Decryption_Failed..
- (_gpgme_decrypt_status_handler): Create an operation info.

2002-08-14

Werner Koch <wk@gnupg.org>

- * key.h (struct certsig_s): New. Use it in gpgme_key_s.
- * key.c (gpgme_key_release): Release it. We need to add more code of course.
- (_gpgme_key_append_name): Use memset to initialize the struct.
- * gpgme.h (GPGME_KEYLIST_MODE_SIGS): New.
- * runpg.c (_gpgme_gpg_op_keylist): Include sigs in listing depending non the list mode.

- * key.c (gpgme_key_get_string_attr): Use GPGME_ATTR_TYPE to return information about the key type (PGP or X.509).
- (gpgme_key_get_ulong_attr): Likewise.

- * keylist.c (keylist_colon_handler): Include 1 in the check for valid algorithms so that RSA is usable. Store the issuer name and serial number also for "crs" records. Parse the expire date for subkeys.
- (set_userid_flags): Put them onto the last appended key.

2002-07-29 Marcus Brinkmann <marcus@g10code.de>

- * runpg.c (_gpgme_gpg_op_edit): Use --with-colons.

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

- * data.c (gpgme_data_read): For GPGME_DATA_TYPE_NONE, return EOF instead an error.

The following changes make it possible to flush an inbound data pipe before invoking a command handler:

- * posix-io.c (_gpgme_io_select): Accept new argument NONBLOCK to _gpgme_io_select. Set timeout of 0 if this is set.
- * w32-io.c (_gpgme_io_select): Likewise.
- * io.h: Add new argument NONBLOCK to _gpgme_io_select prototype.
- * wait.c (do_select): Add new argument to _gpgme_io_select invocation.
- * runpg.h (_gpgme_gpg_set_command_handler): Add new argument

linked_data to prototype.

- * engine.h (_gpgme_engine_set_command_handler): Likewise.
- * engine.c (_gpgme_engine_set_command_handler): Likewise.
- * passphrase.c (_gpgme_passphrase_start): Pass NULL as linked_data argument to _gpgme_engine_set_command_handler.
- * runpg.c (struct gpg_object_s): New members linked_data and linked_idx in CMD.
- (_gpgme_gpg_new): Initialize those new members.
- (_gpgme_gpg_set_command_handler): Accept new argument linked_data.
- (build_argv): Handle linked_data in the same hack as cb_data.
- (read_status): If linked_data is in use, flush the pipe before activating the command handler.
- * gpgme.h: Add prototypes for gpgme_op_edit_start and gpgme_op_edit.

The next changes export the status codes to the user:

- * decrypt.c (_gpgme_decrypt_status_handler): Likewise, also prefix all STATUS_ with GPGME_.
- * delete.c (delete_status_handler): Likewise.
- * decrypt-verify.c (decrypt_verify_status_handler): Likewise.
- * encrypt.c (_gpgme_encrypt_status_handler): Likewise.
- (_gpgme_encrypt_sym_status_handler): Likewise.
- * encrypt-sign.c (encrypt_sign_status_handler): Likewise.
- * engine-gpgsm.c (parse_status): Likewise.
- (gpgsm_status_handler): Likewise.
- (gpgsm_set_recipients): Likewise.
- * export.c (export_status_handler): Likewise.
- * genkey.c (genkey_status_handler): Likewise.
- * import.c (append_xml_impinfo): Likewise.
- (import_status_handler): Likewise.
- * keylist.c (keylist_status_handler): Likewise.
- * passphrase.c (_gpgme_passphrase_status_handler): Likewise.
- (command_handler): Likewise.
- * progress.c (_gpgme_progress_status_handler): Likewise.
- * sign.c (_gpgme_sign_status_handler): Likewise.
- * trustlist.c (trustlist_status_handler): Likewise.
- * verify.c (_gpgme_verify_status_handler): Likewise.
- * gpgme.h (GpgmeEditCb): New type.
- * runpg.h (GpgStatusCode): Rename and move to ...
- * gpgme.h (GpgmeStatusCode): ... this and here.
- * Makefile.am (status-table.h): Run mkstatus on gpgme.h, not runpg.h.
- * mkstatus: Prefix STATUS with GPGME_.
- * runpg.h (GpgStatusHandler, GpgCommandHandler): Change type accordingly.
- * ops.h (_gpgme_verify_status_handler,

_gpgme_decrypt_status_handler, _gpgme_sign_status_handler,
_gpgme_encrypt_status_handler, _gpgme_passphrase_status_handler,
_gpgme_progress_status_handler): Likewise.
* runpg.c (struct gpg_object_s): Likewise for CMD.code.

These changes add an edit operation to GPGME:

* context.h (struct gpgme_context_s): New member RESULT.edit. *
ops.h: Add prototype
for _gpgme_release_edit_result and
_gpgme_passphrase_command_handler.
* passphrase.c (command_handler): Make non-static and rename to ...
(_gpgme_passphrase_command_handler): ... this.
(_gpgme_passphrase_start): Use new name for command handler.
* types.h: Add EditResult type.
* gpgme.c (_gpgme_release_result): Release EDIT result.
* edit.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add edit.c.
(libgpgme_la_LDADD): Rename to libgpgme_la_LIBADD, and include
assuan_libobjs.
(assuan_libobjs): New variable, set this instead
libgpgme_la_LIBADD.
* engine.h (_gpgme_engine_op_edit): New prototype.
* engine.c (_gpgme_engine_op_edit): New function.
* runpg.h (_gpgme_gpg_op_edit): New prototype.
* runpg.c (_gpgme_gpg_op_edit): New function.

2002-07-27 Marcus Brinkmann <marcus@g10code.de>

* delete.c (delete_problem): New case ambiguous specification.
(delete_status_handler): Handle new case (poorly).

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c
(_gpgme_gpgsm_op_delete): Implement this.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_LDADD): Add @LIBOBJS@ for vasprintf and
fopencookie.
* vasprintf.c: Update to more recent libiberty version.
* debug.h: Replace #elsif with #elif.

Submitted by Stphane Corthisy:

* util.h (vasprintf): Correct prototype.
* encrypt-sign.c: Include <stddef.h>.
(encrypt_sign_status_handler): Change type of ENCRYPT_INFO_LEN to

size_t.

* ath-pthread.c: Include <stdlib.h>, not <malloc.h>.

* ath-pth.c: Likewise.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* wait.c (fdt_global): Make static. Reported by Stphane Corthsy.

* runpg.c (_gpgme_gpg_op_keylist_ext): Skip empty string patterns. Reported by Stphane Corthsy.

* key.c (gpgme_key_get_as_xml): Add OTRUST attribute. Requested by Stphane Corthsy.

(gpgme_key_get_string_attr): Add GPGME_ATTR_SIG_SUMMARY case to silence gcc warning.

* runpg.c (_gpgme_gpg_new): Always set utf8 as charset.

2002-07-03

Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_set_io_cbs): Deal with CTX being NULL.

* gpgme.c (_gpgme_op_event_cb_user): New function.

* op-support.c (_gpgme_op_reset): Support a new mode of operation for private or user event loop. Use new user event callback wrapper.

* trustlist.c (gpgme_op_trustlist_start): Use this new mode.

* keylist.c (gpgme_op_keylist_start): Likewise.

* runpg.c (_gpgme_gpg_io_event): New function.

* runpg.h (_gpgme_gpg_io_event): New prototype.

* engine-gpgsm.c (_gpgme_gpg_io_event): New function.

* engine-gpgsm.h (_gpgme_gpgsm_io_event): New prototype.

* engine.c (_gpgme_engine_io_event): New function.

* engine.h (_gpgme_engine_io_event): New prototype.

* keylist.c (finish_key): Call _gpgme_engine_io_event, and move the real work for the default IO callback routines to ...

(_gpgme_op_keylist_event_cb): ... here. New function.

* trustlist.c (trustlist_colon_handler): Signal GPGME_EVENT_NEXT_TRUSTITEM. Move queue manipulation to ...

(_gpgme_op_trustlist_event_cb): ... here. New function.

* gpgme.c (gpgme_op_event_cb): Call _gpgme_op_keylist_event_cb and _gpgme_op_trustlist_event_cb when appropriate.

* ops.h (_gpgme_op_keylist_event_cb): New prototype.

(_gpgme_op_trustlist_event_cb): Likewise.

- * op-support.c (`_gpgme_op_reset`): Add comment why we don't use the user provided event handler directly.
- * gpgme.h (`GpgmeRegisterIOCb`): Return `GpgmeError` value, and TAG in a pointer argument.
- * wait.c (`_gpgme_add_io_cb`): Likewise.
- * wait.h (`_gpgme_add_io_cb`): Likewise for prototype.
- * runpgg.c (`_gpgme_gpg_add_io_cb`): Call `IO_CBS->add` with new argument. Fix up error handling.
- * engine-gpgsm.c (`_gpgme_gpgsm_add_io_cb`): Call `IO_CBS->add` with new argument, fix up error handling.

2002-07-03 Werner Koch <wk@gnupg.org>

- * encrypt.c (`status_handler_finish`): New.
- (`_gpgme_encrypt_status_handler`): Moved some code out to the new function and call this function also in case we get into the status handler with an error which might happen due to a kludge in `engine-gpgsm.c`

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

- * keylist.c (`gpgme_op_keylist_ext_start`): Always use our own FD table (eg use synchronous mode).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h: Fix documentation of key attribute retrieval functions.

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

- * ops.h (`_gpgme_wait_on_condition`): Remove HANG argument from prototype and change return type to `GpgmeError`.
- (`_gpgme_wait_one`): New prototype.
- * wait.c (`gpgme_wait`): Replace with the meat from `_gpgme_wait_on_condition` here, and remove the support for conditions.
- (`_gpgme_wait_on_condition`): Remove HANG argument from prototype and change return type to `GpgmeError`. Replace with meat from `_gpgme_wait_one` and add support for conditions.
- (`_gpgme_wait_one`): Just call `_gpgme_wait_on_condition` without condition.
- * keylist.c (`gpgme_op_keylist_ext_start`): Always use our own FD table (eg use synchronous mode).
- (`gpgme_op_keylist_next`): Remove HANG argument from `_gpgme_wait_on_condition`. Check its return value.
- * trustlist.c (`gpgme_op_trustlist_start`): Always use our own FD

table (eg use synchronous mode).

(gpgme_op_trustlist_next): Remove HANG argument from
_gpgme_wait_on_condition. Check its return value.

2002-06-26 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (map_assuan_error): Map No_Data_Available to EOF.

* import.c (append_xml_impinfo): Kludge to print fingerprint
instead of keyid for use with gpgsm.

(import_status_handler): Set a flag to know whether any import
occurred.

(gpgme_op_import): Return -1 if no certificate was imported.

2002-06-25 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_set_io_cbs) [ENABLE_GPGSM]: Fixed
function arguments.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_export): Only export the keys
listed in RECP.

* export.c (gpgme_op_export): If no data was returned,
return
GPGME_No_Recipients.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_export): Implement.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_assuan_simple_command): Return ERR.

(parse_status): New function.

(gpgsm_status_handler): Use parse_status.

(gpgsm_assuan_simple_command): Accept new arguments STATUS_FNC and
STATUS_FNC_VALUE and process status messages.

(gpgsm_set_recipients): Pass new arguments to gpgsm_assuan_simple_command.

(gpgsm_set_fd): Likewise.

(_gpgme_gpgsm_op_keylist): Likewise.

(_gpgme_gpgsm_op_keylist_ext): Likewise.

(_gpgme_gpgsm_op_sign): Likewise.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

* wait.c (_gpgme_remove_io_cb): Unlock FDT->lock.

2002-06-20 Werner Koch <wk@gnupg.org>

* `runpg.c` (`build_argv`): Ignore `GPG_AGENT_INFO` if set but empty.

* `verify.c` (`calc_sig_summary`): Set bad policy for wrong key usage.

(`skip_token`): New.

(`_gpgme_verify_status_handler`): Watch out for wrong key usage.

(`gpgme_get_sig_string_attr`): Hack to return info on the key usage. Does now make use of the former `RESERVED` argument which has been renamed to `WHATIDX`.

(`gpgme_get_sig_ulong_attr`): Renamed `RESERVED` to `WHATIDX`.

2002-06-14 Marcus Brinkmann <marcus@g10code.de>

* `wait.c` (`do_select`): Return -1 on error, and 0 if nothing to run.

(`_gpgme_wait_one`): Only set `HANG` to zero if `do_select` returned an error, or there are no more file descriptors to wait on.

(`_gpgme_wait_on_condition`): Ignore return value from `do_select` for now.

2002-06-13 Werner Koch <wk@gnupg.org>

* `verify.c` (`gpgme_op_verify`): Make sure that we never access an uninitialized result structure.

2002-06-12 Werner Koch <wk@gnupg.org>

* `keylist.c` (`struct keylist_result_s`): New.

(`_gpgme_release_keylist_result`): Release it here

(`keylist_status_handler`): Handle truncated.

(`append_xml_keylistinfo`): New.

* `gpgme.c` (`_gpgme_release_result`): and use it here.

* `types.h`: Declare the new type here.

*

`context.h` (`struct gpgme_context_s`): Use it here.

2002-06-11 Marcus Brinkmann <marcus@g10code.de>

* `engine-gpgsm.c` (`_gpgme_gpgsm_release`): Close `status_cb.fd`.

(`_gpgme_gpgsm_new`): Duplicate status file descriptor, so we can use our own close notification mechanism without interfering with `assuan`.

2002-06-11 Werner Koch <wk@gnupg.org>

* `gpgme.h`: Add `GPGME_ATTR_SIG_SUMMARY` and the `GPGME_SIGSUM_` constants.

* verify.c (calc_sig_summary): New.
(gpgme_get_sig_ulong_attr): And use it here.

2002-06-10 Werner Koch <wk@gnupg.org>

* runpgg.h: Add new status codes TRUNCATED and ERROR.
* verify.c (is_token, copy_token): New.
(_gpgme_verify_status_handler): Use copy_token, handle the new
ERROR status and store the errorcode used withpgsm and trust
status codes.
* gpgme.h: New attribute ERR TOK.
* key.c (gpgme_key_get_string_attr): Add dummy case for it.
(gpgme_get_sig_string_attr): Use it here to return the last error.

2002-06-10 Marcus Brinkmann <marcus@g10code.de>

*
engine-gpgsm.c (_gpgme_gpgsm_start): Move the code that sets the
close notification for the status fd to ...
(_gpgme_gpgsm_new): ... here.
* wait.h: Include "sema.h". Remove prototypes of
_gpgme_remove_proc_from_wait_queue and
_gpgme_register_pipe_handler. Add prototypes of
_gpgme_fd_table_init, _gpgme_fd_table_deinit, _gpgme_fd_table_put,
_gpgme_add_io_cb, _gpgme_remove_io_cb, _gpgme_wait_event_cb and
_gpgme_wait_one..
* wait.c: Remove global variables PROC_QUEUE, PROC_QUEUE_LOCK,
FD_TABLE_SIZE, FD_TABLE, FD_TABLE_LOCK. New global variables
FDT_GLOBAL, CTX_DONE_LIST, CTX_DONE_LIST_SIZE,
CTX_DONE_LIST_LENGTH and CTX_DONE_LIST_LOCK. Remove struct
proc_s. Replace struct wait_item_s.
(_gpgme_fd_table_init): New function.
(_gpgme_fd_table_deinit): Likewise.
(_gpgme_fd_table_put): Likewise.
(set_process_done): Remove function.
(do_select): Take argument FDT. Use that to decide which fds to
select on.
(_gpgme_remove_proc_from_wait_queue): Remove function.
(_gpgme_wait_event_cb):
New function.
(_gpgme_wait_one): Likewise.
(_gpgme_register_pipe_handler): Remove function.
(_gpgme_add_io_cb): New function.
(_gpgme_remove_io_cb): Likewise.
(_gpgme_freeze_fd): Remove function.
(_gpgme_thaw_fd): Remove function.
* runpgg.c (struct fd_data_map_s): Add new member TAG.
(struct gpg_object_s): Likewise for STATUS and COLON. Add member

IDX to CMD. Add new member IO_CBS.
 (close_notify_handler): New variables POSSIBLY_DONE and NOT_DONE.
 For each I/O callback, check if it should be unregistered. If all
 callbacks have been unregistered, trigger GPGME_EVENT_DONE.
 Remove member RUNNING.
 (_gpgme_gpg_new): Initialize new members.
 (_gpgme_gpg_release): Check PID not RUNNING. Don't call
 _gpgme_remove_proc_from_wait_queue. Close GPG->CMD.FD if set.
 (build_argv): Store away the index instead the file descriptor for
 CMD.
 (_gpgme_gpg_add_io_cb): New function.
 (_gpgme_gpg_spawn): Use _gpgme_gpg_add_io_cb to register IO
 callbacks.
 (gpg_status_handler):
 Change return type to void, remove PID
 argument, close filedescriptor if EOF or error occurs.
 (read_status): Use _gpgme_gpg_add_io_cb instead _gpgme_thaw_fd.
 Use IO_CBS->remove instead _gpgme_freeze_fd.
 (gpg_colon_line_handler): Change return type to void, remove PID
 argument, close filedescriptor if EOF or error occurs.
 (command_cb): Use IO_CBS->remove instead _gpgme_freeze_fd.
 (_gpgme_gpg_set_io_cbs): New function.
 * rungpg.h (_gpgme_gpg_set_io_cbs): Prototype for
 _gpgme_gpg_set_io_cbs.
 * gpgme.h (GpgmeIOCb): New type.
 (GpgmeRegisterIOCb): Likewise.
 (GpgmeRemoveIOCb): Likewise.
 (GpgmeEventIO): Likewise.
 (GpgmeEventIOCb): Likewise.
 (struct GpgmeIOCbs): New structure to hold I/O callbacks.
 (gpgme_set_op_io_cbs): New prototype.
 (gpgme_get_op_io_cbs): Likewise.
 * ops.h: New prototype for _gpgme_op_event_cb. Remove prototypes
 for _gpgme_freeze_fd and _gpgme_thaw_fd. Remove PID argument from
 _gpgme_data_inbound_handler and _gpgme_data_outbound_handler
 prototype.
 Add prototype for _gpgme_op_reset.
 Add synchronous argument to _gpgme_decrypt_start prototype.
 * io.h: Beautification.
 * gpgme.c: Include "wait.h".
 (gpgme_new): Initialize FDT.
 (gpgme_set_io_cbs): New function.
 (gpgme_get_io_cbs): Likewise.
 (_gpgme_op_event_cb): Likewise.
 * data.c (_gpgme_data_inbound_handler): Change return type to
 void. Drop PID argument. Close FD on error and EOF.
 (write_mem_data): Don't close FD here ...
 (write_cb_data): ... or here ...

(_gpgme_data_outbound_handler): ... but here. Change return type to void. Drop PID argument.

* context.h: Include "wait.h".

(struct gpgme_context_s): New members FDT and IO_CBS.

* op-support.c: New file.

* Makefile.am (libgpgme_la_SOURCES): Add op-support.c.

* ops.h: Add prototype for _gpgme_op_reset().

* decrypt.c (_gpgme_decrypt_start): New argument SYNCHRONOUS. Use _gpgme_op_reset.

(gpgme_op_decrypt_start): Add synchronous argument.

(gpgme_op_decrypt): Likewise. Use _gpgme_wait_one instead gpgme_wait.

*

delete.c (gpgme_op_delete_start): Rename to ...

(_gpgme_op_delete_start): ... this. New argument SYNCHRONOUS. Use _gpgme_op_reset. Make function static.

(gpgme_op_delete_start): Just a wrapper around _gpgme_op_delete_start now.

(gpgme_op_delete): Add synchronous argument. Use _gpgme_wait_one instead gpgme_wait.

* encrypt.c: Include "wait.h".

(ggpgme_op_encrypt_start): Rename to ...

(_gpgme_op_encrypt_start): ... this. New argument SYNCHRONOUS. Use _gpgme_op_reset. Make function static.

(gpgme_op_encrypt_start): Just a wrapper around _gpgme_op_encrypt_start now.

(gpgme_op_encrypt): Add synchronous argument. Use _gpgme_wait_one instead gpgme_wait.

* encrypt_sign.c (gpgme_op_encrypt_sign_start): Rename to ...

(_gpgme_op_encrypt_sign_start): ... this. New argument SYNCHRONOUS. Use _gpgme_op_reset. Make function static.

(gpgme_op_encrypt_sign_start): Just a wrapper around _gpgme_op_encrypt_sign_start now.

(gpgme_op_encrypt_sign): Add synchronous argument. Use

_gpgme_wait_one instead gpgme_wait.

* export.c (gpgme_op_export_start): Rename to ...

(_gpgme_op_export_start): ... this. New argument SYNCHRONOUS. Use _gpgme_op_reset. Make function static.

(gpgme_op_export_start): Just a wrapper around _gpgme_op_export_start now.

(gpgme_op_export): Add synchronous argument. Use _gpgme_wait_one instead gpgme_wait.

* genkey.c (gpgme_op_genkey_start): Rename to ...

(_gpgme_op_genkey_start): ... this. New argument SYNCHRONOUS. Use _gpgme_op_reset. Make function static.

(gpgme_op_genkey_start): Just a wrapper around _gpgme_op_genkey_start now.

(gpgme_op_genkey): Add synchronous argument. Use `_gpgme_wait_one` instead `gpgme_wait`.

* `import.c` (`gpgme_op_import_start`): Rename to ...

(`_gpgme_op_import_start`): ... this. New argument `SYNCHRONOUS`. Use `_gpgme_op_reset`. Make function static.

(`gpgme_op_import_start`): Just a wrapper around `_gpgme_op_import_start` now.

(`gpgme_op_import`): Add synchronous argument. Use `_gpgme_wait_one` instead `gpgme_wait`.

* `keylist.c` (`gpgme_op_keylist_start`): Use `_gpgme_op_reset`.

(`gpgme_op_keylist_ext_start`): Likewise.

* `sign.c` (`gpgme_op_sign_start`): Rename to ...

(`_gpgme_op_sign_start`): ... this. New argument `SYNCHRONOUS`. Use `_gpgme_op_reset`. Make function static.

(`gpgme_op_sign_start`): Just a wrapper around `_gpgme_op_sign_start` now.

(`gpgme_op_sign`): Add synchronous argument. Use `_gpgme_wait_one` instead `gpgme_wait`.

* `trustlist.c` (`gpgme_op_trustlist_start`): Use `_gpgme_op_reset`.

* `verify.c` (`gpgme_op_verify_start`): Rename to ...

(`_gpgme_op_verify_start`): ... this. New argument `SYNCHRONOUS`. Use `_gpgme_op_reset`. Make function static.

(`gpgme_op_verify_start`): Just a wrapper around `_gpgme_op_verify_start` now.

(`gpgme_op_verify`): Add synchronous argument. Use `_gpgme_wait_one` instead `gpgme_wait`.

* `engine-gpgsm.c` (`iocb_data_t`): New type.

(`struct gpgsm_object_s`): New member `status_cb`. Replace `input_fd` and `input_data` with `input_cb`. Replace `output_fd` and `output_data` with `output_cb`. Replace `message_fd` and `message_data` with `message_cb`. New member `io_cbs`.

(`_gpgme_gpgsm_new`): Initialize all new members (and drop the old ones).

(`close_notify_handler`): New variable `POSSIBLY_DONE`. For each I/O callback, check if it should be unregistered. If all callbacks have been unregistered, trigger `GPGME_EVENT_DONE`.

(`_gpgme_gpgsm_release`): Remove variable `PID`. Use new variable names to close the file descriptors.

(`_gpgme_gpgsm_op_decrypt`): Use new variable names,

(`_gpgme_gpgsm_op_encrypt`): Likewise.

(`_gpgme_gpgsm_op_genkey`): Likewise.

(`_gpgme_gpgsm_op_import`): Likewise.

(`_gpgme_gpgsm_op_keylist`): Likewise.

(`_gpgme_gpgsm_op_keylist_ext`): Likewise.

(`_gpgme_gpgsm_op_sign`): Likewise.

(`_gpgme_gpgsm_op_verify`): Likewise.

(gpgsm_status_handler): Drop argument PID. Change return type to void. Close status pipe before returning because of EOF or error.
(_gpgme_gpgsm_add_io_cb): New function.
(_gpgme_gpgsm_start): Use _gpgme_gpgsm_add_io_cb to register callback function.
(_gpgme_gpgsm_set_io_cbs): New function.
* engine-gpgsm.h: New prototype for _gpgme_gpgsm_set_io_cbs.
* engine.c (_gpgme_engine_set_io_cbs): New function.
* engine.h: New prototype for _gpgme_engine_set_io_cbs.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_SOURCES): Remove mutex.h.

2002-06-03 Marcus Brinkmann <marcus@g10code.de>

* key.c: Include <ctype.h>.
(_gpgme_key_append_name): Skip one more char when processing escaped char. Submitted by Marc Mutz <mutz@kde.org>. Handle hexadecimal encodings. Also reported by Marc. Thanks!

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

* ath.h: Enable the _gpgme_ prefix. Fix all those prefix macros.
* posix-sema.c: Use that prefix here.
* posix-io.c: Include "ath.h".
(_gpgme_io_read): Use _gpgme_ath_read instead read.
(_gpgme_io_write): Use _gpgme_ath_write instead write.
(_gpgme_io_waitpid): Use _gpgme_ath_waitpid instead waitpid.
(_gpgme_io_select): Use _gpgme_ath_select instead select.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (ath_components): New variable.
(ath_components_pthread): Likewise.
(ath_components_pth): Likewise.
(system_components): Add ath_componentes.

* ath.h: New file.
* ath.c: Likewise.
* ath-pthread.c: Likewise.
* ath-pth.c: Likewise.
* posix-sema.c (_gpgme_sema_cs_enter): Rework to use the ATH interface.
* mutex.h: Remove file.

2002-05-30 Werner Koch <wk@gnupg.org>

* key.c (gpgme_key_get_string_attr): Return NULL when asking for an issuer with IDX > 0. We don't support altIssuerNames for now.

2002-05-22 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): Aehmm, added missing variable definition. Oohh - Marcus was faster.

2002-05-22 Marcus Brinkmann <marcus@gnu.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): Fix last change.

2002-05-21 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist)
(_gpgme_gpgsm_op_keylist_ext):
Pass the keylist mode to gpgsm.

2002-05-10 Werner Koch <wk@gnupg.org>

* key.h (gpgme_key_s): Add OTRUST.
* keylist.c (set_ownertrust): New.
(keylist_colon_handler): Get the ownertrust value
* key.c (gpgme_key_get_string_attr, gpgme_key_get_ulong_attr):
Return that value.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

* w32-util.c: New static variable GET_PATH_LOCK.
(_gpgme_get_gpg_path): Remove superfluous NULL initializer.
Take lock while determining path.
(_gpgme_get_gpgsm_path): Likewise.
* version.c (do_subsystem_inits): Set DONE to 1 after
initialization.
(gpgme_get_engine_info): New variable ENGINE_INFO_LOCK. Take lock
while determining engine info.
* runpg.c (_gpgme_gpg_get_version): New variable
GPG_VERSION_LOCK. Take the lock while determining the program
version.
* posix-io.c: Include "sema.h".
(_gpgme_io_spawn): New variable FIXED_SIGNALS_LOCK. Take the lock
while fixing the signals.
(_gpgme_io_select): Make READFDS and WRITEFDS non-static.
*
key.c: Include "sema.h". New globals KEY_CACHE_LOCK and
KEY_REF_LOCK.

(capabilities_to_string): Make STRINGS very const.
(_gpgme_key_cache_add): Lock the key cache.
(_gpgme_key_cache_get): Likewise.
(gpgme_key_ref, gpgme_key_release): Lock the key_ref_lock.
* import.c (append_xml_impinfo): Make IMPORTED_FIELDS and
IMPORT_RES_FIELDS very const. Make FIELD and FIELD_NAME a little
const.
* engine.c (_gpgme_engine_get_info): New variable
ENGINE_INFO_LOCK. Take lock while determining engine info.
* engine-gpgsm.c: Include "sema.h".
(_gpgme_gpgsm_get_version): New variable GPGSM_VERSION_LOCK. Take
lock while getting program version.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

* debug.h: New file.
* Makefile.am (libgpgme_la_SOURCES): Add debug.h.
* util.h: Removed all prototypes and declarations related to
debugging. Include "debug.h".

* debug.c (debug_level): Comment variable and remove superfluous
zero initializer.
(errfp): Likewise.
(_gpgme_debug_enabled):
Function removed.
(struct debug_control_s): Definition removed.
(_gpgme_debug_level): Function removed.
(_gpgme_debug_begin): Rewritten to use vasprintf. Accept a
printf-style format specification and a variable number of
arguments.
(_gpgme_debug_add): Rewritten using vasprintf. Expect that format
starts out with "%s" for simplicity.
(_gpgme_debug_end): Rewritten using vasprintf. Do not accept a
TEXT argument anymore.

* posix-io.c (_gpgme_io_select): Use new level argument for
DEBUG_BEGIN instead explicit if construct.

* debug.c (debug_init): Remove superfluous zero initializer,
remove volatile flag of INITIALIZED. Do not use the
double-checked locking algorithm, it is fundamentally flawed and
will empty your fridge (on a more serious note, despite the
volatile flag it doesn't give you the guarantee you would expect,
for example on a DEC Alpha or an SMP machine. The volatile only
serializes accesses to the volatile variable, but not to the other
variables).

2002-05-03

Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (`_gpgme_gpgsm_new`): Redirect any gpgsm error output to `/dev/null`.

* verify.c (`gpgme_get_sig_key`): Set the protocol of the listctx.

* gpgme.c (`gpgme_get_protocol`): New.

* data.c (`gpgme_data_write`): Changed type of BUFFER to void*.
(`gpgme_data_read`): Ditto.

* verify.c (`_gpgme_verify_status_handler`): Handle TRUST_* status lines so that a claim can be made without looking up the key.

(`gpgme_get_sig_string_attr`): New.

(`gpgme_get_sig_ulong_attr`): New.

* gpgme.h (`GpgmeAttr`): Added GPGME_ATTR_SIG_STATUS.

* runpgg.h: Add new status codes from gpg 1.0.7 and formatted the list to align with the status.h file from gnupg.

* gpgme.h (`GpgmeSigStat`): Add `_GOOD_EXP` and `_GOOD_EXPKEY`.

* verify.c (`_gpgme_verify_status_handler`, `finish_sig`): Handle these new status codes. Store the expiration time

2002-04-27 Werner Koch <wk@gnupg.org>

* gpgme.h (`GpgmeData_Encoding`): New.

* data.c (`gpgme_data_get_encoding`, `gpgme_data_set_encoding`):
New.

* engine-gpgsm.c (`map_input_enc`): New. Use it in all local functions where the INPUT command gets send.

2002-04-27 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (`_gpgme_gpgsm_op_verify`): Close the output descriptor only when we don't need it anymore. Close the message descriptor if we don't need it.

2002-04-26 Werner Koch <wk@gnupg.org>

* Makefile.am (`libgpgme_la_LIBADD`): Use libtool libraries.

2002-04-25 Marcus Brinkmann <marcus@g10code.de>

* runpgg.c (`_gpgme_gpg_release`): Call `gpgme_data_release` on GPG->cmd.cb_data, not xfree.

2002-04-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Set the display, ttyname, ttytype, lc_ctype and lc_messages options in the server.

2002-04-24 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Add new error codes.

2002-04-23 Werner Koch <wk@gnupg.org>

* key.c (gpgme_key_get_ulong_attr): Swapped use of can_encrypt and can_certify to return the requested values.

2002-04-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_get_progress_cb): Allow either return parameter to be NULL.
(gpgme_get_passphrase_cb): Likewise.

2002-04-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_get_passphrase_cb): New function.
(gpgme_get_progress_cb): New function.
* gpgme.h: Add new prototypes for gpgme_get_passphrase_cb and gpgme_get_progress_cb.

2002-03-28 Werner Koch <wk@gnupg.org>

* gpgme.h (GpgmeAttr): Add values for issuer and chaining.
* key.h (gpgme_key_s): Add issuer and chaining elements for X509.
* keylist.c (keylist_colon_handler): Store them.
* key.c (gpgme_key_release): Free them.
(gpgme_key_get_as_xml,gpgme_key_get_string_attr): Print them.

2002-03-26 Werner Koch <wk@gnupg.org>

* Makefile.am (libgpgme_la_SOURCES): Add mutex.h

2002-03-21 Werner Koch <wk@gnupg.org>

* util.h [!HAVE_FOPENCOOKIE]: Make sure off_t and ssize_t are defined.

2002-03-18 Marcus Brinkmann <marcus@g10code.de>

*

Makefile.am (system_components): New variable, set depending on HAVE_DOSISH_SYSTEM.

(libgpgme_la_SOURCES): Use system_components. Remove `syshdr.h'.

* syshdr.h: File removed.

* posix-io.c: Remove !HAVE_DOSISH_SYSTEM safeguard. Clean up source.

* posix-sema.c: Likewise.

* posix-util.c: Likewise.

* w32-io.c: Remove HAVE_DOSISH_SYSTEM safeguard.

* w32-sema.c: Likewise.

* w32-util.c: Likewise.

* posix-io.c: Include `unistd.h', do not include `syshdr.h'.

* posix-sema.c: Likewise.

* w32-io.c: Include `io.h', do not include `syshdr.h'

* w32-sema.c: Likewise.

* w32-util.c: Likewise.

* data.c: Do not include `syshdr.h'.

* wait.c: Likewise.

* wait.h: Code cleanup.

* mutex.h: New file.

* posix-sema.c: Implement.

2002-03-08 Werner Koch <wk@gnupg.org>

* util.h [!HAVE_FOPENCOOKIE]: Fixed type. Thanks to Frank Heckenbach.

2002-03-07 Werner Koch <wk@gnupg.org>

* gpgme.h (gpgme_op_keylist_ext_start): Add prototype.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

*

encrypt.c (_gpgme_encrypt_sym_status_handler): New function.

(gpgme_op_encrypt_start): New variable SYMMETRIC, set it if RECP is null, and if it is set, use _gpgme_encrypt_sym_status_handler as status handler and run _gpgme_passphrase_start.

* runpgg.c (_gpgme_gpg_op_encrypt): If RECP is zero, do symmetric encryption.

* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): If RECP is zero, return error value.

* runpgg.c (_gpgme_gpg_op_verify): Add "--" argument.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c (`_gpgme_passphrase_status_handler`): Also set the error `No_Passphrase` if only a bad passphrase was provided.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* `rungpg.c` (`_gpgme_gpg_op_verify`): If `TEXT` is of mode `GPGME_DATA_MODE_IN`, construct a command line that stores the plaintext in `TEXT`.

* `verify.c` (`gpgme_op_verify_start`): Accept `TEXT` being uninitialized, and in this case interpret `SIG` as a normal or cleartext signature and `TEXT` as a return data object.

* `engine-gpgsm.c` (`_gpgme_gpgsm_op_verify`): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* `engine-gpgsm.c` (`_gpgme_gpgsm_op_keylist_ext`) [`!ENABLE_GPGSM`]: Add stub function.

2002-02-28 Werner Koch <wk@gnupg.org>

* `key.h` (`subkey_s`): New member `expires_at`.

* `keylist.c` (`keylist_colon_handler`): Set it here

* `key.c` (`gpgme_key_get_as_xml`, `gpgme_key_get_ulong_attr`): Return it.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* `rungpg.h` (`_gpgme_gpg_op_keylist_ext`): New prototype.

* `rungpg.c` (`_gpgme_gpg_op_keylist_ext`): New function.

* `engine-gpgsm.h` (`_gpgme_gpgsm_op_keylist_ext`): New prototype.

* `engine-gpgsm.c` (`_gpgme_gpgsm_op_keylist_ext`): New function.

* `engine.h` (`_gpgme_engine_op_keylist_ext`): New prototype.

* `engine.c` (`_gpgme_engine_op_keylist_ext`): New function.

* `keylist.c` (`gpgme_op_keylist_ext_start`): New function.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* `gpgme.h`: Add new error code `GPGME_Invalid_Recipient`.

* `encrypt.c` (struct

`encrypt_result_s`): New member `invalid_recipients`, rename `no_recipients` to `no_valid_recipients`.

(`_gpgme_encrypt_status_handler`): Include error for invalid recipients.

* `engine-gpgsm.c` (`gpgsm_set_recipients`): Change type of first argument to `GpgsmObject`. Use that to report back the status about the recipients.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Fix the last change.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Parse the args line to see if the problem is due to a missing key, and report that back to the user.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* engine.c (_gpgme_engine_op_encrypt_sign): New function.
* engine.h (_gpgme_engine_op_encrypt_sign): New prototype.
* runpgg.c (_gpgme_append_gpg_args_from_signers): New function.
(_gpgme_gpg_op_sign): Use that new function.
(_gpgme_gpg_op_encrypt_sign): New function.
* runpgg.h (_gpgme_gpg_op_encrypt_sign):
New prototype.
* gpgme.h (gpgme_op_encrypt_sign_start): New prototype.
(gpgme_op_encrypt_sign): Likewise.
* Makefile.am (libgpgme_la_SOURCES): Add encrypt-sign.c.
* ops.h (_gpgme_encrypt_status_handler): Add prototype.
(_gpgme_sign_status_handler): Add prototype.
* sign.c (sign_status_handler): Rename to ...
(_gpgme_sign_status_handler): ... this and make non-static.
* encrypt.c (encrypt_status_handler): Rename to ...
(_gpgme_encrypt_status_handler): ... this and make non-static.
* encrypt.c (gpgme_op_encrypt_start): Use new status handler name.
* sign.c (gpgme_op_sign_start): Likewise.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* context.h (struct gpgme_context_s): New member include_certs.
* gpgme.h (gpgme_set_include_certs): Add prototype.
(gpgme_get_include_certs): Likewise.
* gpgme.c (gpgme_set_include_certs): New function.
(gpgme_get_include_certs): Likewise.
(gpgme_new): Set include_certs to 1 (the default).
* engine.c (_gpgme_engine_op_sign): Accept
new argument include_certs,
and pass it to _gpgme_gpgsm_op_sign.
* engine.h (_gpgme_engine_op_sign): Likewise for prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Accept new argument
include_certs and handle it.
* engine-gpgsm.h (_gpgme_gpgsm_start): Add new argument include_certs.
* sign.c (gpgme_op_sign_start): Add new argument to
_gpgme_engine_op_sign call.

2002-02-14 Werner Koch <wk@gnupg.org>

* keylist.c (gpgme_op_keylist_start): Do not use a verbose listing.

2002-02-13 Werner Koch <wk@gnupg.org>

* vasprintf.c, fopencookie.c: Add replacement functions.

* util.h: Add prototypes for them.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_assuan_simple_command): Return 0 if we reach the end of the function.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* genkey.c (gpgme_op_genkey_start): Fix logic in validity check.

(gpgme_op_genkey_start): Skip newlines after opening tag.

* engine-gpgsm.c (_gpgme_gpgsm_start): Remove cruft.

2002-02-08

Marcus Brinkmann <marcus@g10code.de>

* genkey.c (gpgme_op_genkey_start): Allow PUBKEY and SECKEY to be set, and pass them down to the crypto engine.

* engine-gpgsm.h (_gpgme_gpgsm_start): New arguments PUBKEY and SECKEY.

* engine.h: Likewise.

* runpg.h (_gpgme_gpg_spawn): Likewise.

* engine.c (_gpgme_engine_op_genkey): Likewise. Use those arguments.

* runpg.c (_gpgme_gpg_op_genkey): Likewise. Complain if those arguments are set.

* engine-gpgsm.c (_gpgme_gpgsm_op_genkey): Likewise. Implement function.

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist): Beautify comment.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* runpg.c (_gpgme_gpg_op_keylist): Remove handling of keylist mode (for now).

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* wait.c (gpgme_wait): Add new argument STATUS, in which the status of the returned context is returned.

(`_gpgme_wait_on_condition`): Rework the function a bit, to make it aware of cancelled processes, and to allow to use `gpgme_wait` with `CTX` being `NULL` (as documented in the source).

(`struct proc_s`): New member `REPORTED`.

* `gpgme.h`: Fix prototype.

* `verify.c` (`gpgme_op_verify`): Fix use of `gpgme_wait`.

* `sign.c` (`gpgme_op_sign`): Likewise.

* `import.c` (`gpgme_op_import`): Likewise.

* `genkey.c` (`gpgme_op_genkey`): Likewise.

* `export.c` (`gpgme_op_export`): Likewise.

* `encrypt.c` (`gpgme_op_encrypt`): Likewise.

* `delete.c` (`gpgme_op_delete`): Likewise.

* `decrypt-verify.c` (`gpgme_op_decrypt_verify`): Likewise.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* `gpgme.c` (`gpgme_set_keylist_mode`): Possibly return an error value.

(`gpgme_get_keylist_mode`): New function.

(`gpgme_new`): Set the default for `keylist_mode` member of `CTX`.

* `gpgme.h` (`gpgme_set_keylist_mode`): Fix prototype.

(`gpgme_get_keylist_mode`): New prototype.

(`GPGME_KEYLIST_MODE_LOCAL`): New macro.

(`GPGME_KEYLIST_MODE_EXTERN`): Likewise..

2002-02-02 Marcus Brinkmann <marcus@g10code.de>

This patch has gotten a bit large... mmh. The main thing that happens here is that error values are now not determined in the operation function after `gpgme_wait` completed, but in the status handler when EOF is received. It should always be the case that either an error is flagged or EOF is received, so that after a `gpgme_wait` you should never have the situation that no error is flagged and EOF is not received. One problem is that the engine status handlers don't have access to the context, a horrible kludge works around this for now. All errors that happen during a pending operation should be caught and reported in `ctx->error`, including out-of-core and cancellation. This rounds up neatly a couple of loose ends, and makes it possible to pass up any errors in the communication with the backend as well. As a bonus, there will be a function to access `gpgme->wait`, so that the operations can truly be implemented with their `_start` function.

* `engine-gpgsm.c` (`gpgsm_status_handler`): Horrible kludge to report error back

to the context.

* `runpgg.c (gpg_status_handler)`: Same horrible kludge applied here.

* `engine-gpgsm.c (gpgsm_assuan_simple_command)`: Add error checking.

* `wait.c (_gpgme_wait_on_condition)`: If canceled, set `CTX->error` to a value indication that.

* `verify.c (add_notation)`: Set error, not `out_of_core`.

`(finish_sig)`: Likewise.

`(gpgme_op_verify_start)`: Don't clear `out_of_core`.

`(_gpgme_verify_status_handler)`: At EOF, clean up the notation data.

`(gpgme_op_verify)`: And don't do it here.

* `trustlist.c (trustlist_status_handler)`: Check error, not `out_of_core`.

`(gpgme_op_trustlist_start)`: Don't clear `out_of_core`.

`(gpgme_op_trustlist_next)`: Check error, not `out_of_core`.

`(gpgme_op_trustlist_end)`: Likewise.

* `ops.h (test_and_allocate_result)`: New macro.

`(_gpgme_passphrase_result)`: Remove prototype.

* `delete.c (gpgme_op_delete)`: Return error from context.

`(delete_status_handler)`: Use macro `test_and_allocate_result`.

Perform error checking at EOF.

`(gpgme_op_delete_start)`: Release

result.

* `passphrase.c (_gpgme_passphrase_status_handler)`: Use macro `test_and_allocate_result`, and perform error checking here.

`(_gpgme_passphrase_result)`: Function removed.

* `sign.c (gpgme_op_sign_start)`: Do not set `out_of_core` to zero.

`(gpgme_op_sign)`: Just return the error value from the context.

`(sign_status_handler)`: Only progress if no error is set yet. If

we process an EOF, set the resulting error value (if any).

* `decrypt.c (_gpgme_decrypt_result)`: Function removed.

`(create_result_struct)`: Function removed.

`(_gpgme_decrypt_status_handler)`: Use macro `test_and_allocate_result`,

calculate error on EOF, do not progress with errors.

`(_gpgme_decrypt_start)`: Do not set `out_of_core` to zero.

`(gpgme_op_decrypt)`: Just return the error value from the context.

* `encrypt.c (encrypt_status_handler)`: Perform the error checking here.

`(gpgme_op_encrypt_start)`: Do not clear `out_of_core`.

* `export.c (export_status_handler)`: Return if error is set in context.

`(gpgme_op_export_start)`:

Release result.

`(gpgme_op_export)`: Return error from context.

* `decrypt-verify.c (gpgme_op_decrypt_verify)`: Return the error in the context.

* genkey.c (genkey_status_handler): Use macro test_and_allocate_result. Perform error checking at EOF.
(gpgme_op_genkey): Just return the error from context.
* import.c (gpgme_op_import): Return the error from context.
(import_status_handler): Use macro test_and_allocate_result.
* keylist.c (gpgme_op_keylist_start): Do not clear out_of_core.
(gpgme_op_keylist_next): Return error of context.
(keylist_colon_handler): Set error instead out_of_code.
(finish_key): Likewise.

* context.h: Remove member out_of_core, add member error.
* gpgme.c (_gpgme_release_result): Clear error flag.

* engine.h (_gpgme_engine_get_error): New prototype.
* engine.c (_gpgme_engine_get_error): New function.
* engine-gpgsm.c (_gpgme_gpgsm_get_error): New function.

* engine-gpgsm.c (map_assuan_error): New function.
(gpgsm_assuan_simple_command): Change return type to GpgmeError, use the new function to map error values.
(gpgsm_set_fd): Change return type to GpgmeError.
(_gpgme_gpgsm_op_decrypt): Change type of ERR to GpgmeError.
(gpgsm_set_recipients): Likewise. Change type of return value equivalently. Adjust error values.
(_gpgme_gpgsm_op_import): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(struct gpgsm_object_s): New member error.
(gpgsm_status_handler): Set error if error occurs. Determine error number from ERR line received. If assuan_read_line fails, terminate the connection.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (MOSTLYCLEANFILES): New variable.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): At error, terminate the connection to the server.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

* runpgg.h: Add STATUS_KEY_CREATED.

* progress.c: New file.

* Makefile.am (libgpgme_la_SOURCES): Add progress.c.

* genkey.c (genkey_status_handler):
Use
_gpgme_progress_status_handler. Add check for status.
(struct genkey_result_s): New structure.
(_gpgme_release_genkey_result): New function.
(gpgme_op_genkey): Check for error.
* gpgme.c (_gpgme_release_result): Call
_gpgme_release_genkey_result.
* ops.h (_gpgme_release_genkey_result): Add prototype.
* types.h (GenKeyResult): New type.
* context.h (gpgme_context_s): Add GenKeyResult to member result.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (_gpgme_release_result): Call
_gpgme_release_delete_result.
* ops.h (_gpgme_release_delete_result): Add prototype.
* types.h (DeleteResult): New type.
* context.h (gpgme_context_s): Add DeleteResult to member result.

* delete.c (enum delete_problem): New type.
(struct delete_result_s): New structure.
(_gpgme_release_delete_result): New function.
(delete_status_handler): Implement more status codes.
(gpgme_op_delete): Return error on failure.

* import.c (MAX_IMPORTED_FIELDS): Bump up to 14.

2002-01-30

Marcus Brinkmann <marcus@g10code.de>

* import.c (struct import_result_s): New structure.
(_gpgme_release_import_result): New function.
(append_xml_impinfo): Likewise.
(import_status_handler): Implement.
* gpgme.c (_gpgme_release_result): Add call to
_gpgme_release_import_result.
* ops.h (_gpgme_release_import_result): Add prototype.
* types.h (ImportResult): New type.
* context.h (gpgme_context_s): Add ImportResult to member result.

* encrypt.c (gpgme_op_encrypt): Code clean up.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add lots of comment and fix the formatting. Add
gpgme_trustlist_end prototype.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h: Add new type GpgmeIdleFunc. Change type of gpgme_register_idle to return and accept this type.
 - * wait.c (gpgme_register_idle): Fix type.
- Save and return old value of idle_function.

2002-01-29 Werner Koch <wk@gnupg.org>

- * engine-gpgsm.c (_gpgme_gpgsm_op_keylist): Implement secret only mode.
- * keylist.c (keylist_colon_handler): Add support for the new "crs" record type.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

- * engine-gpgsm.c (_gpgme_gpgsm_release): Call assuan_disconnect, not assuan_pipe_disconnect.
- * Makefile.am (libgpgme_la_LIBADD): Change to link assuan and jnlib (needed by assuan) statically into libgpgme. Linking a static library into a shared library this way is not portable.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.h (GpgmePassphraseCb): Change type of R_HD from void* to void**.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

- * data.c (gpgme_data_new_from_filepart): Change type of LENGTH from off_t to size_t.
- * gpgme.h: Likewise.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

- * wait.c (_gpgme_wait_on_condition): If the process finished, reset the pending flag. Also if the operation was cancelled.

(struct proc_s): Rename READY to DONE.

(wait_item_s): Likewise.

(set_process_ready): Rename to ...

(set_process_done): ... this.

(_gpgme_remove_proc_from_wait_queue): Call set_process_done instead set_process_ready.

(_gpgme_wait_on_condition): Likewise.

(do_select): Rename READY to DONE.

- * verify.c (gpgme_op_verify): Do not set pending to zero here.
- * sign.c (gpgme_op_sign): Likewise.
- * import.c (gpgme_op_import): Likewise.
- * genkey.c (gpgme_op_genkey): Likewise.
- * export.c (gpgme_op_export): Likewise.
- * encrypt.c (gpgme_op_encrypt): Likewise.
- * delete.c (gpgme_op_delete): Likewise.
- * decrypt-verify.c (gpgme_op_decrypt_verify): Likewise.
- * decrypt.c (gpgme_op_decrypt): Likewise.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

- * export.c: Cleanup.

2002-01-15 Marcus Brinkmann <marcus@g10code.de>

- * trustlist.c: Various source clean ups.
- (my_isdigit): Removed.
- (gpgme_op_trustlist_end): New function.

2002-01-13 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.c: Various source clean ups, like renaming C to CTX where appropriate.
- (gpgme_new): Clear R_CTX before starting the work.
- (my_isdigit): Removed.
- (my_isxdigit): Likewise.

- * data.c: Various source clean ups.
- (gpgme_data_new_from_mem): Check BUFFER after clearing R_DH.
- (gpgme_data_new_with_read_cb): Similar for READ_CB.
- (gpgme_data_new_from_file): Loop over fread while EINTR.
- (gpgme_data_new_from_filepart): Rediddled a bit. Allow LENGTH to be zero. Loop over fread while EINTR.

- (my_isdigit): Removed.
- (my_isxdigit): Likewise.

2001-12-21 Marcus Brinkmann <marcus@g10code.de>

- * engine-gpgsm.c (_gpgme_gpgsm_new): Replace General_Error with Pipe_Error where appropriate.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* engine.c: Include `string.h'. Reported by Stphane Corthisy.

* version.c (get_engine_info): Remove prototype.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): New variable CHILD_FDS.
Fill it with the servers fds, and pass it to assuan_pipe_connect.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

*

keylist.c (gpgme_op_keylist_end): New function.

* gpgme.h (gpgme_op_keylist_end): New prototype.

* engine.h (gpgme_engine_check_version): Move prototype to ...

* gpgme.h (gpgme_engine_check_version): ... here.

* genkey.c (gpgme_op_genkey_start): Remove unused variable.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* version.c (gpgme_get_engine_info): Reimplemented.

(gpgme_check_engine): Reimplemented.

(_gpgme_compare_versions): Return NULL if MY_VERSION is NULL.

* engine.c: Include `io.h'.

(gpgme_engine_get_info): New function.

* engine.h (gpgme_engine_check_version, _gpgme_engine_get_info):

Add prototype.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* runpg.c (struct reap_s, reap_list, reap_list_lock): Moved to ...

* engine.c (struct reap_s, reap_list, reap_list_lock): ... here.

Include `time.h', `sys/types.h', `assert.h', and `sema.h'.

* runpg.c (_gpgme_engine_add_child_to_reap_list): New function.

(do_reaping, _gpgme_gpg_housecleaning): Moved to

...

* engine.c (do_reaping, _gpgme_engine_housecleaning): ... here.

* runpg.c (_gpgme_gpg_release): Replace code that is now in its
own function by call to _gpgme_engine_add_child_to_reap_list().

* wait.c: Include `engine.h'.

(run_idle): Call _gpgme_engine_housecleaning(), not

_gpgme_gpg_housecleaning().

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Append, not prepend, the uid.
Initialize the next field of the uid structure.
(gpgme_key_get_as_xml): Do not list last uid first.

2001-12-17 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_set_colon_line_handler): New
function [!ENABLE_GPGSM].

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Put TEXT into
message_data, not SIG.
(_gpgme_gpgsm_op_sign): Use '--detached', not '--detach'.

* sign.c (sign_status_handler): Call
_gpgme_passphrase_status_handler early.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

*
engine-gpgsm.c: Revert last change.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Freeze the output file
handler when ending this operation, otherwise the wait function
will sit on it.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (struct gpgsm_object_s): New member colon.attic.
(_gpgme_gpgsm_new): Initialize some more members.
(_gpgme_gpgsm_release): Free the colon line handler's attic line.
(gpgsm_status_handler): Rework the inline-data processing.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* runpg.c (_gpgme_gpg_spawn): Do not add the fds to the child
list that are not dup'ed, for those the close-on-exec flag is set
now.
* version.c (_gpgme_get_program_version): Remove first entry in
CFD, as the close-on-exec flag is now set for this fd.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (`_gpgme_gpgsm_op_encrypt`): Do not add `armor` option to `ENCRYPT`.
* engine-gpgsm.c
(`gpgsm_set_recipients`): Free LINE when returning successfully.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (`close_notify_handler`): New function.
(`_gpgme_gpgsm_new`): Manage the file descriptors a bit differently. Do not set close-on-exec flags.
(`_gpgme_gpgsm_op_decrypt`): Do not set `message_fd` to -1, this is done by the close handler.
(`_gpgme_gpgsm_op_encrypt`): Likewise.
(`_gpgme_gpgsm_op_import`): Likewise (also for `output_fd`).
(`_gpgme_gpgsm_op_keylist`): Likewise (also for `input_fd` and `output_fd`).
(`_gpgme_gpgsm_op_sign`): Likewise.
(`_gpgme_gpgsm_op_verify`): Likewise, but for `output_fd`.

* posix-io.c (`_gpgme_io_pipe`): Set the close-on-exec flag for the non-inherited file descriptor index of the pipe.

2001-12-13 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (`_gpgme_gpgsm_set_colon_line_handler`): New.
(`gpgsm_status_handler`): Pass datalines to a colon handler
* engine.c (`_gpgme_engine_set_colon_line_handler`): Set the colon handler for gpgsm.

* engine-gpgsm.c
(`_gpgme_gpgsm_op_keylist`): Allow NULL for pattern.
(`gpgsm_assuan_simple_command`): Removed underscore from `assuan_write_line`.
(`_gpgme_gpgsm_start`): Ditto.
(`gpgsm_assuan_simple_command`): Replaced internal Assuan read function by the new `assuan_read_line`. Removed the use of the internal header.
(`gpgsm_status_handler`): Ditto. Use the new `assuan_pending_line`.
(`_gpgme_gpgsm_start`): Use the documented way to get an fd from assuan.

* keylist.c (`keylist_colon_handler`): Handle "crt" records
* key.h (`gpgme_key_s`): Add an x509 flag.
* key.c (`parse_x509_user_id`): New.
(`_gpgme_key_append_name`): Handle x.509 names.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Make it work with current version of assuan.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_set_fd): Accept one more argument OPT.
(_gpgme_gpgsm_op_encrypt): Pass armor argument to gpgsm_set_fd for output descriptor.
(_gpgme_gpgsm_op_sign):
Likewise.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (gpgme_op_keylist_next): Set pending to 0 if EOF occurs.

2001-11-26 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Fix stupid typo.

2001-11-24 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Don't break if bsearch fails.
Deal with assuan read line returning more than one line (for now).

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Implement it according to the current protocol definition.

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Set CLOEXEC flag for parent ends of the pipe.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Include stdlib.h and string.h. Also include, for now, runpgg.h and status-table.h.
(gpgsm_status_handler): Implement more of the status handler.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

*
engine.c (_gpgme_engine_op_decrypt): Implement CMS case.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.

(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.

* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): New function.
(gpgsm_assuan_simple_command): Likewise.
(gpgsm_set_recipients): Likewise.
(gpgsm_set_fd): Reimplement using gpgsm_assuan_simple_command.
(_gpgme_gpgsm_op_delete): New function.
(_gpgme_gpgsm_op_export): Likewise.
(_gpgme_gpgsm_op_genkey): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_trustlist): Likewise.
(_gpgme_gpgsm_release): Release command.
(_gpgme_gpgsm_op_decrypt): Allocate command.
(_gpgme_gpgsm_op_import): Likewise.
(gpgsm_status_handler): Also treat `ERR` strings as EOF.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h
(gpgme_set_protocol): New prototype.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_decrypt): New function.
(_gpgme_gpgsm_op_import): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Shuffle around header inclusion a bit, to still
keep them separate.
(_gpgme_set_status_handler) [ENABLE_GPGSM]: New function.

2001-11-22 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c: Include more headers so that NULL and mk_error
is defined even with an undefined GPGSM_PATH.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* runpg.c (gpg_inbound_handler, write_mem_data, write_cb_data,
gpg_outbound_handler): Moved to ...
* data.c (_gpgme_data_inbound_handler, write_mem_data,
write_cb_data, _gpgme_data_outbound_handler): ... here. Make the

gpgme* ones non-static.

* data.c: Include io.h.

* ops.h (_gpgme_data_inbound_handler): New prototype.

(_gpgme_data_outbound_handler): Likewise.

(_gpgme_gpg_spawn): Use

these new functions.

* engine-gpgsm.h (_gpgme_gpgsm_op_decrypt, _gpgme_gpgsm_op_delete,

_gpgme_gpgsm_op_encrypt, _gpgme_gpgsm_op_export,

_gpgme_gpgsm_op_genkey, _gpgme_gpgsm_op_import,

_gpgme_gpgsm_op_keylist, _gpgme_gpgsm_op_sign,

_gpgme_gpgsm_op_trustlist, _gpgme_gpgsm_op_verify,

_gpgme_gpgsm_start, _gpgme_gpgsm_set_status_handler): New prototype.

Include <runpg.h> for status handler function.

* engine-gpgsm.c (struct gpgsm_object_s): New members input_fd,

input_data, output_fd, output_data, message_fd, message_data, command

and status.

(_gpgme_gpgsm_new): Open input, output and message pipes before
connecting to the client. Close server's ends afterwards.

(_gpgme_gpgsm_release): Close open file descriptors. Remove
server process from wait queue.

(_gpgme_gpgsm_op_verify, _gpgme_gpgsm_start,

_gpgme_gpgsm_set_status_handler, gpgsm_status_handler): New function.

* engine.c (_gpgme_engine_start): Implement for GPGME_PROTOCOL_CMS.

(_gpgme_engine_set_status_handler):

Likewise.

(_gpgme_engine_op_verify): Likewise.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

* context.h: Do not include runpg.h, but engine.h.

(struct gpgme_context_s): Replace member gpg with engine.

* gpgme.c (gpgme_release): Release engine, not gpg.

* recipient.c (_gpgme_append_gpg_args_from_recipients): Function
moved ...

* runpg.c (_gpgme_append_gpg_args_from_recipients): ... here.

Make static, change order of arguments, and return an error value.

* ops.h (_gpgme_append_gpg_args_from_recipients): Removed prototype.

* runpg.h (_gpgme_gpg_op_verify): Add prototype.

(_gpgme_gpg_op_encrypt): Likewise.

(_gpgme_gpg_op_decrypt): Likewise.

(_gpgme_gpg_op_delete): Likewise.

(_gpgme_gpg_op_export): Likewise.

(_gpgme_gpg_op_genkey): Likewise.
(_gpgme_gpg_op_import): Likewise.
(_gpgme_gpg_op_keylist): Likewise.
(_gpgme_gpg_op_sign): Likewise.
(_gpgme_gpg_op_trustlist): Likewise.
* runpgg.c (_gpgme_gpg_op_verify): New function.
(_gpgme_gpg_op_encrypt): Likewise.
(_gpgme_gpg_op_decrypt):
Likewise.
(_gpgme_gpg_op_delete): Likewise.
(_gpgme_gpg_op_export): Likewise.
(_gpgme_gpg_op_genkey): Likewise.
(_gpgme_gpg_op_import): Likewise.
(_gpgme_gpg_op_keylist): Likewise.
(_gpgme_gpg_op_sign): Likewise.
(_gpgme_gpg_op_trustlist): Likewise.

* engine.h (_gpgme_engine_set_status_handler): Add prototype.
(_gpgme_engine_set_command_handler): Likewise.
(_gpgme_engine_set_colon_line_handler): Likewise.
(_gpgme_engine_op_decrypt): Likewise.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_import): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.
(_gpgme_engine_op_verify): Likewise.
(_gpgme_engine_start): Likewise.
* engine.c (_gpgme_engine_set_status_handler): New function.
(_gpgme_engine_set_command_handler): Likewise.
(_gpgme_engine_set_colon_line_handler):
Likewise.
(_gpgme_engine_op_decrypt): Likewise.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_import): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.
(_gpgme_engine_op_verify): Likewise.
(_gpgme_engine_start): Likewise.

* verify.c (gpgme_op_verify_start): Reimplement in terms of above

functions.

- * encrypt.c (gpgme_op_encrypt_start): Likewise.
- * decrypt.c (_gpgme_decrypt_start): Likewise.
- * passphrase.c (_gpgme_passphrase_start): Likewise.
- * keylist.c (gpgme_op_keylist_start): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

- * types.h: Add types EngineObject and GpgsmObject.

* Makefile.am (libgpgme_la_SOURCES): Add engine-gpgsm.h, engine-gpgsm.c, engine.h and engine.c.

- * engine.h: New file.
- * engine.c: Likewise.
- * engine-gpgsm.h: Likewise.
- *
- engine-gpgsm.c: Likewise.

* runpgg.c (_gpgme_gpg_get_version): New function.

(_gpgme_gpg_check_version): Likewise.

* runpgg.h: Add prototypes for _gpgme_gpg_get_version and _gpgme_gpg_check_version.

* version.c (compare_versions): Rename to ...

(_gpgme_compare_versions): ... this. Make non-static.

(gpgme_check_version): Use _gpgme_compare_versions rather than compare_versions.

(gpgme_check_engine): Likewise.

* ops.h (_gpgme_get_program_version): Add prototype.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_INCLUDES): Remove obsolete directive.

(AM_CPPFLAGS): New directive [BUILD_ASSUAN].

(libgpgme_la_LIBADD): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* version.c: Remove global variables lineno and tmp_engine_version.

(version_handler): Removed.

(_gpgme_get_program_version): New function.

(get_engine_info): Don't use context and version_handler, but _gpgme_get_program_version.

* ops.h (_gpgme_get_program_version):

Add prototype for

_gpgme_get_program_version (we expect to use it elsewhere soon).

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

- * version.c (get_engine_info): If GnuPG is not available, return an error message.
- * posix-util.c (_gpgme_get_gpg_path): Allow GPG_PATH to be undefined.
- (_gpgme_get_gpgsm_path): New function.
- * w32-util.c (find_program_in_registry): New static function.
- (_gpgme_get_gpg_path): Allow GPG_PATH to be undefined. Rework to use find_program_in_registry.
- (_gpgme_get_gpgsm_path): New function.
- (util.h): Prototype _gpgme_get_gpgsm_path).
- * runpg.c (_gpgme_gpg_spawn): Verify that _gpgme_get_gpg_path() returns non-null.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

- * decrypt-verify.c: New file.
- * Makefile.am (libgpgme_la_SOURCES): Add decrypt-verify.c.
- * types.h: Add decrypt-verify types.
- * ops.h: Likewise.
- * context.h: Add result type for decrypt-verify.
- * gpgme.h: Add decrypt-verify prototypes.

- * decrypt.c (decrypt_status_handler):
Renamed to ...
(_gpgme_decrypt_status_handler): ... this. Make non-static.
- (_gpgme_decrypt_start): New function, derived from
gpgme_op_decrypt_start.
- (gpgme_op_decrypt_start): Reimplement in terms of
_gpgme_decrypt_start.
- (_gpgme_decrypt_result): New function to retrieve error value.
- (gpgme_op_decrypt): Use _gpgme_decrypt_result.
- * ops.h: Add prototypes for new functions.

- * verify.c (verify_status_handler): Renamed to ...
(_gpgme_verify_status_handler): ... this. Make non-static.
- (gpgme_op_verify_start): Use new function name.
- (intersect_stati): Renamed to ...
(_gpgme_intersect_stati): ... this. Make non-static.
- (gpgme_op_verify): Use new name.
- * ops.h: Add prototypes for new functions.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

- * passphrase.c: New file.
- * Makefile.am (libgpgme_la_SOURCES): Add passphrase.c.
- * ops.h (_gpgme_passphrase_result): Add prototypes from

passphrase.c.

* types.h: Likewise.

* context.h: Add member passphrase to result.

*

gpgme.c (`_gpgme_release_result`): Release passphrase member.

* decrypt.c: Some formatting and variable name changes (like CTX instead C).

(struct `decrypt_result_s`): Remove members now found in passphrase result.

(`_gpgme_release_decrypt_result`): Don't release removed members.

(`decrypt_status_handler`): Call `_gpgme_passphrase_status_handler`, and don't handle the cases caught there.

(`command_handler`): Removed.

(`gpgme_op_decrypt_start`): Don't set command handler, but invoke `_gpgme_passphrase_start` which does it.

(`gpgme_op_decrypt`): Invoke `_gpgme_passphrase_result` and drop the cases covered by it.

* sign.c Some formatting and variable name changes (like CTX instead C).

(struct `sign_result_s`): Remove members now found in passphrase result.

(`_gpgme_release_sign_result`): Don't release removed members.

(`sign_status_handler`): Call `_gpgme_passphrase_status_handler`, and don't handle the cases caught there.

(`command_handler`): Removed.

(`gpgme_op_sign_start`): Don't set command handler, but invoke

`_gpgme_passphrase_start` which does it.

(`gpgme_op_sign`): Invoke `_gpgme_passphrase_result` and drop the cases covered by it.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

* decrypt.c (`command_handler`): Fix last change.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

* verify.c (`_gpgme_release_verify_result`): Rename RES to RESULT. Rename R2 to NEXT_RESULT.

(`intersect_stati`): Rename RES to RESULT.

(`gpgme_get_sig_status`): Likewise. Do not check return_type, but the member verify of result.

(`gpgme_get_sig_key`): Likewise.

* sign.c (`_gpgme_release_sign_result`): Rename RES to RESULT. If RESULT is zero, return.

(sign_status_handler, command_handler): Do not check return_type, but the member sign of result.

(gpgme_op_sign): Likewise. Drop assertion.

* encrypt.c (_gpgme_release_encrypt_result): Rename RES to RESULT.

If RESULT is zero, return.

(encrypt_status_handler): Do not check return_type, but the member encrypt of result.

(gpgme_op_encrypt):

Likewise. Drop assertion.

* decrypt.c (_gpgme_release_decrypt_result): Rename RES to RESULT.

(create_result_struct): Do not set result_type.

(command_handler, decrypt_status_handler): Do not check return_type, but the member decrypt of result.

(gpgme_op_decrypt): Likewise. Drop assertion.

* context.h (enum ResultType): Removed.

(struct gpgme_context_s): Remove member result_type.

(struct result): Replaces union result.

* gpgme.c: Include string.h.

(_gpgme_release_result): Release all members of c->result, which is now a struct. Zero out all members of the struct afterwards.

2001-11-11 Marcus Brinkmann <marcus@g10code.de>

* runpgp.c (_gpgme_gpg_release): Release GPG->cmd.cb_data.

Release all members of the list GPG->arglist.

Reported by Michael Schmidt <mschmidt@cs.uni-sb.de>.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

* runpgp.c (pipemode_copy): Change type of NBYTES to size_t.

* key.c: Include string.h.

* data.c: Likewise.

* recipient.c: Likewise.

2001-10-29

Marcus Brinkmann <marcus@g10code.de>

* context.h: New member signers_len.

* signers.c (gpgme_signers_clear): Require that signers are non-NULL with assertion. Use signers_len to determine how much keys to release. Add documentation.

(gpgme_signers_add): Use signers_len to determine if the buffer is large enough. Use xtryrealloc rather than xtrymalloc and copying.

Add documentation.

(gpgme_signers_enum): Use signers_len to determine if key is available. Add documentation.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* data.c (_gpgme_data_append): Check if LENGTH is smaller than ALLOC_CHUNK, not DH->length.

2001-10-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_set_protocol): Fix last change.

2001-10-15 Werner Koch <wk@gnupg.org>

* gpgme.h (GpgmeProtocol): New.

* gpgme.c (gpgme_set_protocol): New.

2001-09-26 Werner Koch <wk@gnupg.org>

* gpgme.c (gpgme_set_passphrase_cb): Ignore a NULL context.

(gpgme_set_progress_cb): Ditto.

Suggested by Mark Mutz.

2001-09-17 Werner Koch <wk@gnupg.org>

* keylist.c (finish_key): Shortcut for no tmp_key. Changed all callers to use this function without a check for tmp_key.

* keylist.c (gpgme_op_keylist_next): Reset the key_cond after emptying the queue. Bug reported by Stphane Corthisy.

2001-09-12 Werner Koch <wk@gnupg.org>

* data.c (gpgme_data_rewind): Allow rewind for callbacks.

2001-09-07 Werner Koch <wk@gnupg.org>

* runpg.h: Add NO_RECP.

* encrypt.c (encrypt_status_handler): Take on No_RECP.

(gpgme_op_encrypt): Better error return.

* verify.c (verify_status_handler): Take on NODATA.

2001-09-03 Werner Koch <wk@gnupg.org>

* runpg.h: Added STATUS_INV_RECP.

* gpgme.c (_gpgme_release_result): Add support for new

EncryptResult object.

* encrypt.c (append_xml_encinfo): New.
(encrypt_status_handler): Add some status parsing.
(_gpgme_release_encrypt_result): New.

2001-08-29 Werner Koch <wk@gnupg.org>

* recipient.c (gpgme_recipients_release):
Free the list. By Timo.

* keylist.c (keylist_colon_handler): Do a finish key if we receive
an EOF here. This is probably the reason for a lot of bugs
related to keylisting. It is so obvious. Kudos to Enno Cramer
for pointing that out.

2001-08-28 Werner Koch <wk@gnupg.org>

* gpgme.c, gpgme.h (gpgme_get_op_info): New.
(_gpgme_set_op_info): New.
(_gpgme_release_result): Reset the op_info here.
* sign.c (append_xml_siginfo): New.
(sign_status_handler): Store the sig create information.

2001-07-31 Werner Koch <wk@gnupg.org>

* encrypt.c (gpgme_op_encrypt): Hack to detect no valid recipients.

2001-07-30 Werner Koch <wk@gnupg.org>

* gpgme.c (gpgme_get_armor,gpgme_get_textmode): New.

* runpg.c (build_argv): Disable armor comments
* w32-io.c (build_commandline): Need to add quotes here

2001-07-24 Werner Koch <wk@gnupg.org>

* data.c (gpgme_data_read): Add a way to return the available bytes.

2001-07-23 Werner Koch <wk@gnupg.org>

* util.c: Removed
stpcpy() because we use the version from jnlib.

2001-07-19 Werner Koch <wk@gnupg.org>

* mkstatus: Define the collating sequence for sort.

2001-06-26 Werner Koch <wk@gnupg.org>

* runpgg.h: Add STATUS_UNEXPECTED as suggested by Timo.

2001-06-15 Werner Koch <wk@gnupg.org>

* keylist.c (set_userid_flags): Fixed the assigned values. Kudos to Timo for pointing this out.

2001-06-01 Werner Koch <wk@gnupg.org>

* debug.c (_gpgme_debug_begin): Fixed a /tmp race. Noted by Johannes Poehlmann.

2001-05-28 Werner Koch <wk@gnupg.org>

* version.c (gpgme_check_engine): Stop version number parsing at the opening angle and not the closing one. By Tommy Reynolds.

2001-05-01 Jos Carlos Garca Sogo <jose@jaimedelamo.eu.org>

* encrypt.c (gpgme_op_encrypt_start): Deleted the assert (!c->gpg) line, because it gave an error if another operation had been made before using the same context.

* decrypt.c (gpgme_op_decrypt_start): The same as above. Also added one line to release the gpg object in the context (if any).

2001-04-26 Werner Koch <wk@gnupg.org>

* key.c, key.h (_gpgme_key_cache_init): New.
(_gpgme_key_cache_add): New.
(_gpgme_key_cache_get): New.
* version.c (do_subsystem_inits): Init the cache.
* keylist.c (finish_key): Put key into the cache
* verify.c (gpgme_get_sig_key): First look into the cache.

2001-04-19 Werner Koch <wk@gnupg.org>

* keylist.c (parse_timestamp): Adjusted for the changed --fixed-list-mode of gpg 1.0.4h.

2001-04-05 Werner Koch <wk@gnupg.org>

* verify.c (gpgme_op_verify_start): Enabled pipemode for detached sigs.

2001-04-04 Werner Koch <wk@gnupg.org>

* w32-io.c (_gpgme_io_select): Don't select on the writer if there

are still bytes pending. Timo found this not easy to track down race condition.

2001-04-02 Werner Koch <wk@gnupg.org>

* gpgme.h: Add GPGME_ATTR_KEY_{EXPIRED,DISABLED}.

* key.c (gpgme_key_get_ulong_attr): And return those attribs.

* verify.c (gpgme_get_sig_key): Set keyiosting mode depending on the mode set in the current context. Suggested by Timo.

* key.c (gpgme_key_get_ulong_attr): Return can_certify and not can_encrypt. By Timo.

2001-03-30 Werner Koch <wk@gnupg.org>

* debug.c (debug_init): Allow to specify a debug file. (_gpgme_debug_level): New.

* posix-io.c (_gpgme_io_read, _gpgme_io_write): Print output. (_gpgme_io_select): Debug only with level > 2.

2001-03-15 Werner Koch <wk@gnupg.org>

* runpgg.c: Included time.h.

* key.h: New keyflags for capabilities.

* keylist.c (set_mainkey_capability, set_subkey_capability): New. (keylist_colon_handler): Parse them.

* gpgme.h: New attribute values for capabilities.

* key.c (gpgme_key_get_string_attr): Return them.

(capabilities_to_string): New.

(gpgme_key_get_ulong_attr): Return the global caps.

2001-03-14 Werner Koch <wk@gnupg.org>

* w32-io.c (destroy_reader,destroy_writer): Fixed syntax error. Thanks to Jan Oliver Wagner.

2001-03-13 Werner Koch <wk@gnupg.org>

* context.h: Add invalid and revoke flags to user_id structure.

* keylist.c (gpgme_op_keylist_start): Use --fixed-list-mode.

(keylist_colon_handler): Adjust for that.

(set_userid_flags): New.

(set_mainkey_trust_info): Handle new key invalid flag

(set_subkey_trust_info): Ditto.
* gpgme.h: Add new attributes for key and user ID flags.
* key.c (_gpgme_key_append_name): Init these flags
(gpgme_key_get_as_xml): Print them.
(one_uid_as_xml): New helper for above.
(gpgme_key_get_string_attr, gpgme_key_get_ulong_attr):
Return the new attributes. Enhanced, so that subkey information
can be returned now.

2001-02-28 Werner Koch <wk@gnupg.org>

* w32-io.c (destroy_reader): Set stop_me flag.
(writer, create_writer, destroy_writer, find_writer, kill_writer): New.
(_gpgme_io_write): Use a writer thread to avoid blocking.
(_gpgme_io_close): Cleanup a writer thread
(_gpgme_io_select): Replace the faked wait on writing by a real
waiting which is now possible due to the use of a writer thread.

2001-02-20

Werner Koch <wk@gnupg.org>

* w32-io.c (destroy_reader, kill_reader): New.
(create_reader, reader): Add a new event to stop the thread.
(_gpgme_io_close): Kill the reader thread.

* posix-io.c (_gpgme_io_select): Handle frozen fds here.
* 32-io.c (_gpgme_io_select): Ditto. Removed a bunch of unused code.

* wait.c: Reworked the whole thing.
* runpg.c (_gpgme_gpg_new): Init pid to -1.
(_gpgme_gpg_release): Remove the process from the wait queue.

2001-02-19 Werner Koch <wk@gnupg.org>

* w32-io.c (_gpgme_io_set_close_notify): New.
(_gpgme_io_close): Do the notification.

* posix-io.c (_gpgme_io_select): Use a 1 sec timeout and not 200
microseconds.

* wait.c (remove_process): Don't close the fd here.
(do_select): Set the fd to -1 and remove the is_closed flag everywhere.
(_gpgme_wait_on_condition): Remove the assert on the queue and
break out if we could not find the queue. The whole thing should
be reworked.

* posix-io.c (_gpgme_io_set_close_notify): New.
(_gpgme_io_close):

Do the notification.

- * `rungpg.c` (`close_notify_handler`): New.
- (`_gpgme_gpg_new`): Register a callback for the fd.
- (`_gpgme_gpg_set_colon_line_handler`): Ditto.
- (`build_argv`): Ditto

2001-02-13 Werner Koch <wk@gnupg.org>

- * `rungpg.c` (`struct reap_s`): Replaced `pid_t` by `int`.
- * `types.h`: Add `ulong` typedef.
- * `rungpg.c` (`do_reaping`, `_gpgme_gpg_housecleaning`): New.
- (`_gpgme_gpg_release`): Reap children.
- * `io.h`, `posix-io.c` (`_gpgme_io_kill`): New.
- * `w32-io.c` (`_gpgme_io_kill`): New (dummy).
- * `keylist.c` (`gpgme_op_keylist_start`): Cancel a pending request.
- * `posix-io.c` (`_gpgme_io_read`): Add some debug output.
- (`_gpgme_io_write`): Ditto.
- (`_gpgme_io_select`): Increased the timeout.

2001-02-12 Werner Koch <wk@gnupg.org>

Enhanced the signature verification, so that it can now handle more than one signature and is able to return more information on the signatures.

- * `verify.c` (`gpgme_get_sig_key`): New.
- (`gpgme_get_sig_status`): New.

- * `gpgme.h`: Add `stdio.h`.
- (`GpgmeSigStat`):
- New status `DIFF`.

2001-02-01 Werner Koch <wk@gnupg.org>

- * `w32-io.c` (`set_synchronize`): Add `EVENT_MODIFY_STATE`. Add Debug code to all `Set/ResetEvent()`.

- * `rungpg.c` (`read_status`): Check for end of stream only if we have an r. By Timo.

2001-01-31 Werner Koch <wk@gnupg.org>

- * `wait.c` (`_gpgme_wait_on_condition`): Removed all exit code processing.
- (`propagate_term_results`, `clear_active_fds`): Removed.

(count_active_fds): Renamed to ..

(count_active_and_thawed_fds): .. this and count only thawed fds.

* runpgg.c (gpg_colon_line_handler): Return colon.eof and not status.eof ;-)

2001-01-30 Werner Koch <wk@gnupg.org>

* w32-io.c (_gpgme_io_spawn): Use the supplied path arg.

* version.c (get_engine_info): Return better error information.

* posix-util.c, w32-util.c: New.

(_gpgme_get_gpg_path): New, suggested by Jan-Oliver.

* runpgg.c (_gpgme_gpg_spawn): Use new function to get GPG's path.

* signers.c (gpgme_signers_add): Oops, one should test code and not just write it;

the newarr was not assigned. Thanks to Jos

for pointing this out. Hmmm, still not tested, why should a coder test his fix :-)

* w32-io.c: Does now use reader threads, so that we can use WaitForMultipleObjects.

* sema.h, posix-sema.c, w32-sema.c: Support for Critical sections. Does currently only work for W32.

* debug.c, util.h : New. Changed all fprintfs to use this new set of debugging functions.

2001-01-23 Werner Koch <wk@gnupg.org>

* data.c (_gpgme_data_release_and_return_string): Fixed string termination.

2001-01-22 Werner Koch <wk@gnupg.org>

* delete.c: New.

* signers.c: New.

* key.c (gpgme_key_ref, gpgme_key_unref): New.

* sign.c (gpgme_op_sign_start): Allow the use of other keys.

* version.c (gpgme_get_engine_info, gpgme_check_engine): New.

* runpgg.c (_gpgme_gpg_set_simple_line_handler): New.

2001-01-05 Werner Koch <wk@gnupg.org>

* data.c (gpgme_data_rewind): Allow to rewind data_type_none.

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;;; License along with GPGME; if not, write to the Free
;;; Software Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA
;;; 02111-1307, USA.

(defpackage #:gpgme-system

(:use #:common-lisp #:asdf))

(in-package #:gpgme-system)

(defsystem gpgme

:description "GnuPG Made Easy."

:author "g10 Code GmbH"

:version "1.15.1"

:licence "GPL"

:defsystem-depends-on ("cffi-grovel"))

```

:depends-on ("cffi" "gpg-error" "trivial-garbage")
:components ((:file "gpgme-package")
              (:cffi-grovel-file "gpgme-grovel"
                :depends-on ("gpgme-package")))
              (:file "gpgme"
                :depends-on ("gpgme-package" "gpgme-grovel"))))
#-*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

```

* GPGME Python Bindings

```

:PROPERTIES:
:CUSTOM_ID: top
:END:

```

** Contents

```

:PROPERTIES:
:CUSTOM_ID: contents
:END:

```

- [[file:short-history][A short history of the project]]
- [[file:what-is-new][What's New]]
- [[file:maintenance-mode][Maintenance Mode]] (from January, 2019)
- [[file:what-was-new][What Was New]]
- [[file:gpgme-python-howto][GPGME Python Bindings HOWTO]]

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```

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-----BEGIN PGP PUBLIC KEY BLOCK-----

```
mQENBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLU1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJIO1s0N2c
PSht98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYN8SFC+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/ixekeQCqpRjLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAG0EHRlc3RAZXhhbXBsZS5v
cmeJAVQEEwEIAD4WIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8Jn
AAULCQGhAgYVCgkICwIEFgIDAQIeAQIXgAAKCRajAWNe7/DLBf9kB/wOQ/S60HGw
Fq07W9N01HWULyhHKoMmcHL6rfZ64oDqLxolPSasz7WAMW1jN4qtWJ0mFzwo83V6
kaBe+wF6Kqir6udFSBW9rPcFg6/VZXPltT0a6uacIHq6DyQ5iMW4YQWbV9OR2rN
GkYo1JCBR0XdRjYCSX3yB4TWv/eXnZ37/WjmiTOIZh35rjs+NuU/S5JPdfAp2/k7
0DevQeBsv+UjVXjWpNTZmPbvDnd995uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6U
unOf9Rlp1oMzdxMool/d1MICxg2h3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ
1J8Nsv87SZEuQENBFrsKEkBCADjoEBhg/QPqZHg8VyoD1xYRAWGxyDJKX/GrSs6
yE+x2hk5FoQCajxKa/d4AVxOnJpdwhAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0p
O7bgAiZxkA6RHxtNqhpPnPQoXvUzkzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/
8i9Taz67pdZwuJjac8qBuJHjzAo1bjYctFYUSG5pbmMQyNLySzziNkFa4DajODlt
3RuqVGP316Fk+Sy2+60tC/HIX8jgMyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyL
UGKU+L8cB2g1PGGp2biBFWqZbudZoyRBet/0yH/zirBdQJw1ABEBAAGJATwEGAEI
ACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAKCRajAWNe
7/DLBf0pCACPP5hBuUWngu2Hqvg+tNiujsiYzId3MffFxEk3CbXeHcJ5F32NDJ9
PYCnra4L8wSv+NZt9gIa8IFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7Jq3e/4Iy
0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02Lkr+2Cc/Q
k6H+vlNOHGRgnPI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe23nntMSD
A+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRnyw4WHpZriN69F0t9Mmd7bM1
+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=QyY6
```

-----END

PGP PUBLIC KEY BLOCK-----

Using gpgme.js

At first, make sure that the environment you want to use gpgme.js in has access and permissions for nativeMessaging, and gpgme-json installed. For details, see the README.

The library itself is started via the { @link init } method. This will test the nativeMessaging connection, and then resolve into an Object offering the top level API:

```

* [encrypt]{ @link GpgME#encrypt}
* [decrypt]{ @link GpgME#decrypt}
* [sign]{ @link GpgME#sign}
* [verify]{ @link GpgME#verify}
* [Keyring]{ @link GPGME_Keyring}

```

...

```

gpgmejs.init()
  .then(function(GPGME) {
    // using GPGME
  }, function(error){
    // error handling;
  })

```

...

All methods that require communication with nativeMessaging are asynchronous, using Promises. Rejections will be instances of { @link GPGME_Error }.

An exception are Keys, which can be initialized in a 'sync' mode, allowing them to be cached and used synchronously until manually refreshed.

Keyring and Keys

The gnupg keys can be accessed via the [Keyring]{ @link GPGME_Keyring }.

The Keyring offers the methods for accessing information on all Keys known to gnupg.

****Due to security constraints, the javascript-binding currently only offers limited support for secret-Key interaction.****

The existence of secret Keys is not secret, and those secret Keys can be used for signing, but Operations that may expose, modify or delete secret Keys are not supported.

```

* [getKeysArmored]{ @link GPGME_Keyring#getKeysArmored}
* [getKeys]{ @link GPGME_Keyring#getKeys}
* [getDefaultKey]{ @link GPGME_Keyring#getDefaultKey}
* [generateKey]{ @link GPGME_Keyring#generateKey}
* [deleteKey]{ @link GPGME_Keyring#deleteKey}
#!/usr/bin/env bash
# MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
# This script will read the license file into memory, strip out the copyright, and then
# generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e

```

```

calculate_md5_sum() {
local FILE="$1"

# Read the contents of the file into a variable
local raw_license_text=$(<"$FILE")

# Convert to lowercase
local lowercase_license_text="{raw_license_text,,}"

# Remove anything before the beginning of the license
local stripped_license_text=$(awk '/permission is hereby granted,/{p=1} p' <<< "$lowercase_license_text")

# Replace line breaks (Windows or Linux) with a single space
local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

# Replace multiple spaces with a single space
local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

# Strip away any non-printable, non-whitespace characters
local clean_unprintable_license_text=$(tr
-cd '[:print:][:space:]' <<< "$normalized_license_text")

# Remove punctuation and special characters
local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z ]//g')

# Calculate the MD5 sum of the cleaned license text
local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')

# Output the MD5 sum
echo "$MD5SUM"
}

# Check if the FILE argument is provided
if [ -z "$1" ]; then
echo "Please provide a FILE as an argument."
exit 1
fi

# Invoke the function with the provided FILE argument
calculate_md5_sum "$1"

;;; gpgme-grovel.lisp

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```

```
(in-package :gpgme)
```

```
(include "errno.h" "sys/types.h")
```

```
(constant (+ebadf+ "EBADF"))
```

```
(ctype off-t "off_t")
```

```
(ctype size-t "size_t")
```

```
(ctype ssize-t "ssize_t")
```

```
(cvar ("errno" *errno*) :int)
```

```
(21:protected-private-key(3:dsa(1:p129:_d8|po3s@!WGUOAXRC$_[8SN:y|o?2[.pVxn(kOc\Bk0zu&FnK)(1:q21:
vBeOP\p)(1:g129:fU/e(2hp@hjc2uE=Sg GO;ZkIyFnGM!GsG@
= _SZkII)(1:y128:K:9tA)4SU1 }sG`nZpx/imV^>A;V%?5!!sS{!=-6@|
=d
```

```
) (9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:Li7:6452224)16:,kO{,}80:z7OCG/sB48(H9%*ojSO
OGSma`YUs1h<_)(12:protected-at15:20130812T105134)))
```

For a list of the authors of the source code of GPGME, please see the file AUTHORS. The following people supported GPGME development in various ways (for example by finding bugs or giving advice), and we want to thank them for their help. If we forgot you, please let us know.

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% Created 2019-01-18 Fri 10:10

% Intended LaTeX compiler: xelatex

```
\documentclass[12pt]{article}
\usepackage{graphicx}
\usepackage{grffile}
\usepackage{longtable}
\usepackage{wrapfig}
\usepackage{rotating}
\usepackage[normalem]{ulem}
\usepackage{amsmath}
\usepackage{textcomp}
\usepackage{amssymb}
\usepackage{capt-of}
\usepackage{hyperref}
\usepackage{xltxtra}
\usepackage[margin=1in]{geometry}
\setmainfont[Ligatures={Common}]{Times New Roman}
\author{Ben McGinnes <ben@gnupg.org>}
\author{Ben McGinnes}
\date{\today}
\title{GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)}
\hypersetup{
pdfauthor={Ben McGinnes},
pdftitle={GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)},
pdfkeywords={},
pdfsubject={},
pdfcreator={Emacs 26.1 (Org mode 9.1.14)},
pdflang={English}}
\begin{document}

\maketitle
```


\tableofcontents

\section{Introduction}

\label{sec:org8e5fa02}

\begin{center}

\begin{tabular}{ll}

Version: & 0.1.4\\

GPGME Version: & 1.12.1\\

Author: & Ben

McGinnes <ben@gnupg.org>\\

Author GPG Key: & DB4724E6FA4286C92B4E55C4321E4E2373590E5D\\

Language: & Australian English, British English\\

Language codes: & en-AU, en-GB, en\\

\end{tabular}

\end{center}

This document provides basic instruction in how to use the GPGME Python bindings to programmatically leverage the GPGME library.

\subsection{Python 2 versus Python 3}

\label{sec:org517cbf4}

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

\subsection{Examples}

\label{sec:org2c08d53}

All of the examples found in this document can be found as Python 3 scripts in the `\texttt{lang/python/examples/howto}` directory.

`\subsection{Unofficial Drafts}`

`\label{sec:orgceb2216}`

In addition to shipping with each release of GPGME, there is a section on locations to read or download `\hyperref[sec:org080a94a]{draft editions}` of this document from at the end of it. These are unofficial versions produced in between major releases.

`\subsection{What's New}`

`\label{sec:orga79ddc2}`

Full

details of what is new are now available in the `\href{what-is-new.org}{What's New}` file and archives of the preceding `\emph{What's New}` sections are available in the `\href{what-was-new}{What Was New}` file.

`\subsubsection{New in GPGME 1130}`

`\label{sec:org746b75d}`

See the `\href{what-is-new/#new-stuff-1-13-0}{What's New}` document for what is new in version 1.13.0.

`\subsubsection{New in GPGME 1120}`

`\label{sec:org7adcade}`

See the `\href{what-was-new/#new-stuff-1-12-0}{What Was New}` document for what was new in version 1.12.0.

`\section{GPGME Concepts}`

`\label{sec:orgb257fc1}`

`\subsection{A C API}`

`\label{sec:org4fe1dfa}`

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `\texttt{gpgme.h}` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very

effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some means of providing an interface to those languages. This is where the need for bindings in various languages stems.

`\subsection{Python bindings}`

`\label{sec:org0e49e52}`

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of `\texttt{gpgme.h}` generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of `\texttt{gpgme.h}`.

`\subsection{Difference between the Python bindings and other GnuPG Python packages}`

`\label{sec:org97acfd7}`

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

`\subsubsection{The python-gnupg package maintained by Vinay Sajip}`

`\label{sec:org0136847}`

This is arguably the most popular means of integrating GPG with Python. The package utilises the `\texttt{subprocess}` module to implement wrappers for the `\texttt{gpg}` and `\texttt{gpg2}` executables normally invoked on the command line (`\texttt{gpg.exe}` and `\texttt{gpg2.exe}` on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the `\texttt{subprocess}` calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those `subprocess` calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The `python-gnupg` package is available under the MIT license.

`\subsubsection{The gnupg package created and maintained by Isis Lovecruft}`

`\label{sec:orgdc03987}`

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the `python-gnupg` package as just `gnupg`. This new

package also relied on subprocess to call the `gpg` or `gpg2` binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original `python-gnupg` and since its functions were called in a different manner to `python-gnupg`, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The `gnupg` package is available under the GNU General Public License version 3.0 (or any later version).

`\subsection{The PyME package maintained by Martin Albrecht}`

`\label{sec:org715600b}`

This package is the origin of these bindings, though they are somewhat different now. For details of when and how the PyME package was folded back into GPGME itself see the `\href{short-history.org}{Short History}` document.`\footnote{\texttt{short-history}` and/or `\texttt{short-history.html}`.)

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the `python-gnupg` or `gnupg` packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

`\section{GPGME Python bindings installation}`

`\label{sec:org73d8d6f}`

`\subsection{No PyPI}`

`\label{sec:org9a038}`

Most third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is

infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against `gpgme.h` and `gpgme.h` is generated from `gpgme.h.in` at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding [CFFI and SWIG](https://cffi.org) at the end of this section for further details.

Requirements

[sec:org2f7f06c](#)

The

GPGME Python bindings only have three requirements:

`\begin{enumerate}`

`\item` A suitable version of Python 2 or Python 3. With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.

`\item` <https://www.swig.org> {SWIG}.

`\item` GPGME itself. Which also means that all of GPGME's dependencies must be installed too.

`\end{enumerate}`

Recommended Additions

[sec:org25bd7d4](#)

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

`\begin{enumerate}`

`\item` If possible, use Python 3 instead of 2.

`\item` Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.

`\item` If possible add the

following Python modules which are not part of

the standard library: <http://docs.python-requests.org/en/latest/index.html> {Requests},

<https://cython.org/> {Cython}, <https://pendulum.eustace.io/> {Pendulum} and

<https://github.com/Selfnet/hkp4py> {hkp4py}.

`\end{enumerate}`

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

`\subsection{Installation}`

`\label{sec:orgf1c7587}`

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your `\texttt{\$PATH}`.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in `\texttt{\$PATH}`. It specifically checks for the `\texttt{python}` and `\texttt{python3}` executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: `\texttt{python}`, `\texttt{python2}` and `\texttt{python2.7}`.

For Python 3 it checks for these executables in this order: `\texttt{python3}`, `\texttt{python3.7}`, `\texttt{python3.6}`, `\texttt{python3.5}` and `\texttt{python3.4}`.^{footnote{With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported minor release is quite possible too.}}

On systems where `\texttt{python}` is actually `\texttt{python3}` and not `\texttt{python2}` it may be possible that `\texttt{python2}` may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME

1.12.0, the order of preferred Python versions has been changed to move Python 3.7 ahead of Python 3.6.

`\subsubsection{Installing GPGME}`

`\label{sec:org903bd67}`

See the GPGME `\texttt{README}` file for details of how to install GPGME from source.

`\subsection{Known Issues}`

`\label{sec:org0d2a332}`

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should they be encountered.

`\subsubsection{Breaking Builds}`

`\label{sec:orgbac75f3}`

Occasionally when installing GPGME with the Python bindings included it may be observed that the `\texttt{make}` portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with `\texttt{make check}` and `\texttt{make install}` appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce `\texttt{lang/python/python2-gpg/}` and `\texttt{lang/python/python3-gpg/}` directories. These should contain the build output generated during compilation, including the complete bindings and module installed into `\texttt{site-packages}`.

Occasionally the errors in the early part or some other conflict (e.g. not installing as `\textbf{\emph{root}}` or `\textbf{\emph{su}}`) may result in nothing being installed to the relevant `\texttt{site-packages}` directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the `\textbf{root}` user or prepended with `\texttt{sudo -H}`^{Yes, even if you use virtualenv with everything you do in}

Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the `\emph{entire}` GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on

POSIX systems which utilise single user mode (some even require it.) in the `\texttt{lang/python/}` directory:

```
\begin{verbatim}
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py
  build
/path/to/pythonX.Y setup.py install
\end{verbatim}
```

Yes, the build command does need to be run twice. Yes, you still need to run the potentially failing or incomplete steps during the `\texttt{configure}`, `\texttt{make}` and `\texttt{make install}` steps with installing GPGME. This is because those steps generate a lot of essential files needed, both by and in order to create, the bindings (including both the `\texttt{setup.py}` and `\texttt{gpgme.h}` files).

```
\begin{enumerate}
\item IMPORTANT Note
\label{sec:org37f3d4a}
If specifying a selected number of languages to create bindings for,
try to leave Python last. Currently the majority of the other
language bindings are also preceding Python of either version when
listed alphabetically (not counting the Qt bindings).
```

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative `\texttt{configure}` steps for GPGME using the `\texttt{-{ }-enable-languages=\$LANGUAGE}` option.

Alternatively `\texttt{make}` (or `\texttt{gmake}`, depending on your platform) may be run with the `\texttt{-k}` option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

```
\end{enumerate}
```

```
\subsubsection{Reinstalling Responsibly}
```

```
\label{sec:org21e4dec}
```

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required.

With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then

the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues

observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing the previous version(s) is simply a matter of changing to the relevant `\texttt{site-packages}` directory for the version of Python in question and removing the `\texttt{gpg/}` directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

`\subsubsection{Multiple installations}`

`\label{sec:org30b18bd}`

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (`build`, `build`, `install`) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings `\textbf{must}` match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME `\href{https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e}{1.12.1}` the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, 3.6, 3.7 and 3.8 (dev branch) that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the `\texttt{\$PATH}` when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find,

including alternative prefixes.

`\subsubsection{Won't Work With Windows}`

`\label{sec:org0e8ae3a}`

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the `\href{https://python.org}{Python website}` (i.e. mostly MSI installers, sometimes self-extracting `\texttt{.exe}` files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is `\emph{considerably}` more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of

Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

`\begin{enumerate}`

`\item` Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

`\item` Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

`\end{enumerate}`

Do `\textbf{not}` use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community

Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released [\href{https://www.python.org/downloads/windows/}](https://www.python.org/downloads/windows/){for Windows}:

```
\begin{center}
\begin{tabular}{rll}
CPython & & Microsoft product name & & runtime filename\\
2.7.6 & & Visual Studio 2008 & & MSVCR90.DLL\\
3.4.0 & & Visual Studio 2010 & & MSVCR100.DLL\\
3.5.0 & & Visual Studio 2015 & & \textbf{see below}\\
3.6.0 & & Visual Studio 2015 & & \textbf{see below}\\
3.7.0 & & Visual Studio 2017* & & \textbf{see below}
\end{tabular}
\end{center}
```

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus **incompatible** with all the versions of CPython which can be used with the GPGME Python bindings.

It is

also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [\href{https://matthew-brett.github.io/pydagogue/python_msvc.html}](https://matthew-brett.github.io/pydagogue/python_msvc.html){Using Microsoft Visual C with Python}. It is also worth reading the Microsoft Developer Network blog post on [\href{http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx}](http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx){the universal CRT} and Steve Dower's blog posts on Python extensions ([\href{http://stevedower.id.au/blog/building-for-python-3-5}](http://stevedower.id.au/blog/building-for-python-3-5){part 1} and [\href{http://stevedower.id.au/blog/building-for-python-3-5-part-two}](http://stevedower.id.au/blog/building-for-python-3-5-part-two){part 2}).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the <https://wiki.python.org/moin/WindowsCompilers> {Windows compilers} wiki page on the CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare `\textbf{minimum}`, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from `\texttt{python.org}` the advanced options available which utilise [\hyperref\[sec:org3b53926\]{Cython}](https://pypi.org/project/Cython/) will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

`\begin{enumerate}`

`\item` Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.

`\item`

Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).

`\item` Compile both CPython and GPGME with these bindings using the tools selected in step 2.

`\item` Ignore MingW, Msys2 and the official CPython binary installers.

`\item` Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

\end{enumerate}

\subsubsection{CFFI is the Best and GPGME should use it instead of SWIG}

\label{sec:org645735a}

There are many reasons for favouring <https://cffi.readthedocs.io/en/latest/overview.html> {CFFI} and proponents of it are quite happy to repeat these things as if all it would take to switch from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the

bindings to Python using the `gpgme.h` file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable codebase. If there were some means of applying SWIG's dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the `gpgme-tool.c` file in the GPGME `src/` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

\subsubsection{Virtualised Environments}

\label{sec:orgb0d56f5}

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into

question too.

As it happens the answer as to whether or not the bindings can be used with virtualenv, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix

like `{usr/local}` or `{opt/local}` then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a `{sites.pth}` file in the `{site-packages/}` directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. <https://docs.pytest.org/en/latest/index.html> `{pytest}`) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. <https://www.virtualbox.org/> `{VirtualBox}`), a

hardware emulation layer (e.g. [\href{https://www.qemu.org/}{QEMU}](https://www.qemu.org/)) or an application container (e.g. [\href{https://www.docker.com/why-docker/}{Docker}](https://www.docker.com/why-docker/)).

Finally it should be noted that the limited tests conducted thus far have been using the `\texttt{virtualenv}` command in a new directory to create the virtual python environment. As opposed to the standard `\texttt{python3 -m venv}` and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command `\texttt{python3 -m virtualenv /path/to/install/virtual/thingy}` instead.

\section{Fundamentals}

\label{sec:org832642e}

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

\subsection{No REST}

\label{sec:org3d694ba}

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is *\textbf{not}* a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

\subsection{Context}

\label{sec:org10e4004}

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the

public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

```
\section{Working with keys}
```

```
\label{sec:orgff114ca}
```

```
\subsection{Key selection}
```

```
\label{sec:org6589217}
```

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
\begin{verbatim}
```

```
import gpg
```

```
k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
```

```
keys = list(k)
```

```
\end{verbatim}
```

This is passable and very likely to be common:

```
\begin{verbatim}
```

```
import gpg
```

```
k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
```



```
keys = list(k)
\end{verbatim}
```

And this is a really bad idea:

```
\begin{verbatim}
import
  gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
\end{verbatim}
```

Alternatively it may be that the intention is to create a list of keys which all match a particular search string. For instance all the addresses at a particular domain, like this:

```
\begin{verbatim}
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
\end{verbatim}
```

```
\subsubsection{Counting keys}
\label{sec:org63a3d62}
Counting the number of keys in your public keybox (\texttt{pubring.kbx}), the format which has superseded the old keyring format (\texttt{pubring.gpg}) and \texttt{secreg.gpg}), or the number of secret keys is a very simple task.
```

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
Number of secret keys: {0}
Number of public keys: {1}
""".format(secnum, pubnum))
```

\end{verbatim}

NOTE:

The [Cython](#) introduction in the [Advanced and Experimental](#)

section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

\subsection{Get key}

\label{sec:org26adb2e}

An alternative method of getting a single key via its fingerprint is available directly within a Context with `Context().get_key`. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

\begin{verbatim}

```
import gpg
```

```
fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
```

```
key = gpg.Context().get_key(fingerprint)
```

\end{verbatim}

Whereas this example demonstrates selecting the author's current key with the `secret` key word argument set to `True`:

\begin{verbatim}

```
import gpg
```

```
fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
```

```
key = gpg.Context().get_key(fingerprint, secret=True)
```

\end{verbatim}

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
\subsection{Importing keys}
```

```
\label{sec:org1ad598a}
```

Importing keys is possible with the `key\import()` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS key servers via the web using the `requests` module. Since `requests` returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
\begin{verbatim}
```

```
import gpg
```

```
import os.path
```

```
import requests
```

```
c = gpg.Context()
```

```
url = "https://sks-key servers.net/pks/lookup"
```

```
pattern = input("Enter the pattern to search for key or user IDs: ")
```

```
payload = {"op": "get", "search": pattern}
```

```
r = requests.get(url, verify=True, params=payload)
```

```
result = c.key_import(r.content)
```

```
if result is not None and hasattr(result, "considered") is False:
```

```
    print(result)
```

```
elif result is not None and hasattr(result, "considered") is True:
```

```
    num_keys = len(result.imports)
```

```
    new_revs = result.new_revocations
```

```
    new_sigs = result.new_signatures
```

```
    new_subs = result.new_sub_keys
```

```
    new_uids = result.new_user_ids
```

```
    new_scr = result.secret_imported
```

```
    nochange = result.unchanged
```

```
    print("""
```

```
The total number of keys considered for import was: {0}
```

```
    Number of keys revoked: {1}
```

```
    Number of new signatures: {2}
```

```
    Number of new subkeys: {3}
```

```
    Number of new user IDs: {4}
```

```
    Number of new secret keys: {5}
```

Number of unchanged keys: {6}

The key IDs for all considered keys were:

```
"".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scert,
         nochange))
for i in range(num_keys):
    print("{0}\n".format(result.imports[i].fpr))
else:
    pass
\end{verbatim}
```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading `{0x}` indicative of hexadecimal be included. Also note that the old short key IDs (e.g. `{0xDEADBEEF}`) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal

value which may be missing the leading `{0x}` is a simple matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a `ValueError` simply results in treating the string as a string. This is the method and logic utilised in the `{import-keys-hkp.py}` script (see below).

`{Working with ProtonMail}`

`{sec:org27b0d6f}`

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

```
\begin{verbatim}
```

```
import gpg
```

```
import requests
```

```
import sys
```

```
print("""
```

```
This script searches the ProtonMail key server for the specified key and imports it.
```

```
""")
```

```
c = gpg.Context(armor=True)
```

```
url = "https://api.protonmail.ch/pks/lookup"
```

```
ksearch = []
```

```

if len(sys.argv) >= 2:
    keyterm = sys.argv[1]
else:
    keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is
True:
    ksearch.append(keyterm[1:])
    ksearch.append(keyterm[1:])
    ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
    ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
    ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
    ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
    ksearch.append("{0}@protonmail.com".format(keyterm))
    ksearch.append("{0}@protonmail.ch".format(keyterm))
    ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
    uidlist = keyterm.split("@")
    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
    uidlist = keyterm.split("@")
    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
else:
    ksearch.append(keyterm)

for k in ksearch:
    payload = {"op": "get", "search": k}
    try:
        r = requests.get(url, verify=True, params=payload)
        if r.ok is True:
            result = c.key_import(r.content)
        elif r.ok is False:
            result = r.content
    except Exception as e:
        result = None

if result is not None and hasattr(result, "considered") is False:
    print("{0} for {1}".format(result.decode(), k))
elif result is not None and hasattr(result, "considered") is True:
    num_keys = len(result.imports)

```

```
new_revs = result.new_revocations
new_sigs = result.new_signatures
new_subs = result.new_sub_keys
new_uids = result.new_user_ids
new_scert = result.secret_imported
nochange = result.unchanged
print("""
```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

```
Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}
```

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
nochange))
for i in range(num_keys):
    print(result.imports[i].fpr)
print("")
elif result is None:
    print(e)
\end{verbatim}
```

Both the above example, [./examples/howto/pmkey-import.py](https://github.com/ProtonMail/pmkey-import.py), and a version which prompts for an alternative GnuPG home directory, [./examples/howto/pmkey-import-alt.py](https://github.com/ProtonMail/pmkey-import-alt.py), are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers, their server is related more to their API and is not feature complete by comparison to the servers in the SKS pool. One notable difference being that the ProtonMail server does not permit non ProtonMail users to update their own keys, which could be a vector for attacking ProtonMail users who may not receive a key's revocation if it had been compromised.

\subsubsection{Importing with HKP for Python}

\label{sec:org592d7ab}

Performing the same tasks with the <https://github.com/Selfnet/hkp4py> {hkp4py module} (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some checks on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The hkp4py module permits such checks prior to the importing of the keys found.

```
\begin{verbatim}
import gpg
import hkp4py
import sys

c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
    pattern = " ".join(sys.argv[1:])
elif
len(sys.argv) == 2:
    pattern = sys.argv[1]
else:
    pattern = input("Enter the pattern to search for keys or user IDs: ")

if pattern is not None:
    try:
        key = server.search(hex(int(pattern, 16)))
        keyed = True
    except ValueError as ve:
        key = server.search(pattern)
        keyed = False

    if key is not None:
        keys.append(key[0])
        if keyed is True:
            try:
                fob = server.search(pattern)
            except:
                fob = None
            if fob is not None:
                keys.append(fob[0])
        else:
            pass
    else:
        pass

```

```

for logrus in pattern.split():
    try:
        key = server.search(hex(int(logrus, 16)))
        hexed = True
    except ValueError as ve:
        key = server.search(logrus)
        hexed = False

    if key is not None:
        keys.append(key[0])
        if hexed is True:
            try:

fob = server.search(logrus)
    except:
        fob = None
    if fob is not None:
        keys.append(fob[0])
    else:
        pass
else:
    pass

if len(keys) > 0:
    for key in keys:
        import_result = c.key_import(key.key_blob)
        results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print(result)
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scert = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was: {0}

Number of keys revoked: {1}
Number of new signatures: {2}
Number of new subkeys: {3}
Number

```


of new user IDs: {4}
Number of new secret keys: {5}
Number of unchanged keys: {6}

The key IDs for all considered keys were:

```
"".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,  
         nochange))  
for i in range(num_keys):  
    print(result.imports[i].fpr)  
    print("")  
else:  
    pass  
\end{verbatim}
```

Since the hkp4py module handles multiple keys just as effectively as one (the list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

Importing from ProtonMail with HKP for Python

sec:org3966a76

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

Import from ProtonMail via HKP for Python Example no. 1

sec:org6cd15c3

The following script is available with the rest of the examples under the somewhat less than original name, pmkey-import-hkp.py.

```
\begin{verbatim}
```

```

import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage: pmkey-import-hkp.py [search strings]
""")

c
= gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
    keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
    keyterm = sys.argv[1]
    keyterms.append(keyterm)
else:
    key_term = input("Enter the key ID, UID or search string: ")
    keyterms = key_term.split()

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{}@protonmail.com".format(keyterm[1:]))
        ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{}@protonmail.com".format(keyterm))
        ksearch.append("{}@protonmail.ch".format(keyterm))
        ksearch.append("{}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{}@protonmail.com".format(uid))

```

```

        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)

except Exception as e:
    import_result = c.key_import(key.key)
else:
    paradox.append(keys)
    import_result = None
except Exception as e:
    import_result = None
results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scert = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

{1}

```

Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}

Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
         nochange))
for i in range(num_keys):
    print(result.imports[i].fpr)
    print("")
elif result is None:
    pass
\end{verbatim}
```

\item Import from ProtonMail via HKP for Python Example no. 2

\label{sec:org3b674e5}

Like its counterpart above, this script can also be found with the rest of the examples, by the name `pmkey-import-hkp-alt.py`.

With this script a modicum of effort has been made to treat anything passed as a `\texttt{homedir}` which either does not exist or which is not a directory, as also being a possible user ID to check for. It's not guaranteed to pick up on all such cases, but it should cover most of them.

```
\begin{verbatim}
```

```
import gpg
import hkp4py
import os.path
import sys
```

```
print("""
This script searches the ProtonMail key server
for the specified key and
imports it. Optionally enables specifying a different GnuPG home directory.
```

```
Usage: pmkey-import-hkp.py [homedir] [search string]
or: pmkey-import-hkp.py [search string]
""")
```

```
c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
```

```

ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 3:
    homedir = sys.argv[1]
    keyterms = sys.argv[2:]
elif len(sys.argv) == 3:
    homedir = sys.argv[1]
    keyterm = sys.argv[2]
    keyterms.append(keyterm)
elif len(sys.argv) == 2:
    homedir = ""
    keyterm = sys.argv[1]
    keyterms.append(keyterm)
else:
    keyterm = input("Enter the key ID, UID or search string: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
    keyterms.append(keyterm)

if len(homedir) == 0:
    homedir = None
    homeless = False

if homedir is not None:
    if homedir.startswith("~"):
        if os.path.exists(os.path.expanduser(homedir))
is True:
        if os.path.isdir(os.path.expanduser(homedir)) is True:
            c.home_dir = os.path.realpath(os.path.expanduser(homedir))
        else:
            homeless = True
    else:
        homeless = True
elif os.path.exists(os.path.realpath(homedir)) is True:
    if os.path.isdir(os.path.realpath(homedir)) is True:
        c.home_dir = os.path.realpath(homedir)
    else:
        homeless = True
else:
    homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
# a search string.
if homeless is True:
    keyterms.append(homedir)

```

```

c.home_dir = None
else:
    pass

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{}@protonmail.com".format(keyterm[1:]))
        ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{}@protonmail.com".format(keyterm))
        ksearch.append("{}@protonmail.ch".format(keyterm))
        ksearch.append("{}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{}@protonmail.com".format(uid))
            ksearch.append("{}@protonmail.ch".format(uid))
            ksearch.append("{}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{}@protonmail.com".format(uid))
            ksearch.append("{}@protonmail.ch".format(uid))
            ksearch.append("{}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking
    for key for: {}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)
                except Exception as e:
                    import_result = c.key_import(key.key)
            else:
                paradox.append(keys)
                import_result = None
    except Exception as e:

```

```
import_result = None
results.append(import_result)
```

for result in results:

if result is not None and hasattr(result, "considered") is False:

```
    print("{0} for {1}".format(result.decode(), k))
```

elif result is not None and hasattr(result, "considered") is True:

```
    num_keys = len(result.imports)
    new_revs = result.new_revocations
    new_sigs = result.new_signatures
    new_subs = result.new_sub_keys
    new_uids = result.new_user_ids
    new_scert = result.secret_imported
    nochange = result.unchanged
    print("""
```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

Number of keys revoked: {2}

Number of new signatures: {3}

Number of new subkeys: {4}

Number of new user IDs: {5}

Number of new secret keys: {6}

Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
          nochange))
for i in range(num_keys):
    print(result.imports[i].fpr)
print("")
elif result is None:
    pass
```

\end{verbatim}

\end{enumerate}

\subsection{Exporting keys}

\label{sec:org4596a77}

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

```
\subsubsection{Exporting  
public keys}
```

```
\label{sec:org873704f}
```

There are two methods of exporting public keys, both of which are very similar to the other. The default method, `\texttt{key_export()}`, will export a public key or keys matching a specified pattern as normal. The alternative, the `\texttt{key_export_minimal()}` method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

```
\begin{verbatim}
```

```
import gpg
```

```
import os.path
```

```
import sys
```

```
print("""
```

```
This script exports one or more public keys.
```

```
""")
```

```
c = gpg.Context(armor=True)
```

```
if len(sys.argv) >= 4:
```

```
    keyfile = sys.argv[1]
```

```
    logrus = sys.argv[2]
```

```
    homedir = sys.argv[3]
```

```
elif len(sys.argv) == 3:
```

```
    keyfile = sys.argv[1]
```

```
    logrus = sys.argv[2]
```

```
    homedir = input("Enter the GPG configuration directory path (optional): ")
```

```
elif len(sys.argv) == 2:
```

```
    keyfile = sys.argv[1]
```

```
    logrus = input("Enter the UID matching the key(s) to export: ")
```

```
    homedir = input("Enter the
```

```
GPG configuration directory path (optional): ")
```

```
else:
```

```
    keyfile = input("Enter the path and filename to save the secret key to: ")
```

```
    logrus = input("Enter the UID matching the key(s) to export: ")
```

```
    homedir = input("Enter the GPG configuration directory path (optional): ")
```

```
if homedir.startswith("~"):
```

```
    if os.path.exists(os.path.expanduser(homedir)) is True:
```

```
        c.home_dir = os.path.expanduser(homedir)
```

```
    else:
```

```
        pass
```

```
elif os.path.exists(homedir) is True:
```

```
    c.home_dir = homedir
```

```
else:
```

```
    pass
```



```

try:
    result = c.key_export(pattern=logrus)
except:
    result = c.key_export(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)
else:
    pass
\end{verbatim}

```

It should be noted that the result will only return `None` when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to `None` this triggers the exporting of the entire public keybox.

```

\begin{verbatim}
import
    gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):

```

```

if os.path.exists(os.path.expanduser(homedir)) is True:
    c.home_dir = os.path.expanduser(homedir)
else:
    pass
elif os.path.exists(homedir)
is True:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export_minimal(pattern=logrus)
except:
    result = c.key_export_minimal(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)
else:
    pass
\end{verbatim}

```

\subsubsection{Exporting secret keys }

\label{sec:org6c28d3d}

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of `\texttt{pinentry}` via `\texttt{gpg-agent}` in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```
\begin{verbatim}
```

```
import gpg
```

```
import os
```

```
import os.path
```

```
import sys
```

```
print("""
```

```
This script exports one or more secret keys.
```

```
The gpg-agent and pinentry are invoked to authorise the export.
```

```
""")
```

```
c = gpg.Context(armor=True)
```

```
if len(sys.argv) >= 4:
```

```

    keyfile
= sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir =
None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export_secret(pattern=logrus)
except:
    result = c.key_export_secret(pattern=None)

if result is not None:

```

```

with open(keyfile, "wb") as f:
    f.write(result)
    os.chmod(keyfile, 0o600)
else:
    pass
\end{verbatim}

```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (`\texttt{.gpg}`) and ASCII armoured (`\texttt{.asc}`) files.

```

\begin{verbatim}
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the
user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

```

```

if sys.platform == "win32":
    gpgconfgcmd = "gpgconf.exe --list-dirs homedir"
else:
    gpgconfgcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]

```

```

logrus = input("Enter the UID matching the secret key(s) to export: ")
homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the filename to save the secret key to: ")
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir)
== 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir = None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

if c.home_dir is not None:
    if c.home_dir.endswith("/"):
        gpgfile = "{0}{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}{1}.asc".format(c.home_dir, keyfile)
    else:
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
    if os.path.exists(os.environ["GNUPGHOME"]) is True:
        hd = os.environ["GNUPGHOME"]
    else:
        try:
            hd = subprocess.getoutput(gpgconfcmd)
        except:
            process = subprocess.Popen(gpgconfcmd.split(),

```

```

        stdout=subprocess.PIPE)
    procom = process.communicate()
    if sys.version_info[0] == 2:
        hd = procom[0].strip()
    else:
        hd = procom[0].decode().strip()
    gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
    ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
    a_result = a.key_export_secret(pattern=logrus)
    b_result = b.key_export_secret(pattern=logrus)
except:
    a_result = a.key_export_secret(pattern=None)
    b_result = b.key_export_secret(pattern=None)

if a_result is not None:
    with open(ascfile, "wb") as f:
        f.write(a_result)
    os.chmod(ascfile, 0o600)
else:
    pass

if b_result is not None:
    with open(gpgfile, "wb") as f:
        f.write(b_result)
    os.chmod(gpgfile, 0o600)
else:
    pass
\end{verbatim}

```

\subsubsection{Sending public keys to the SKS Keyservers }

\label{sec:org82d4958}

As with the previous section on importing keys, the `hkp4py` module adds another option with exporting keys in order to send them to the public keyservers.

The following example demonstrates how this may be done.

```
\begin{verbatim}
```

```
import gpg
import hkp4py
import os.path
import sys
```

```
print("""
```

This script sends one or more public keys to the SKS keyserver and is essentially a slight variation on the export-key.py script.

```
"""  
  
c = gpg.Context(armor=True)  
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")  
  
if len(sys.argv) > 2:  
    logrus = " ".join(sys.argv[1:])  
elif len(sys.argv) == 2:  
    logrus = sys.argv[1]  
else:  
    logrus = input("Enter the UID matching the key(s) to send: ")  
  
if len(logrus) > 0:  
    try:  
        export_result = c.key_export(pattern=logrus)  
    except Exception as e:  
        print(e)  
        export_result = None  
else:  
    export_result = c.key_export(pattern=None)  
  
if export_result is not None:  
    try:  
        try:  
            send_result = server.add(export_result)  
        except:  
            send_result = server.add(export_result.decode())  
        if send_result is not None:  
            print(send_result)  
        else:  
            pass  
    except Exception as e:  
        print(e)  
else:  
    pass  
\end{verbatim}
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as `send-key-to-keyserver.py`.

The `hkp4py` module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

```
\section{Basic Functions}
```

```
\label{sec:orgb40b488}
```

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

```
\subsection{Encryption}
```

```
\label{sec:org3170365}
```

Encrypting

is very straight forward. In the first example below the message, `\texttt{text}`, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

```
\subsubsection{Encrypting to one key}
```

```
\label{sec:org8098c64}
```

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the `\texttt{gpg.Context().encrypt()}` method.

Those keyword arguments are: `\texttt{recipients}`, a list of keys encrypted to (covered in greater detail in the following section); `\texttt{sign}`, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to `\texttt{True}`); `\texttt{sink}`, to write results or partial results to a secure sink instead of returning it (defaults to `\texttt{None}`); `\texttt{passphrase}`, only used when utilising symmetric encryption (defaults to `\texttt{None}`); `\texttt{always_trust}`, used to override the trust model settings for recipient keys (defaults to `\texttt{False}`); `\texttt{add_encrypt_to}`, utilises any preconfigured `\texttt{encrypt-to}` or `\texttt{default-key}` settings in the user's `\texttt{gpg.conf}` file (defaults to `\texttt{False}`); `\texttt{prepare}`, prepare for encryption (defaults to `\texttt{False}`); `\texttt{expect_sign}`, prepare for signing (defaults to `\texttt{False}`); `\texttt{compress}`, compresses the plaintext prior to encryption (defaults to `\texttt{True}`).

```
\begin{verbatim}
```

```
import gpg
```

```
a_key = "0x12345678DEADBEEF"
```

```
text = b""Some text to test with.
```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```



```
c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)
```

with open("secret_plans.txt.asc", "wb") as afile:

```
    afile.write(ciphertext)
\end{verbatim}
```

Though this is even more likely to be used like this; with the plaintext input read from a file, the recipient keys used for encryption regardless of key trust status and the encrypted output also encrypted to any preconfigured keys set in the `gpg.conf` file:

```
\begin{verbatim}
```

```
import gpg
```

```
a_key = "0x12345678DEADBEEF"
```

with open("secret_plans.txt", "rb") as afile:

```
    text = afile.read()
```

```
c = gpg.Context(armor=True)
```

```
rkey = list(c.keylist(pattern=a_key, secret=False))
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
                                           always_trust=True,
                                           add_encrypt_to=True)
```

with open("secret_plans.txt.asc", "wb") as afile:

```
    afile.write(ciphertext)
\end{verbatim}
```

If the `recipients` parameter is empty then the plaintext is encrypted symmetrically. If no `passphrase` is supplied as a parameter or via a callback registered with

the `Context()` then an out-of-band prompt for the passphrase via `pinentry` will be invoked.

```
\subsection{Encrypting to multiple keys}
```

```
\label{sec:orgdcf6e47}
```

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (`text`) to everyone with an email address on the `gnupg.org` domain, Footnote: You probably don't really want to do this. Searching the key servers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the `gnupg.org` domain, but just included a

comment regarding the project in their key somewhere.) but does `\emph{not}` encrypt to a default key or other key which is configured to normally encrypt to.

```
\begin{verbatim}
import gpg

text = b""Oh look, another test message.
```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an input() prompt.

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
    if rpattern[i].can_encrypt == 1:
        logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                             sign=False, always_trust=True)

with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
\end{verbatim}
```

All it would take to change the above example to sign the message and also encrypt the message to any configured default keys would be to change the `\texttt{c.encrypt}` line to this:

```
\begin{verbatim}
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,

                                             always_trust=True,
                                             add_encrypt_to=True)
\end{verbatim}
```

The only keyword arguments requiring modification are those for which

the default values are changing. The default value of `\texttt{sign}` is `\texttt{True}`, the default of `\texttt{always_trust}` is `\texttt{False}`, the default of `\texttt{add_encrypt_to}` is `\texttt{False}`.

If `\texttt{always_trust}` is not set to `\texttt{True}` and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
\begin{verbatim}
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
    text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
    if rpattern[i].can_encrypt == 1:
        logrus.append(rpattern[i])

    try:
        ciphertext, result,
sign_result = c.encrypt(text, recipients=logrus,
                        add_encrypt_to=True)
    except gpg.errors.InvalidRecipients as e:
        for i in range(len(e.recipients)):
            for n in range(len(logrus)):
                if logrus[n].fpr == e.recipients[i].fpr:
                    logrus.remove(logrus[n])
            else:
                pass
    try:
        ciphertext, result, sign_result = c.encrypt(text,
                                                    recipients=logrus,
                                                    add_encrypt_to=True)
        with open("secret_plans.txt.asc", "wb") as afile:
            afile.write(ciphertext)
    except:
        pass
\end{verbatim}
```

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

```
\subsection{Decryption}
```

```
\label{sec:org1282b3d}
```

Decrypting something encrypted to a key in one's secret keyring is fairly straight forward.

In this example code, however, preconfiguring either `gpg.Context()` or `gpg.core.Context()` as `c` is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to `c` simply adds lines for no gain.

```
\begin{verbatim}
```

```
import gpg
```

```
ciphertext = input("Enter path and filename of encrypted file: ")
```

```
newfile = input("Enter path and filename of file to save decrypted data to: ")
```

```
with open(ciphertext, "rb") as cfile:
```

```
    try:
```

```
        plaintext, result, verify_result = gpg.Context().decrypt(cfile)
```

```
    except gpg.errors.GPGMEError as e:
```

```
        plaintext = None
```

```
        print(e)
```

```
if plaintext is not None:
```

```
    with open(newfile, "wb") as nfile:
```

```
        nfile.write(plaintext)
```

```
else:
```

```
    pass
```

```
\end{verbatim}
```

The data available in `plaintext` in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in

`result` and the results of verifying any signatures of the data in

`verify_result`.

If `gpg.Context().decrypt(cfile, verify=False)` is called instead, then `verify_result` will be returned as `None` and the rest remains as described here.

```
\subsection{Signing text and files}
```

```
\label{sec:org59f1262}
```

The following sections demonstrate how to specify keys to sign with.

```
\subsubsection{Signing key selection}
```

```
\label{sec:org909cb3c}
```

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

```
\begin{verbatim}
```

```
import gpg
```

```
logrus = input("Enter the email address or string to match signing keys to: ")
```

```
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
```

```
sig_src = list(hancock)
```

```
\end{verbatim}
```

The signing examples in the following sections include the explicitly designated `\texttt{signers}` parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the patten expects a string, bytes or None and not a list. A string with two fingerprints won't match any single key.

```
\subsubsection{Normal or default signing messages or files}
```

```
\label{sec:org6ee259d}
```

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of `\texttt{gpg.Context().armor}`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```

\begin{verbatim}
import gpg

text0 = """"Declaration of ... something.

""""
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
    afile.write(signed_data.decode())
\end{verbatim}

```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```

\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
"rb") as tfile:
    text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
    afile.write(signed_data)
\end{verbatim}

```

`\subsubsection{Detached signing messages and files}`

`\label{sec:org51049d4}`

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```

\begin{verbatim}
import gpg

text0 = """"Declaration of ... something.

""""
text = text0.encode()

```

```
c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)
```

```
with open("/path/to/statement.txt.asc", "w") as afile:
    afile.write(signed_data.decode())
\end{verbatim}
```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```
\begin{verbatim}
import gpg
```

```
with open("/path/to/statement.txt",
"rb") as tfile:
    text = tfile.read()
```

```
c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)
```

```
with open("/path/to/statement.txt.sig", "wb") as afile:
    afile.write(signed_data)
\end{verbatim}
```

```
\subsubsection{Clearsigning messages or text}
\label{sec:orgf528a20}
```

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

```
\begin{verbatim}
import gpg
```

```
text0 = """Declaration of ... something.
```

```
"""
```

```
text = text0.encode()
```

```
c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)
```

```
with open("/path/to/statement.txt.asc", "w") as afile:
    afile.write(signed_data.decode())
\end{verbatim}
```

In spite of the appearance of a clear-signed message, the data handled

by GPGME in signing it must still be byte literals.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
"rb") as tfile:
    text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
    afile.write(signed_data)
\end{verbatim}
```

\subsection{Signature verification}

\label{sec:org6cd81af}

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
    data, result = c.verify(open(gpg_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):

        sign = result.signatures[i]
        print("""Good signature from:
```



```

{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
           time.ctime(sign.timestamp)))
else:
    pass
\end{verbatim}

```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
    data, result = c.verify(open(asc_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
           time.ctime(sign.timestamp)))
    else:
        pass
\end{verbatim}

```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `\texttt{data}` to see if it matches with something like this:

```

\begin{verbatim}
with open(filename, "rb") as afile:

```

```

text = afile.read()

if text == data:
    print("Good signature.")
else:
    pass
\end{verbatim}

```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `c.verify`. So `data` is `None` and only the information in `result` is available.

```

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
    data, result = c.verify(open(filename), open(sig_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with
key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
\end{verbatim}

\begin{verbatim}
import gpg
import time

```

```

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
    data, result = c.verify(open(filename), open(asc_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
\end{verbatim}

```

```

\section{Creating keys and subkeys}
\label{sec:org754c6df}

```

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to \texttt{SECRET} level clearance, so his keys will be 3072-bit keys.

The pre-configured \texttt{gpg.conf} file which sets cipher, digest and other preferences contains the following configuration parameters:

```

\begin{verbatim}
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown

```

```

enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences
ZLIB BZIP2 ZIP Uncompressed
\end{verbatim}

```

```
\subsection{Primary key}
```

```
\label{sec:org0185c23}
```

Generating a primary key uses the `create_key` method in a Context.

It contains multiple arguments and keyword arguments, including:

`userid`, `algorithm`, `expires_in`, `expires`, `sign`, `encrypt`, `certify`, `authenticate`, `passphrase` and `force`. The defaults for all of those except `userid`, `algorithm`, `expires_in`, `expires` and `passphrase` is `False`. The defaults for `algorithm` and `passphrase` is `None`. The default for `expires_in` is `0`. The default for `expires` is `True`. There is no default for `userid`.

If `passphrase` is left as `None` then the key will not be generated with a passphrase, if `passphrase` is set to a string then that will be the passphrase and if

`passphrase` is set to `True` then `gpg-agent` will launch `pinentry` to prompt for a passphrase. For the sake of convenience, these examples will keep `passphrase` set to `None`.

```
\begin{verbatim}
```

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/gnupg-dm"
```

```
userid = "Danger Mouse <dm@secret.example.net>"
```

```
dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
                    sign=True, certify=True)
```

```
\end{verbatim}
```

One thing to note here is the use of setting the `c.home_dir` parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and

active key store data. As with the default directory, `~/.gnupg`, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The `temp-homedir-config.py` script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned `GenkeyResult` object, which includes the following data:

```
\begin{verbatim}
print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
           dmkey.uid))
\end{verbatim}
```

Alternatively the information can be confirmed using the command line program:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
     177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid   [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
\end{verbatim}
```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the `gpg.conf` file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own `gpg.conf` file in order to be able to generate this:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
```

```
quit
```

```
Secret key is available.
```

```
sec rsa3072/026D2F19E99E63AA
```

```
  created: 2018-03-15 expires: 2019-03-15 usage: SC
```

```
  trust: ultimate   validity: ultimate
```

```
[ultimate] (1). Danger Mouse <dm@secret.example.net>
```

```
[ultimate] (1). Danger Mouse <dm@secret.example.net>
```

```
  Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH, IDEA, CAST5, 3DES
```

```
  Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
```

```
  Compression: ZLIB, BZIP2, ZIP, Uncompressed
```

```
  Features: MDC, Keyserver no-modify
```

```
bash-4.4$
```

```
\end{verbatim}
```

```
\subsection{Subkeys}
```

```
\label{sec:org5e2acbc}
```

Adding

subkeys to a primary key is fairly similar to creating the primary key with the `\texttt{create_subkey}` method. Most of the arguments are the same, but not quite all. Instead of the `\texttt{userid}` argument there is now a `\texttt{key}` argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
\begin{verbatim}
```

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/gnupg-dm"
```

```
key = c.get_key(dmkey.fpr, secret=True)
```

```
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,  
                        encrypt=True)
```

```
\end{verbatim}
```

As with the primary key, the results here can be checked with:

```
\begin{verbatim}
```

```
print("""
```

```

Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""".format(dmsub.fpr,
dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
dmsub.uid))
\end{verbatim}

```

As well as on the command line with:

```

\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
    177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid    [ultimate] Danger Mouse <dm@secret.example.net>
ssb  rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
\end{verbatim}

```

```

\subsection{User IDs}
\label{sec:org4869c58}
\subsubsection{Adding User IDs}
\label{sec:orgebb13ca}

```

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is `\texttt{key_add_uid}` and the only arguments it takes are for the `\texttt{key}` and the new `\texttt{uid}`.

```

\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
= "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
\end{verbatim}

```

Unsurprisingly the result of this is:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
     177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid   [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid   [ultimate] Danger Mouse <dm@secret.example.net>
ssb  rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
\end{verbatim}
```

```
\subsection{Revoking User IDs}
\label{sec:org1683695}
Revoking a user ID is a fairly similar process, except that it uses
the \texttt{key\_revoke\_uid} method.
```

```
\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
\end{verbatim}
```

```
\subsection{Key certification}
\label{sec:orgf431bf8}
Since
key certification is more frequently referred to as key signing,
the method used to perform this function is \texttt{key\_sign}.
```

The `\texttt{key_sign}` method takes four arguments: `\texttt{key}`, `\texttt{uids}`, `\texttt{expires_in}` and `\texttt{local}`. The default value of `\texttt{uids}` is `\texttt{None}` and which results in all user IDs being selected. The default value of both `\texttt{expires_in}` and `\texttt{local}` is `\texttt{False}`; which results in the signature never expiring and being able to be exported.

The `\texttt{key}` is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the `\texttt{uids}` value is not `\texttt{None}` then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger

Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
\begin{verbatim}
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
\end{verbatim}
```

`\subsubsection{Verifying key certifications}`

`\label{sec:org87abdd3}`

```
\begin{verbatim}
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
    for sig in user.signatures:
        print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
              sig.uid)
\end{verbatim}
```

Which for Danger Mouse displays the following:

```
\begin{verbatim}
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@adversary.org>
\end{verbatim}
```

The

two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year. Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```
\begin{verbatim}
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys = list(c.keylist(pattern=dmuid,
    mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
    for sig in user.signatures:
        print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
            sig.uid)
\end{verbatim}
```

Note that this final code block includes the use of a module which is `\emph{not}` part of Python's standard library, the `\href{https://pendulum.eustace.io/}{pendulum module}`. Unlike the standard `datetime` module, `pendulum` makes working with dates and times significantly easier in Python; just as the `requests` module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither `requests` nor `pendulum` are required modules for using

the GPGME Python bindings, they are both highly recommended more generally.

`\section{Advanced or Experimental Use Cases}`

`\label{sec:org944cc00}`

`\subsection{C plus Python plus SWIG plus Cython}`

`\label{sec:org3b53926}`

In spite of the apparent incongruence of using Python bindings to a C interface only to generate

more C from the Python; it is in fact quite

possible to use the GPGME bindings with `\href{http://docs.cython.org/en/latest/index.html}{Cython}`. Though in many cases

the benefits may not be obvious since the most computationally

intensive work never leaves the level of the C code with which GPGME

itself is interacting with.

Nevertheless, there are some situations where the benefits are

demonstrable. One of the better and easier examples being the one of

the early examples in this HOWTO, the `\hyperref[sec:org63a3d62]{key counting}` code. Running that

example as an executable Python script, `\texttt{keycount.py}` (available in

the `\texttt{examples/howto/}` directory), will take a noticeable amount of time

to run on most systems where the public keybox or keyring contains a

few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that

script on my laptop; as I tend to do periodically and timed it using

`\texttt{time}` utility, with the following results:

```
\begin{verbatim}
```

```
bash-4.4$
```

```
time keycount.py
```

```
Number of secret keys: 23
```

```
Number of public keys: 12112
```

```
real 11m52.945s
```

```
user 0m0.913s
```

```
sys 0m0.752s
```

```
bash-4.4$
```

```
\end{verbatim}
```

Sometime after that I imported another key and followed it with a

little test of Cython. This test was kept fairly basic, essentially

lifting the material from the `\href{http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html}{Cython Basic Tutorial}` to demonstrate

compiling Python code to C. The first step was to take the example key counting code quoted previously, essentially from the importing of the `gpg` module to the end of the script:

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
    Number of secret keys: {0}
    Number of public keys: {1}

""".format(secnum, pubnum))
\end{verbatim}
```

Save

that into a file called `keycount.pyx` and then create a `setup.py` file which contains this:

```
\begin{verbatim}
from distutils.core import setup
from Cython.Build import cythonize

setup(
    ext_modules = cythonize("keycount.pyx")
)
\end{verbatim}
```

Compile it:

```
\begin{verbatim}
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
\end{verbatim}
```

Then run it in a similar manner to `keycount.py`:

```
\begin{verbatim}
bash-4.4$ time python3.7 -c "import keycount"
```

Number of secret keys: 23
Number of public keys: 12113

```
real 6m47.905s  
user 0m0.785s  
sys 0m0.331s
```

```
bash-4.4$  
\end{verbatim}
```

Cython turned `keycount.pyx` into an 81KB `keycount.o` file in the `build/` directory, a 24KB `keycount.cpython-37m-darwin.so` file to be imported into Python 3.7 and a 113KB `keycount.c` generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the `keycount.pyx` file or the full 1,452 bytes of the full executable `keycount.py` example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The `keycount.pyx` and `setup.py` files used to generate this example have been added to the `examples/howto/advanced/cython/` directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the <http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd> {Magic Attributes} section of the Cython documentation.

```
\section{Miscellaneous extras and work-arounds}  
\label{sec:orgd72f7de}
```

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with [group lines](#).

```
\subsection{Group lines}  
\label{sec:org83f4d00}
```

There is not yet an easy way to access groups configured in the `gpg.conf` file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
\begin{verbatim}
import subprocess
import sys

if sys.platform == "win32":
    gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
    gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
    lines = procom[0].splitlines()
else:
    lines = procom[0].decode().splitlines()

for line in lines:
    if line.startswith("group") is True:
        break

groups = line.split(":")[-1].replace("'", "").split(',')

group_lines
= []
group_lists = []

for i in range(len(groups)):
    group_lines.append(groups[i].split("="))
    group_lists.append(groups[i].split("="))

for i in range(len(group_lists)):
    group_lists[i][1] = group_lists[i][1].split()
\end{verbatim}
```

The result of that code is that `group_lines` is a list of lists where `group_lines[i][0]` is the name of the group and `group_lines[i][1]` is the key IDs of the group as a string.

The `group_lists` result is very similar in that it is a list of lists. The first part, `group_lists[i][0]` matches `group_lines[i][0]` as the name of the group, but `group_lists[i][1]` is the key IDs of the group as a list.

A demonstration of using the `\texttt{groups.py}` module is also available in the form of the executable `\texttt{mutt-groups.py}` script. This second script reads all the group entries in a user's `\texttt{gpg.conf}` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

`\subsection{Keyserver access for Python}`

`\label{sec:org5ad99aa}`

The `\href{https://github.com/Selfnet/hkp4py}{hkp4py}` module by Marcel Fest was originally a port of the old `\href{https://github.com/dgladkov/python-hkp}{python-hkp}` module from Python 2 to Python 3 and updated to use the `\href{http://docs.python-requests.org/en/latest/index.html}{requests}` module instead. It has since been modified to provide support for Python 2.7 as well and is available via PyPI.

Since it rewrites the `\texttt{hkp}` protocol prefix as `\texttt{http}` and `\texttt{hkps}` as `\texttt{https}`, the module is able to be used even with servers which do not support the full scope of keyserver functions.^{\footnote{Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as HKP or HKPS within the Python Code. The `\texttt{hkp4py}` module will rewrite these appropriately when the connection is made to the server.}} It also works quite readily when incorporated into a `\hyperref[sec:org3b53926]{Cython}` generated and compiled version of any code.

`\subsubsection{Key import format}`

`\label{sec:org1e47c97}`

The `hkp4py` module returns key data via requests as string literals (`\texttt{r.text}`) instead of byte literals (`\texttt{r.content}`). This means that the returned key data must be encoded to UTF-8 when importing that key material using a `\texttt{gpg.Context().key_import()}` method.

For this reason an alternative method has been added to the `\texttt{search}` function of `\texttt{hkp4py.KeyServer()}` which returns the key in the correct format as expected by `\texttt{key_import}`. When importing using this module, it is now possible to import with this:

```
\begin{verbatim}
for key in keys:
    if key.revoked is False:
        gpg.Context().key_import(key.key_blob)
    else:
        pass
\end{verbatim}
```

Without that recent addition it would have been necessary to encode the contents of each `\texttt{hkp4py.KeyServer().search()[i].key}` in `\texttt{hkp4py.KeyServer().search()}` before trying to import it.

An example of this is included in the [\hyperref\[sec:org1ad598a\]{Importing Keys}](#) section of this HOWTO and the corresponding executable version of that example is available in the `\texttt{lang/python/examples/howto}` directory as normal; the executable version is the `\texttt{import-keys-hkp.py}` file.

`\subsection{GPGME version checking}`
`\label{sec:org18b8ef8}`

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the `\texttt{gpg.version.versionstr}` and `\texttt{gpg.version.versionlist}` methods have been quite sufficient. The former returns the same string as `\texttt{gpgme-config -{ }-version}`, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed `libgpgme` version, this check can be performed:

```
\begin{verbatim}
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                       stdout=subprocess.PIPE,
                                       stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
    gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0] >= 3:
    gpgme_version = gpgme_version_str[0].decode().strip()
else:
    gpgme_version = None

if gpgme_version is not None:
    if gpgme_version == gpg.version.versionstr:
        print("The GPGME Python bindings match libgpgme.")
    else:
```



```

    print("The GPGME Python bindings do NOT match libgpgme.")
else:
    print("Upgrade Python and reinstall the GPGME Python bindings.")
\end{verbatim}

```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the `gpg.version.versionintlist` method (added in version `1.12.1-beta79`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```

\begin{verbatim}
import gpg

try:
    if gpg.version.is_beta is True:
        print("The installed GPGME Python bindings were built from beta code.")
    else:
        print("The installed GPGME Python bindings are a released version.")
except Exception as e:
    print(e)

try:
    if gpg.version.versionintlist[0] == 1:
        if gpg.version.versionintlist[1] == 12:
            if gpg.version.versionintlist[2] == 1:
                print("This is the minimum version for using versionintlist.")
            elif gpg.version.versionintlist[2] > 1:
                print("The versionintlist method is available.")

        else:
            pass
    elif gpg.version.versionintlist[1] > 12:
        print("The versionintlist method is available.")
    else:
        pass
    elif gpg.version.versionintlist[0] > 1:
        print("The versionintlist method is available.")
    else:
        pass
except Exception as e:
    print(e)
\end{verbatim}

```

The points where `\texttt{pass}` is used in the above example will most likely also produce an `\texttt{Exception}` error since those results should only occur in versions which do not have the `\texttt{gpgme.version.is_beta}` and `\texttt{gpgme.version.versionintlist}` methods available.

```
\section{Copyright and Licensing}
```

```
\label{sec:org9d52a23}
```

```
\subsection{Copyright}
```

```
\label{sec:org26ed04d}
```

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```
\subsection{Draft Editions of this HOWTO}
```

```
\label{sec:org080a94a}
```

Draft editions of this HOWTO may be periodically available directly from the author at any of the following URLs:

```
\begin{itemize}
```

```
\item
```

```
\href{https://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 SSL)}
```

```
\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 no SSL)}
```

```
\item \href{https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 SSL)}
```

```
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```

```
\end{itemize}
```

All of these draft versions except for one have been generated from this document via GNU Emacs `\href{https://orgmode.org/}{Org mode}` and `\href{https://www.gnu.org/software/texinfo/}{GNU Texinfo}`. Though it is likely that the specific `\href{https://files.au.adversary.org/crypto/gpgme-python-howto}{file}` `\href{http://files.au.adversary.org/crypto/gpgme-python-howto.org}{version}` used will be on the same server with the generated output formats.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

```
\begin{verbatim}
```

```
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
\end{verbatim}
```

The reStructuredText format is also generated from the Org-mode source file, except it is generated using [Pandoc](https://pandoc.org) with either of the following commands:

```
\begin{verbatim}
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
\end{verbatim}
```

In addition to these there is a significantly less frequently updated version as a HTML [WebHelp site](https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html) (AWS S3 SSL); generated from DITA XML source files, which can be found in [an alternative branch](https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/) of the GPGME git repository.

Various generated output formats may occasionally be found in subdirectories of the [gpgme-python](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python) directory. In particular within the [DITA](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita), [reStructuredText](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst) and [Texinfo](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo) subdirectories. The `rst` directory contains output files generated with Sphinx and may include a considerable number of its possible output formats.

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```
\subsection{License GPL compatible}
\label{sec:orge78f3b7}
```

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\end{document}

This is a template. The dist target uses it to create the real file.

Summary: GPGME - GnuPG Made Easy

Name: gpgme

Version: 1.15.1

Release: 1

URL: <https://gnupg.org/gpgme.html>

Source: <https://www.gnupg.org/ftp/gcrypt/gpgme/%{name}-%{version}.tar.gz>

Group: Development/Libraries

Copyright: GPL

BuildRoot: %{_tmppath}/%{name}-%{version}

BuildRequires: make

Prereq: /sbin/ldconfig /sbin/install-info

Requires: gnupg

%description

GnuPG Made Easy (GPGME) is a library designed to make access to GnuPG easier for applications. It provides a High-Level Crypto API for encryption, decryption, signing, signature verification and key management.

%prep

%setup -q

%build

CFLAGS="\$RPM_OPT_FLAGS"; export CFLAGS

./configure --prefix=/usr

make

%install

rm -fr \$RPM_BUILD_ROOT

mkdir -p \$RPM_BUILD_ROOT

make install prefix=\$RPM_BUILD_ROOT/usr infodir=\$RPM_BUILD_ROOT%{_infodir}

rm -f \$RPM_BUILD_ROOT%{_infodir}/dir

%clean

rm -fr \$RPM_BUILD_ROOT

make distclean

%post

/sbin/ldconfig

/sbin/install-info %{_infodir}/gpgme.info.gz

%{_infodir}/dir

/sbin/install-info %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir

%preun

```

if [ "$1" = 0 ]; then
/sbin/install-info --delete % {_infodir}/gpgme.info.gz % {_infodir}/dir
/sbin/install-info --delete % {_infodir}/gpgme-python-howto.info.gz % {_infodir}/dir
fi

%postun
/sbin/ldconfig

%files
%defattr(-,root,root)
%doc COPYING COPYING.LESSER AUTHORS README INSTALL NEWS ChangeLog TODO THANKS
%attr(0755,root,root) % {_bindir}/gpgme-config
%attr(0755,root,root) % {_libdir}/*gpgme.so*
%attr(0755,root,root) % {_libdir}/*gpgme.la
%attr(0644,root,root) % {_libdir}/*gpgme.a
%{_includedir}/gpgme.h
%{_datadir}/aclocal/gpgme.m4
%{_infodir}/gpgme.info*
%{_infodir}/gpgme-python-howto.info*

%changelog
* Sat Aug 30 2003 Robert Schiele <rschiele@uni-mannheim.de>
- % {_infodir}/dir is not packaged, remove to prevent checking failure
* Mon Jul 01 2002 Wojciech Polak <polak@lodz.pdi.net>
- initial specfile release for GPGME.

# EOF

```

1.70 gzip 1.12-1.el9

1.70.1 Available under license :

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Version 1.3, 3 November 2008

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1.71 python3-inotify 0.9.6-25.el9

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1.72 bzip2 1.0.8-8.el9

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Julian Seward, jseward@acm.org
bzip2/libbzip2 version 1.0.8 of 13 July 2019

1.73 libgpg-error 1.42-5.el9

1.73.1 Available under license :

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1.74 python3-iniparse 0.4-45.el9

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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Release from	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no

2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2			
2002	PSF	yes		
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
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Version 3, 29 June 2007

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#+STARTUP: showall

* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.

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1993 Christopher Seiwald seiwald@vix.com
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```

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1.80 passwd 0.80-12.el9

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1.81 libzstd 1.5.1-2.el9

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```
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@end smallexample

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```
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for details type @samp{show w}.
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```

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Version 3, 29 June 2007

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1.90 python-inotify 0.9.6-25.el9

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1.91 json-glib 1.6.6-1.el9

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Version 2.1, February 1999

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1.93 libpwquality 1.4.4-8.el9

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```

```
<signature of Ty Coon>, 1 April 1989
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```

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1.94 python-decorator 4.4.2-6.el9

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1.95 dbus-python 1.2.18-2.el9

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You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the program, if
necessary. Here is a sample; alter the names:

```
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`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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```
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Version 3, 29 June 2007

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* /opt/cola/permits/1733048589_1692873314.0745714/0/langpacks-3.0-16.el9.src.rpm-cosi-expand-archive-8GtWXIy0/langpacks.spec

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1.104 pygobject 3.40.1-6.el9

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That's all there is to it!

1.105 python-iniparse 0.4-45.e19

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=====

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python

releases have also been GPL-compatible; the table below summarizes the various releases.

Release from	Derived	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2			
2002	PSF	yes		
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes

Footnotes:

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

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1.106 gpgme 1.15.1-6.el9

1.106.1 Available under license :

```
(21:protected-private-key(3:elg(1:p129:|B36I(s7)+ZJ/pvE;"tg7N ca"Gxvnyu&bB#h'7=89&oG
R<hO)(1:g1:)(1:y128:Ji]WU_UP}AQ\YMhAl|2e{ _tcMNDg]{ QnWsK 4pY{ $bDCs)(9:protected25:openpgp-s2k3-
sha1-aes-cbc((4:sha18:JcE7:6452224)16: i[Q*vK)192:FJA!O!ZAF
biJ&Tsb!t
&9@R\~V+x>?sedDz-W(yqf?u^e?s1saV8<T0:tC5%ZMh?$|,y_e[1D)(12:protected-at15:20130812T105135)))
(21:protected-private-key(3:elg(1:p129:W#} }l;|m>
;4YV$Qg
LoLy~*Tru*+ID8"-9,:17^g*({ #7)(1:g1:)(1:y128:2o62,Tj/
rRi3sSS iCAYNYbVtAHKi7(UPp)?Od{ 'R^f)(9:protected25:openpgp-s2k3-sha1-aes-
cbc((4:sha18:fw`E7:5242880)16:aqR)192:5f1a-` {^EV699WoB\,:Rs1*W6Lu iZ
:=ZqURM47;pA3#DL
so8O)Th^P@IP0&.DR;"rkN7)(12:protected-at15:20101008T070216)))
#+TITLE: GPGME Python Bindings HOWTO Examples
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

* Examples

:PROPERTIES:

:CUSTOM_ID: gpgme-python3-examples

:END:

The contents of this directory are the examples included in the /GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO/ file. Each script is explicitly for Python 3 and specifically for Python 3.4 or later.

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cython

;;; gpgme-package.lisp

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```

```
;;; Conventions:
;;;
;;; gpg-error is used for error handling.
;;;
;;; Standard I/O streams are used for input and output.
```

```
(defpackage #:gpgme
  (:use #:common-lisp #:cffi #:gpg-error)
  (:import-from #:trivial-garbage
    #:finalize)
  (:export #:check-version
    #:*version*
    #:context
    #:protocol
    #:armorp
    #:textmodep
    #:+include-certs-default+
    #:include-certs
    #:keylist-mode
    #:signers
    #:sig-notations
    #:with-context
    #:key-data
    #:get-key
    #:op-encrypt
    #:op-decrypt
    #:op-sign
    #:op-verify
    #:op-import
    #:op-export))
```

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-05-12 Marcus Brinkmann <marcus@g10code.com>

* gpgme.texi (I/O Callback Example): Fix example code.

* gpgme.texi (Generating Keys): Fix OpenPGP parameters and reference GPG and GPGSM manual.

2010-01-05 Werner Koch <wk@g10code.com>

* gpgme.texi (Changing Passphrases): New.

2009-07-21 Werner Koch <wk@g10code.com>

* uiserver.texi (UI Server Encrypt): Add --expect-sign option to PREP_ENCRYPT.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Result Management): New section.

2009-06-16 Werner Koch <wk@g10code.com>

* gpgme.texi (Exporting Keys): Document gpgme_op_export_keys.
(Importing Keys): Document gpgme_op_import_keys.
(Data Buffer Meta-Data): Document URL encodings.

2009-05-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Document selftest error.
(Creating Contexts): Likewise.

2009-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document GPGME_ENCRYPT_NO_ENCRYPT_TO.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Replace path by file_name.

2008-11-28 Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Change description of the return value to match the code. Spotted by Colin Leroy.

2008-10-15 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Add option --protocol to the SENDER command.

2008-07-17 Werner Koch <wk@g10code.com>

* module-overview.sk: New.

2008-07-04 Werner Koch <wk@g10code.com>

* gpgme.texi (Algorithms): Add a hint on symmetric only encryption.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancellation): Document gpgme_cancel_async.

2008-06-25

Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Updated example to the current API.
Noted by Nico Schottelius.

2008-06-05 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Describe START_CONFDIALOG.

2008-06-04 Werner Koch <wk@g10code.com>

* gpgme.texi: Use @copying command. Change license to GPLv3. Include protocol specs from GpgOL and GPGEx. Minor cleanups.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (File Based Data Buffers): Document the need for blocking operations.
(Callback Based Data Buffers): Likewise.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Rename snippet function to init_gpgme.
(I/O Callback Example): Call it here.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Document that data encoding affects some output data objects now.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Protocols and Engines):
Document GPGME_PROTOCOL_UNKNOWN.

2007-09-11 Werner Koch <wk@g10code.com>

* gpgme.texi (I/O Callback Example): Typo fix.

2007-08-07 Werner Koch <wk@g10code.com>

* gpgme.texi (Verify): Describe chain_model.

2007-07-12 Werner Koch <wk@g10code.com>

* gpgme.texi (Library Version Check): Add remark that the socket
layer will get initialized.

2007-06-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Advanced Key Editing): New section.

2007-05-21 Werner Koch <wk@g10code.com>

* Makefile.am (online): New target.

2007-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Fix documentation of
gpgme_strerror_r.

2006-11-01 Moritz Schulte <moritz@g10code.com>

* gpgme.texi (Data Buffer I/O Operations): Fixed entry for
gpgme_data_seek: OFFSET is not a pointer; some s/whence/offset/.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Clarify that
gpgme_data_release_and_get_mem destroys DH unconditionally.

2005-03-24

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Make example code compatible
to W32 systems.

2006-06-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix inverted condition in description.

2005-12-20 Werner Koch <wk@g10code.com>

* gpgme.texi (Verify): Document pka_trust.

2005-12-06 Werner Koch <wk@g10code.com>

* gpgme.texi (Key Management): Updated to match the fixes for subkey fingerprints and the secret flag.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Document gpgme_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add the new member notations of gpgme_sig_key_t.
(Key Listing Mode): Document GPGME_KEYLIST_MODE_SIG_NOTATIONS.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Enclose all return parameters of dectypes in curly brackets.

* gpgme.texi (Signature Notation Data): New section.
(Verify): Added more about the notation data structure.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Data Buffer I/O Operations, Data Buffer Meta-Data):
New subsections.

* gpgme.texi: Replace plaintext_filename with file_name.

* gpgme.texi (Key Management): Document is_qualified.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Decrypt): Add plaintext_filename to gpgme_decrypt_result_t.
(Verify): Likewise for gpgme_verify_result_t.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Add information about new fields in gpgme_signature_t.

* gpgme.texi (Decrypt): Add gpgme_recipient_t.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Fix return type of gpgme_set_keylist_mode.

Reported by "Sergio" <ml_sergico@virgilio.it>.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Included Certificates): Document GPGME_INCLUDE_CERTS_DEFAULT.

2005-01-12 Marcus

Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Configuration): New section. (Crypto Engine): New subsection.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* lesser.texi (Library Copying): Change from @appendixsec to @appendix.

* gpgme.texi (Features): Change reference to GPL to one to LGPL.

* Makefile.am: Change license to LGPL.

(gpgme_TEXINFOS): Replace gpl.texi with lesser.texi.

* gpgme.texi: Change license to LGPL (also for documentation of GPGME's license).

* lesser.texi: New file.

* gpl.texi: File removed.

* gpgme.texi (Creating Contexts): Fix cut&paste error. Reported by Noel Torres <envite@rolamasao.org>.

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgme_TEXINFOS): Remove fdl.texi.

* gpgme.texi: Do not include fdl.texi. Change license to GPL.

* fdl.texi: File removed.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Change type of keylist_mode in gpgme_key_t to gpgme_keylist_mode_t.

2004-09-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix last change.

2004-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document GPG_ERR_NOT_IMPLEMENTED.

* gpgme.texi: Update copyright year for tex version.

2004-07-29 Moritz Schulte <moritz@g10code.com>

* gpgme.texi (Verify): Fix gpgme_get_key example (ancient force_update argument was still there).

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Elaborate on the length restrictions on search patterns.

* gpgme.texi (Decrypt and Verify): Document the NO_DATA error code.

(Verify): Document the relationship between gpgme_op_verify_result and the decrypt and verify operations.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document GPG_ERR_CERT_REVOKED status.

* gpgme.texi (Decrypt): Add note about new field wrong_key_usage of gpgme_decrypt_result_t.

* gpgme.texi (Key Management): Add note about new field keylist_mode of gpgme_key_t.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Correct type of member wrong_key_usage.

2004-03-29 Moritz Schulte <moritz@duesseldorf.ccc.de>

- * gpgme.texi (Verify): Fix type of gpgme_op_verify_result.
- * gpgme.texi (Key Listing Mode): Typo fix.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Library Version Check): Fix the instruction when to set the locale.

2004-03-03 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (I/O Callback Example Qt): New section by Marc Mutz.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (cancellation): New section.

2004-02-17 Werner Koch <wk@gnupg.org>

- * gpgme.texi (Key Listing Mode): Doc KEYLIST_MODE_VALIDATE.

2004-02-06 Moritz Schulte <mo@g10code.com>

- * gpgme.texi: A couple of small fixes regarding the Largefile Support section.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Largefile Support): New section.

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Key Management): Fix exportable field.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Key Management): Rename member class in gpgme_key_sig_t to sig_class.
(Creating a Signature): Likewise for gpgme_signature_t.

2003-12-23 Moritz Schulte <mo@g10code.com>

- * gpgme.texi (Listing Keys): Minor clarification for gpgme_get_key.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Signal Handling): New section.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Correct documentation on memory synchronization requirement.

* gpgme.texi (Locale): New section.
(Multi Threading): Set locale in example.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Add gpgme_strerror_r.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Update documentation.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

*
gpgme.texi (Header): We don't use the assuan namespace anymore.
Document new thread options.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Change type of member class to unsigned int.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Get error code from SIG->status in the code for gpgme_get_sig_status.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add can_authenticate flag.

* gpgme.texi (Listing Keys): Document GPG_ERR_AMBIGUOUS_NAME for gpgme_get_key.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (EXTRA_DIST): Remove variable.

* gpgme.texi (Encrypting a Plaintext): Bad passphrase is only possible with symmetric encryption, change the wording to reflect that.

* gpgme.texi (Creating a Signature): Document
GPG_ERR_UNUSABLE_SECKEY.

* gpgme.texi (Encrypting a Plaintext): Mention encrypt and sign
operations in result function.
(Creating
a Signature): Likewise.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Remove word duplication.
(Listing Keys): Remove mentioning of force argument.
(Verify): Don't mention r_stat. Fix some typos.
(Decrypt and Verify): Correct info how to get the result. Don't
mention r_stat.
(Manipulating Data Buffers): Fix documentation of return value.
(Listing Keys): Update examples.
(Decrypt): Result might also be available when operation failed.
(Verify): Result might also be available when operation failed.
All spotted by Stphane Corthsy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Sources): Fix cut and paste error.

2003-07-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Clarify difference between can_sign
and can_certify.
(Information About Keys): Likewise for GPGME_ATTR_CAN_SIGN and
GPGME_ATTR_CAN_CERTIFY.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Progress
Meter Callback): Change return type of
gpgme_progress_cb_t to void.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add 2003 to copyright notice.

* gpgme.texi (Header): Fix name space documentation on
libgpg-error.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove reference to

gpgme_recipients_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Crypto Operations): Rename gpgme_invalid_user_id_t to gpgme_invalid_key_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Change error codes to GPG_ERR_* variants. (Error Handling): Rewritten.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Exporting Keys): Change and document prototypes. Add new gpgme_op_export_ext and gpgme_op_export_ext_start variants. (Selecting Recipients): Section removed. (Encrypting a Plaintext): Change prototypes and document the changes.

2003-05-28 Marcus Brinkmann <marcus@g10code.de>

*

gpgme.texi (Exporting Keys): Change argument type from gpgme_recipient_t to gpgme_user_id_t. (Encrypting a Plaintext): Likewise. (Selecting Recipients): Rewritten.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Protocol Selection): Do not use @acronym in @node because that breaks texi2dvi.

* gpgme.texi (Passphrase Callback): Document new prototype.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Header): Remove Gpgme as namespace prefix. Add _GPGME to namespace prefix.
* gpgme.texi (Multi Threading): Add note about link order.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document what happens if key is not found.

* gpgme.texi (Importing Keys): Fix cut and paste error.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Remove reference to
gpgme_get_op_info.
(Detailed Results): Subsection removed.

* gpgme.texi (Key Listing Mode): Add GPGME_KEYLIST_MODE_SIGS.
(Manipulating
Keys): Add obsolescence note.
(Key Signatures): Likewise.
(Information About Keys): Likewise.
(Key Management): Add new data types GpgmeSubkey, GpgmeKeySig,
GpgmeUserID, and all the information about GpgmeKey.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Remove force_update argument from
gpgme_get_key.

* gpgme.texi (Trust Item Management): Add data members of
GpgmeTrustItem type.
(Information About Trust Items): Add note about obsolescence.
(Manipulating Trust Items): Add gpgme_trust_item_ref and
gpgme_trust_item_unref.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Rewritten to take into account new and
deprecated functions and data types.

* gpgme.texi (Decrypt): Descript gpgme_op_decrypt_result and
GpgmeDecryptResult.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Add info about
GpgmeEncryptResult and gpgme_op_encrypt_result.

* gpgme.texi
(Creating a Signature): Add info about
GpgmeNewSignature, GpgmeSignResult and gpgme_op_sign_result.
(Crypto Operations): Add GpgmeInvalidUserID.
(Algorithms): New chapter.

* gpgme.texi (Deleting Keys): Document
GPGME_Ambiguous_Specification.
(Error Values): Remove GPGME_Invalid_Type and GPGME_Invalid_Mode.

Add GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Change GPGME_IMPORT_PRIVATE to
GPGME_IMPORT_SECRET.

* gpgme.texi (Importing Keys): Remove note about gpgme_get_op_info.
(Detailed Results): Remove note about import.

* gpgme.texi (Importing Keys): Add documentation
for
GpgmeImportStatus, GpgmeImportResult and gpgme_op_import_result.

* gpgme.texi (Generating Keys): Fix documentation of public and
secret arguments.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document changed gpgme_op_genkey
and new gpgme_op_genkey_result function. Document
GpgmeGenKeyResult data type.

* gpgme.texi (Error Values): Rename GPGME_No_Passphrase to
GPGME_Bad_Passphrase.

* gpgme.texi (Decrypt): Likewise.

(Decrypt and Verify): Likewise.

(Creating a Signature): Likewise.

(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Rename GPGME_No_Recipients to
GPGME_No_UserID and GPGME_Invalid_Recipient to
GPGME_Invalid_UserID.

(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Remove GPGME_Busy and GPGME_No_Request.

(Listing Keys): Likewise.

(Listing Trust Items): Likewise.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancelling an Operation): Removed.

(Passphrase
Callback): Document new type for GpgmePassphraseCb.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Rename member part to
file_name.

* gpgme.texi (Protocols and Engines): Document
gpgme_get_protocol_name.

* gpgme.texi (Engine Information): Rewritten.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (I/O Callback Interface): Document new even
GPGME_EVENT_START.
(Waiting For Completion): Document new possible return values.
(I/O Callback Interface): Document return type of GpgmeIOCb.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Hooking Up Into Idle Time): Section removed.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Drop R_STAT argument in gpgme_op_verify.
* gpgme.texi (Decrypt and Verify): Likewise for
gpgme_op_decrypt_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document that
GPGME_ATTR_IS_SECRET is not representable
as a string anymore.

2002-12-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Signatures): New section.
(Listing Keys): Add gpgme_get_key.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Memory Based Data Buffers): New subsection.
(File Based Data Buffers): Likewise.
(Callback Based Data Buffers): Likewise.
(Manipulating Data Buffers): Update interfaces. Add
gpgme_data_seek.

* gpgme.texi (Engine Version Check): Remove gpgme_check_engine.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document the new interface.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document new argument to gpgme_op_genkey.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Fix prototype of gpgme_get_sig_key.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Selecting Signers): Fix reference count.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Header): Document name space.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Document gpgme_op_import_ext.

* gpgme.texi (Importing Keys): Undocument EOF.

2002-08-14 Werner Koch <wk@gnupg.org>

* gpgme.texi (Information About Keys): Changed GPGME_ATTR_TYPE.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Say that secret keys might not be deleted.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document (badly) the new key attributes.

* gpgme.texi (Manipulating Data Buffers): Mention that backend tries to detect encoding automatically.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Run Control): Update this section.
(Waiting For Completion): Likewise for this subsection.
(Cancelling an Operation): Likewise for this subsection.
(Using External Event Loops): New subsection with several
subsubsections.

2002-06-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove item about the need to
synchronize anything against gpgme_wait (except gpgme_wait
itself).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Fix documentation for IDX.
(Information About Trust Items): Likewise.

2002-06-26 Werner Koch <wk@gnupg.org>

* gpgme.texi (Importing Keys): Document the return value -1 of
gpgme_op_import.

2002-06-20 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Explain the new whatidx variable.

2002-06-10 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Document attribute GPGME_ATTR_ERRTOK.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Document new autodetection.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (DISTCLEANFILES): New variable.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some typographical corrections
throughout.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Using Automake): New section.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Escape { and }.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Overview): Replace note about thread-safeness.
(Multi Threading): New section.

2002-05-03 Werner Koch <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): Changed some data types
to void*.
(Protocol Selection): Added gpgme_get_protocol.
(Verify): Updated to include the new attribute functions and
status codes.

2002-04-27 Werner Koch <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): New type GpgmeDataEncoding.

2002-04-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document that either return
argument can be NULL.
(Progress Meter Callback): Likewise.

2002-04-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix small
typo. Document the
new function gpgme_get_passphrase_cb.
(Progress Meter Callback): Document the new function
gpgme_get_progress_cb.

2002-04-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Fix function name. Reported
by Wichert Ackerman <wichert@debian.org>.

2002-03-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (direntry): End index entry with a full stop.
Patch submitted by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Fix syntax error in last change.

2002-03-08 Werner Koch <wk@gnupg.org>

* gpgme.texi (Detailed Results): Import does also return info.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document symmetric encryption.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Add example.

* gpgme.texi (Listing Keys): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

*

gpgme.texi (Information About Keys): Document GPGME_ATTR_EXPIRE.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document verification of normal and cleartext signatures.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document gpgme_op_keylist_ext_start.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document GPGME_Invalid_Recipients.
(Error Values): Likewise.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document gpgme_op_encrypt_sign and gpgme_op_encrypt_sign_start.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Add a note about certificates to include.
(Included Certificates): New section.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Remove literal tags.
(Generating Keys): Update documentation.

* gpgme.texi (Generating Keys):
Fix syntax error.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Waiting For Completion): Adjust doc to changes in
the code.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Update documentation.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document error at creation
failure.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Document new error values.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Add reference to gpgme_get_op_info.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some spell checking.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add all the gpgme_op_*_start functions.
Fill the concept index with many, many entries.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Run Control): New section.
(Verify): Document gpgme_get_notation.
(More Information):
New section describing gpgme_get_op_info.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase callback): Change GpgmePassphraseCb's R_HD type from void* to void**.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating data buffers): Change gpgme_data_new_from_filepart's LENGTH type from off_t to size_t.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating keys): New subsection.
(Exporting keys): Likewise.
(Importing keys): Likewise.
(Deleting keys): Likewise.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: g10Code -> g10 Code

* gpgme.texi (Top): Complete detailmenu.

* gpgme.texi: Convert embarrassing cruft to the real thing.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* ChangeLog: New file.
* gpgme.texi: Likewise.
* gpl.texi: Likewise.
* fdl.texi: Likewise.
* Makefile.am (info_TEXINFOS): New variable.
(gpgme_TEXINFOS): Likewise.

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(n

#00e0ce96f90b6c9e02f3922beada93fe50a875eac6bcc18bb9a9cf2e84965caa2d1ff95a7f542465c6c0c19d276e4526ce048868a7a914fd343cc3a87dd74291ffc565506d5bbb25cbac6a0e2dd1f8bcaab0d4a29c2f37c950f363484bf269f78914

40464baf79827e03a36e70b814938eebdc63e964247be75dc58b014b7ea251#)

(e #010001#)

(d

#046129F2489D71579BE0A75FE029BD6CDB574EBF57EA8A5B0FDA942CAB943B117D7BB95E5D28875E0F9FC5FCC06A72F6D502464DABDED78EF6B716177B83D5BDC543DC5D3FED932E59F5897E92E6F58A0F33424106A3B6FA2CBF877510E4AC21C3EE47851E97D12996222AC3566D4CCB0B83D164074ABF7DE655FC2446DA1781#)

(p

#00e861b700e17e8afe6837e7512e35b6ca11d0ae47d8b85161c67baf64377213fe52d772f2035b3ca830af41d8a4120e1c1c70d12cc22f00d28d31dd48a8d424f1#)

(q

#00f7a7ca5367c661f8e62df34f0d05c10c88e5492348dd7bdbc942c9a8f369f935a07785d2db805215ed786e4285df1658eed3ce84f469b81b50d358407b4ad361#)

(u

#304559a9ead56d2309d203811a641bb1a09626bc8eb36ffa23c968ec5bd891eebbafc73ae666e01ba7c8990bae06cc2bbe10b75e69fcacb353a6473079d8e9b#)

)

)

This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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File: gpgme.info, Node: Top, Next: Introduction, Up: (dir)

Main Menu

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35 of the GPGME library.

* Menu:

- * Introduction:: How to use this manual.
- * Preparation:: What you should do before using the library.
- * Protocols and Engines:: Supported crypto protocols.
- * Algorithms:: Supported algorithms.
- * Error Handling:: Error numbers and their meanings.
- * Exchanging Data:: Passing data to and from GPGME.
- * Contexts:: Handling GPGME contexts.

Appendices

- * UI Server Protocol:: The GnuPG UI Server Protocol.
- * Debugging:: How to solve problems.
- * Deprecated Functions:: Documentation of deprecated functions.
- * Library Copying:: The GNU Lesser General Public License says how you can copy and share GnuPG Made Easy.
- * Copying:: The GNU General Public License says how you can copy and share this manual.

Indices

- * Concept Index:: Index of concepts and programs.
- * Function and Data Index:: Index of functions, variables and data types.

The Detailed Node Listing

Introduction

- * Getting Started:: Purpose of the manual, and how to use it.
- * Features:: Reasons to install and use GPGME.
- * Overview:: Basic architecture of the GPGME library.

Preparation

- * Header:: What header file you need to include.
- * Building the Source:: Compiler options to be used.
- * Largefile Support (LFS):: How to use GPGME with LFS.
- * Using Automake:: Compiler options to be used the easy way.
- * Using Libtool:: Avoiding compiler options entirely.
- * Library Version Check:: Getting and verifying the library version.
- * Signal Handling:: How GPGME affects signal handling.
- * Multi-Threading:: How GPGME can be used in an MT environment.

Protocols and Engines

- * Engine Version Check:: Verifying the engine version.
- * Engine Information:: Obtaining more information about the engines.
- * Engine Configuration:: Changing the engine configuration.
- * OpenPGP:: Support for the OpenPGP protocol.
- * Cryptographic Message Syntax:: Support for the CMS.

Algorithms

- * Public Key Algorithms:: A list of all public key algorithms.
- * Hash Algorithms:: A list of all hash algorithms.

Error Handling

- * Error Values:: The error value and what it means.
- * Error Codes:: A list of important error codes.
- * Error Sources:: A list of important error sources.
- * Error Strings:: How to get a descriptive string from a value.

Exchanging Data

- * Creating Data Buffers:: Creating new data buffers.
- * Destroying Data Buffers:: Releasing data buffers.
- * Manipulating Data Buffers:: Operations on data buffers.

Creating Data Buffers

- * Memory Based Data Buffers:: Creating memory based data buffers.
- * File Based Data Buffers:: Creating file

based data buffers.

- * Callback Based Data Buffers:: Creating callback based data buffers.

Manipulating Data Buffers

- * Data Buffer I/O Operations:: I/O operations on data buffers.
- * Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- * Data Buffer Convenience:: Convenience function for data buffers.

Contexts

- * Creating Contexts:: Creating new GPGME contexts.
- * Destroying Contexts:: Releasing GPGME contexts.
- * Result Management:: Managing the result of crypto operations.
- * Context Attributes:: Setting properties of a context.
- * Key Management:: Managing keys with GPGME.
- * Crypto Operations:: Using a context for cryptography.
- * Miscellaneous:: Miscellaneous operations.
- * Run Control:: Controlling how operations are run.

Context Attributes

- * Protocol Selection:: Selecting the protocol used by a context.
- * Crypto Engine:: Configuring the crypto engine.
- * Setting the Sender:: How to tell the engine the sender.
- * ASCII Armor:: Requesting ASCII armored output.
- * Text Mode:: Choosing canonical text mode.
- * Offline Mode:: Choosing offline mode.
- * Included Certificates:: Including a number of certificates.
- * Key Listing Mode:: Selecting key listing mode.
- * Passphrase Callback:: Getting the passphrase from the user.
- * Progress Meter Callback:: Being informed about the progress.
- * Status Message Callback:: Status messages received from gpg.
- * Locale:: Setting the locale of a context.

Key Management

- * Key objects:: Description of the key structures.
- * Listing Keys:: Browsing the list of available keys.
- * Information About Keys:: Requesting detailed information about keys.
- * Manipulating Keys:: Operations on keys.
- * Generating Keys::
Creating new key pairs.
- * Signing Keys:: Adding key signatures to public keys.
- * Exporting Keys:: Retrieving key data from the key ring.
- * Importing Keys:: Adding keys to the key ring.
- * Deleting Keys:: Removing keys from the key ring.

- * Changing Passphrases:: Change the passphrase of a key.
- * Changing TOFU Data:: Changing data pertaining to TOFU.
- * Advanced Key Editing:: Advanced key edit operation.

Crypto Operations

- * Decrypt:: Decrypting a ciphertext.
- * Verify:: Verifying a signature.
- * Decrypt and Verify:: Decrypting a signed ciphertext.
- * Sign:: Creating a signature.
- * Encrypt:: Encrypting a plaintext.

Sign

- * Selecting Signers:: How to choose the keys to sign with.
- * Creating a Signature:: How to create a signature.
- * Signature Notation Data::
How to add notation data to a signature.

Encrypt

- * Encrypting a Plaintext:: How to encrypt a plaintext.

Miscellaneous

- * Running other Programs:: Running other Programs.
- * Using the Assuan protocol:: Using the Assuan protocol.
- * Checking for updates:: How to check for software updates.

Run Control

- * Waiting For Completion:: Waiting until an operation is completed.
- * Using External Event Loops:: Advanced control over what happens when.
- * Cancellation:: How to end pending operations prematurely.

Using External Event Loops

- * I/O Callback Interface:: How I/O callbacks are registered.
- * Registering I/O Callbacks:: How to use I/O callbacks for a context.
- * I/O Callback Example:: An example how to use I/O callbacks.
- * I/O Callback Example GTK+:: How to integrate GPGME in GTK+.
- * I/O Callback Example GDK:: How to integrate GPGME in GDK.
- * I/O Callback Example Qt:: How to integrate GPGME in Qt.

File:

1 Introduction

GnuPG Made Easy (GPGME) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. GPGME provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

GPGME uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

* Menu:

- * Getting Started:: Purpose of the manual, and how to use it.
- * Features:: Reasons to install and use GPGME.
- * Overview:: Basic architecture of the GPGME library.

File: gpgme.info, Node: Getting Started, Next: Features, Up: Introduction

1.1 Getting Started

=====

This manual documents the GPGME library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to GPGME or its users.

This manual can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those

languages bindings follow the general programming model of GPGME but may provide some extra high level abstraction on top of the GPGME style API. For now please see the README files in the lang/ directory of the source distribution.

File: [gpgme.info](#), Node: [Features](#), Next: [Overview](#), Prev: [Getting Started](#), Up: [Introduction](#)

1.2 Features

=====

GPGME has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

its free software

Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (*note Library Copying::).

its flexible

GPGME provides transparent support for several cryptographic protocols by different engines. Currently, GPGME supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

its easy

GPGME hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for GPGME has been added to a program, it is easy to add support for other crypto protocols once GPGME backends provide them.

its language friendly

GPGME comes with languages bindings for several common programming languages: Common Lisp, C++, Python 2, and Python 3.

File: [gpgme.info](#), Node: [Overview](#), Prev: [Features](#), Up: [Introduction](#)

1.3 Overview

=====

GPGME provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, GPGME has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, GPGME can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

File: gpgme.info, Node: Preparation, Next: Protocols and Engines, Prev: Introduction, Up: Top

2 Preparation

To use GPGME, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

* Menu:

- * Header:: What header file you need to include.
- * Building the Source:: Compiler options to be used.
- * Largefile Support (LFS):: How to use GPGME with LFS.
- * Using Automake:: Compiler options to be used the easy way.
- * Using Libtool:: Avoiding compiler options entirely.
- * Library Version Check:: Getting and verifying the library version.
- * Signal Handling:: How GPGME affects signal handling.
- * Multi-Threading:: How GPGME can be used in an MT environment.

File: gpgme.info, Node: Header, Next: Building the Source, Up: Preparation

2.1 Header

=====

All interfaces (data types and functions) of the library are defined in the header file `gpgme.h`. You must include this in all programs using the library, either directly or through some other header file, like this:

```
#include <gpgme.h>
```

The name space of GPGME is `gpgme_*` for function names and data types and `GPGME_*` for other symbols. Symbols internal to GPGME take the form `_gpgme_*` and `_GPGME_*`.

Because GPGME makes use of the GPG Error library, using GPGME will also use the `GPG_ERR_*` name space directly, and the `gpg_err*`, `gpg_str*`, and `gpgmt_*` name space indirectly.

File: `gpgme.info`, Node: Building the Source, Next: Largefile Support (LFS), Prev: Header, Up: Preparation

2.2 Building the Source

=====

If you want to compile a source file including the `gpgme.h` header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the `-I` option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, `gpgme` ships with a small helper program `gpgme-config` that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the `--cflags` option to `gpgme-config`. The following example shows how it can be used at the command line:

```
gcc -c foo.c `gpgme-config --cflags`
```

Adding the output of `gpgme-config --cflags` to the compiler command line will ensure that the compiler can find the GPGME header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the `-L` option). For this, the option `--libs` to `gpgme-config` can be used. For convenience, this option also outputs all other options that are required to link the program with GPGME (in particular,

the `-lpggme` option). The example shows how to link `foo.o` with the GPGME library to a program `foo`.

```
gcc -o foo foo.o `gpgme-config --libs`
```

Of

course you can also combine both examples to a single command by specifying both options to `gpgme-config`:

```
gcc -o foo foo.c `gpgme-config --cflags --libs`
```

If you need to detect the installed language bindings you can use list them using:

```
gpgme-config --print-lang
```

or test for the availability using

```
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
```

File: [gpgme.info](#), Node: [Largefile Support \(LFS\)](#), Next: [Using Automake](#), Prev: [Building the Source](#), Up: [Preparation](#)

2.3 Largefile Support (LFS)

=====

GPGME is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of `64`.

An example: The data type `off_t` is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type `off64_t` is provided, which is 64 bit wide. Or you can replace the existing `off_t` data type with its 64 bit wide counterpart. All occurrences of `off_t` are then

automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for GPGME, because some data types it uses in its interfaces are affected by that. For example, the `off_t` data type is used in the `gpgme_data_seek` function, to match its POSIX counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms GPGME is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the `gpgme.h` header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms `off_t` is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (`CreateFile` et al.) for large files. Released binary versions of GPGME (`libgpgme-11.dll`) have always been build with a 32 bit `off_t`. To avoid an ABI break we stick to this convention for 32 bit Windows by using `long` there. GPGME versions for 64 bit Windows have never been released and thus we are able to use `int64_t` instead of `off_t` there. For easier migration the typedef `gpgme_off_t` has been defined. The reason we cannot use `off_t` directly is that some toolchains (e.g. `mingw64`) introduce a POSIX compatible hack for `off_t`. Some widely used toolkits make use of this hack and in turn GPGME would need to use it also. However, this would introduce an ABI break and existing software making use of `libgpgme` might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using `off_t` to use

gpgme_off_t which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in GPGME is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro AC_SYS_LARGEFILE. If you do this, then you don't need to worry about anything else: It will just work. In this case you might also want to use AC_FUNC_FSEEKO to take advantage of some new interfaces, and AC_TYPE_OFF_T (just in case).

If you do not use Autoconf, you can define the preprocessor symbol `_FILE_OFFSET_BITS` to 64 `_before_` including any header files, for example by specifying the option `-D_FILE_OFFSET_BITS=64` on the compiler command line. You will also want to define the preprocessor symbol `LARGEFILE_SOURCE` to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the GPGME header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (`_LARGEFILE64_SOURCE`).

File: gpgme.info, Node: Using Automake, Next: Using Libtool, Prev: Largefile Support (LFS), Up: Preparation

2.4 Using Automake

=====

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the gpgme-config script at all. GPGME provides an extension to Automake that does all the work for you.

```
-- Macro: AM_PATH_GPGME ([MINIMUM-VERSION], [ACTION-IF-FOUND],  
    [ACTION-IF-NOT-FOUND])  
-- Macro: AM_PATH_GPGME_PTH ([MINIMUM-VERSION], [ACTION-IF-FOUND],  
    [ACTION-IF-NOT-FOUND])  
-- Macro: AM_PATH_GPGME_PTHREAD ([MINIMUM-VERSION], [ACTION-IF-FOUND],  
    [ACTION-IF-NOT-FOUND])  
Check whether GPGME (at least version MINIMUM-VERSION, if given)  
exists on the host system. If it is found, execute  
ACTION-IF-FOUND, otherwise do ACTION-IF-NOT-FOUND, if given.
```

Additionally, the function defines GPGME_CFLAGS to the flags needed for compilation of the program to find the gpgme.h header file, and GPGME_LIBS to the linker flags needed to link the program to the GPGME library. If the used helper script does not match the target type you are building for a warning is printed and the string libgcrypt is appended to the variable gpg_config_script_warn.

AM_PATH_GPGME_PTH

checks for the version of GPGME that can be used with GNU Pth, and defines GPGME_PTH_CFLAGS and GPGME_PTH_LIBS.

AM_PATH_GPGME_PTHREAD checks for the version of GPGME that can be used with the native pthread implementation, and defines GPGME_PTHREAD_CFLAGS and GPGME_PTHREAD_LIBS. Since version 1.8.0 this is no longer required to GPGME_PTHREAD as GPGME itself is thread safe.

This macro searches for gpgme-config along the PATH. If you are cross-compiling, it is useful to set the environment variable SYSROOT to the top directory of your target. The macro will then first look for the helper program in the bin directory below that top directory. An absolute directory name must be used for SYSROOT. Finally, if the configure command line option --with-gpgme-prefix is used, only its value is used for the top directory below which the helper script is expected.

You can use the defined Autoconf variables like this in your Makefile.am:

```
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
```

File: gpgme.info, Node: Using Libtool, Next: Library Version Check, Prev: Using Automake, Up: Preparation

2.5 Using Libtool

=====

The easiest way is to just use GNU Libtool. If you use libtool, and link to libgpgme.la, libgpgme-pth.la or libgpgme-pthread.la respectively, everything will be done automatically by Libtool.

File: gpgme.info, Node: Library Version Check, Next: Signal Handling, Prev: Using Libtool, Up: Preparation

2.6 Library Version Check

=====

-- Function: `const char * gpgme_check_version`

(`const char *REQUIRED_VERSION`)

The function `gpgme_check_version` has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems,

and for this reason alone it must be invoked

early in your program, before you make use of the other functions in GPGME. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If `REQUIRED_VERSION` is `NULL`, the function returns a pointer to a statically allocated string containing the version number of the library.

If `REQUIRED_VERSION` is not `NULL`, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If `REQUIRED_VERSION` is not a valid version number, or if the version requirement is not met, the function returns `NULL`.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking `gpgme_new` or `gpgme_data_new`, so that a detailed error code can be returned (historically, `gpgme_check_version` does not return a detailed error code).

-- Function: `int gpgme_set_global_flag (const char *NAME, const char *VALUE)`

SINCE: 1.4.0

On some systems it is not easy to set environment variables and

thus hard to use GPGMEs internal trace facility for debugging. This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses GPGME functions between a call to this function and after the return from the call to `gpgme_check_version`.

All currently supported features require that this function is called as early as possible even before `gpgme_check_version`. The features are identified by the following values for NAME:

`debug`

To enable debugging use the string `debug` for NAME and VALUE identical to the value used with the environment variable `GPGME_DEBUG`.

`disable-gpgconf`

Using this feature with any VALUE disables the detection of the `gpgconf` program and thus forces GPGME to fallback into the simple OpenPGP only mode. It may be used to force the use of GnuPG-1 on systems which have both GPG versions installed. Note that in general the use of `gpgme_set_engine_info` is a better way to select a specific engine version.

`gpgconf-name`

`gpg-name`

Set the name of the `gpgconf` respective `gpg` binary. The defaults are `GNU/GnuPG/gpgconf` and `GNU/GnuPG/gpg`. Under

Unix the leading directory part is ignored. Under Windows the leading directory part is used as the default installation directory; the `.exe` suffix is added by GPGME. Use forward slashed even under Windows.

`require-gnupg`

Set the minimum version of the required GnuPG engine. If that version is not met, GPGME fails early instead of trying to use the existent version. The given version must be a string with major, minor, and micro number. Example: "2.1.0".

`w32-inst-dir`

On Windows GPGME needs to know its installation directory to find its spawn helper. This is in general no problem because a DLL has this information. Some applications however link statically to GPGME and thus GPGME can only figure out the installation directory of this application which may be wrong in certain cases. By supplying an installation directory as

value to this flag, GPGME will assume that that directory is the installation directory. This flag has no effect on non-Windows platforms.

This function returns 0 on success. In contrast to other functions the non-zero return value on failure does not convey any error code. For setting debug the only possible error cause is an out of memory condition; which would exhibit itself later anyway. Thus the return value may be ignored.

After initializing GPGME, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

```
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
{
    /* Initialize the locale environment. */
    setlocale (LC_ALL, "");
    gpgme_check_version (NULL);
    gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
#ifdef LC_MESSAGES
    gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
}
```

Note that you are highly recommended to initialize the locale settings like this. GPGME can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for portability to W32 systems.

File: gpgme.info, Node: Signal Handling, Next: Multi-Threading, Prev: Library Version Check, Up: Preparation

2.7 Signal Handling

=====

The GPGME library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a SIGPIPE signal will be delivered to the application. The default action is to abort the program. To protect against this, gpgme_check_version sets the SIGPIPE signal action to SIG_IGN, which means that the signal will be ignored.

GPGME will only do that if the signal action for SIGPIPE is SIG_DEF at the time `gpgme_check_version` is called. If it is something different, GPGME will take no action.

This means that if your application does not install any signal handler for SIGPIPE, you don't need to take any precautions. If you do install a signal handler for SIGPIPE, you must be prepared to handle any SIGPIPE events that occur due to GPGME writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for SIGPIPE, you must make sure you do this either before `gpgme_check_version` is called or afterwards.

File: `gpgme.info`, Node: Multi-Threading, Prev: Signal Handling, Up: Preparation

2.8 Multi-Threading

=====

The GPGME library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

The function `gpgme_check_version` must be called before any other function in the library, because it initializes the thread support subsystem in GPGME. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use GPGME. For this, it is sufficient to call `gpgme_check_version` before creating the other threads using `GPGME(1)`.

Any `gpgme_data_t` and `gpgme_ctx_t` object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

Only one thread at any time is allowed to call `gpgme_wait`. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

The function `gpgme_strerror` is not thread safe. You have to use `gpgme_strerror_r` instead.

----- Footnotes -----

(1) At least this is true for POSIX threads, as `pthread_create` is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term Memory Synchronization. For other thread packages other, more relaxed or more strict rules may apply.

File: [gpgme.info](#), Node: Protocols and Engines, Next: Algorithms, Prev: Preparation, Up: Top

3 Protocols and Engines

GPGME supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. GPGME uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by GPGME. Where an exchange of information between the application and the backend is necessary, GPGME provides the necessary callback function hooks and further interfaces.

-- Data type: `enum gpgme_protocol_t`

The `gpgme_protocol_t` type specifies the set of possible protocol values that are supported by GPGME. The following protocols are supported:

`GPGME_PROTOCOL_OpenPGP`

`GPGME_PROTOCOL_OPENPGP`

This specifies the OpenPGP protocol.

`GPGME_PROTOCOL_CMS`

This specifies the Cryptographic Message Syntax.

`GPGME_PROTOCOL_GPGCONF`

Under development. Please ask on gnupg-devel@gnupg.org for help.

`GPGME_PROTOCOL_ASSUAN`

SINCE: 1.2.0

This specifies the raw Assuan protocol.

`GPGME_PROTOCOL_G13`

SINCE: 1.3.0

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_UISEVER

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_SPAWN

SINCE: 1.5.0

Special protocol for use with
gpgme_op_spawn.

GPGME_PROTOCOL_UNKNOWN

Reserved for future extension. You may use this to indicate that the used protocol is not known to the application. Currently, GPGME does not accept this value in any operation, though, except for gpgme_get_protocol_name.

-- Function: const char * gpgme_get_protocol_name
(gpgme_protocol_t PROTOCOL)
The function gpgme_get_protocol_name returns a statically allocated string describing the protocol PROTOCOL, or NULL if the protocol number is not valid.

* Menu:

- * Engine Version Check:: Verifying the engine version.
- * Engine Information:: Obtaining more information about the engines.
- * Engine Configuration:: Changing the engine configuration.
- * OpenPGP:: Support for the OpenPGP protocol.
- * Cryptographic Message Syntax:: Support for the CMS.
- * Assuan:: Support for the raw Assuan protocol.

File: gpgme.info,

Node: Engine Version Check, Next: Engine Information, Up: Protocols and Engines

3.1 Engine Version Check

=====

-- Function: const char * gpgme_get_dirinfo (cons char *WHAT)
SINCE: 1.5.0

The function gpgme_get_dirinfo returns a statically allocated string with the value associated to WHAT. The returned values are the defaults and wont change even after gpgme_set_engine_info

has been used to configure a different engine. NULL is returned if no value is available. Commonly supported values for WHAT are:

homedir

Return the default home directory.

sysconfdir

Return the name of the system configuration directory

bindir

Return the name of the directory with GnuPG program files.

libdir

Return the name of the directory with GnuPG related library files.

libexecdir

Return the name of the directory with GnuPG helper program files.

datadir

Return the name of the directory with GnuPG shared data.

localedir

Return the name of the directory with GnuPG locale data.

agent-socket

Return the name of the socket to connect to the gpg-agent.

agent-ssh-socket

Return the name of the socket to connect to the ssh-agent component of gpg-agent.

dirmngr-socket

Return the name of the socket to connect to the dirmngr.

uiserver-socket

Return the name of the socket to connect to the user interface server.

gpgconf-name

Return the file name of the engine configuration tool.

gpg-name

Return the file name of the OpenPGP engine.

gpgsm-name

Return the file name of the CMS engine.

g13-name

Return the name of the file container encryption engine.

gpg-wks-client-name

Return the name of the Web Key Service tool.

-- Function: `gpgme_error_t gpgme_engine_check_version`
(`gpgme_protocol_t PROTOCOL`)

The function `gpgme_engine_check_version` verifies that the engine implementing the protocol `PROTOCOL` is installed in the expected path and meets the version requirement of GPGME.

This function returns the error code `GPG_ERR_NO_ERROR` if the engine is available and `GPG_ERR_INV_ENGINE` if it is not.

File: `gpgme.info`, Node: Engine Information, Next: Engine Configuration, Prev: Engine Version Check, Up: Protocols and Engines

3.2 Engine Information

=====

-- Data type: `gpgme_engine_info_t`

The `gpgme_engine_info_t` type specifies a pointer to a structure describing a crypto engine. The structure contains the following elements:

`gpgme_engine_info_t next`

This is a pointer to the next engine info structure in the linked list, or `NULL` if this is the last element.

`gpgme_protocol_t protocol`

This is the protocol for which the crypto engine is used.

You

can convert this to a string with `gpgme_get_protocol_name` for printing.

`const char *file_name`

This is a string holding the file name of the executable of the crypto engine. Currently, it is never `NULL`, but using `NULL` is reserved for future use, so always check before you use it.

`const char *home_dir`

This is a string holding the directory name of the crypto engines configuration directory. If it is `NULL`, then the

default directory is used. See `gpgme_get_dirinfo` on how to get the default directory.

`const char *version`

This is a string containing the version number of the crypto engine. It might be `NULL` if the version number can not be determined, for example because the executable doesn't exist or is invalid.

`const char *req_version`

This is a string containing the minimum required version number

of the crypto engine for GPGME to work correctly. This is the version number that `gpgme_engine_check_version` verifies against. Currently, it is never `NULL`, but using `NULL` is reserved for future use, so always check before you use it.

-- Function: `gpgme_error_t gpgme_get_engine_info`

(`gpgme_engine_info_t *INFO`)

The function `gpgme_get_engine_info` returns a linked list of engine info structures in `INFO`. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, and a system error if the memory could not be allocated.

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

```
gpgme_ctx_t ctx;
gpgme_error_t
err;

[...]

if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
{
    gpgme_engine_info_t info;
    err = gpgme_get_engine_info (&info);
    if (!err)
    {
        while (info && info->protocol != gpgme_get_protocol (ctx))
```

```

    info = info->next;
if (!info)
    fprintf (stderr, "GPGME compiled without support for protocol %s",
            gpgme_get_protocol_name (info->protocol));
else if (info->file_name && !info->version)
    fprintf (stderr, "Engine %s not installed properly",
            info->file_name);
else if (info->file_name && info->version && info->req_version)
    fprintf (stderr, "Engine %s version %s installed, "
            "but at least version %s required", info->file_name,
            info->version, info->req_version);
else
    fprintf (stderr, "Unknown problem with engine
for protocol %s",
            gpgme_get_protocol_name (info->protocol));
    }
}

```

File: gpgme.info, Node: Engine Configuration, Next: OpenPGP, Prev: Engine Information, Up: Protocols and Engines

3.3 Engine Configuration

=====

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

```
-- Function: gpgme_error_t gpgme_set_engine_info
(gpgme_protocol_t PROTO, const char *FILE_NAME,
const char *HOME_DIR)
SINCE: 1.1.0
```

The function `gpgme_set_engine_info` changes the default configuration of the crypto engine implementing the protocol `PROTO`.

`FILE_NAME` is the file name of the executable program implementing this protocol, and `HOME_DIR` is the directory name of the configuration directory for this crypto engine. If `HOME_DIR` is

`NULL`, the engines default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

The functions `gpgme_ctx_get_engine_info` and `gpgme_ctx_set_engine_info` can be used to change the engine configuration per context. *Note Crypto Engine::

File: `gpgme.info`, Node: OpenPGP, Next: Cryptographic Message Syntax, Prev: Engine Configuration, Up: Protocols and Engines

3.4 OpenPGP

=====

OpenPGP is implemented by GnuPG, the GNU Privacy Guard. This is the first protocol that was supported by GPGME.

The OpenPGP protocol is specified by `GPGME_PROTOCOL_OpenPGP`.

File: `gpgme.info`, Node: Cryptographic Message Syntax, Next: Assuan, Prev: OpenPGP, Up: Protocols and Engines

3.5 Cryptographic Message Syntax

=====

CMS is implemented by GpgSM, the S/MIME implementation for GnuPG.

The CMS protocol is specified by `GPGME_PROTOCOL_CMS`.

File: `gpgme.info`, Node: Assuan, Prev: Cryptographic Message Syntax, Up: Protocols and Engines

3.6 Assuan

=====

Assuan is the RPC library used by the various GnuPG components. The Assuan protocol allows one to talk to arbitrary Assuan servers using GPGME. *Note Using the Assuan protocol::

The ASSUAN protocol is specified by `GPGME_PROTOCOL_ASSUAN`.

File: `gpgme.info`, Node: Algorithms, Next: Error Handling, Prev: Protocols and Engines, Up: Top

4 Algorithms

The crypto backends support a variety of algorithms used in public key

cryptography.(1) The following sections list the identifiers used to denote such an algorithm.

* Menu:

* Public Key Algorithms:: A list of all public key algorithms.

* Hash Algorithms:: A list of all hash algorithms.

----- Footnotes -----

(1) Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.

File:

gpgme.info, Node: Public Key Algorithms, Next: Hash Algorithms, Up: Algorithms

4.1 Public Key Algorithms

=====

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

-- Data type: enum gpgme_pubkey_algo_t

The gpgme_pubkey_algo_t type specifies the set of all public key algorithms that are supported by GPGME. Possible values are:

GPGME_PK_RSA

This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

GPGME_PK_RSA_E

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

GPGME_PK_RSA_S

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

GPGME_PK_DSA

This value indicates DSA, the Digital Signature Algorithm.

GPGME_PK_ELG

This value indicates ElGamal.

GPGME_PK_ELG_E

This value also indicates ElGamal and is used specifically in GnuPG.

GPGME_PK_ECC

SINCE: 1.5.0

This value is a generic indicator for elliptic curve algorithms.

GPGME_PK_ECDSA

SINCE: 1.3.0

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

GPGME_PK_ECDH

SINCE: 1.3.0

This value indicates ECDH, the Elliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

GPGME_PK_EDDSA

SINCE: 1.7.0

This value indicates the EdDSA algorithm.

-- Function: const char * gpgme_pubkey_algo_name
(gpgme_pubkey_algo_t ALGO)

The function gpgme_pubkey_algo_name returns a pointer to a statically allocated string containing a description of the public key algorithm ALGO. This string can be used to output the name of the public key algorithm to the user.

If ALGO is not a valid public key algorithm, NULL is returned.

-- Function: char * gpgme_pubkey_algo_string (gpgme_subkey_t KEY)
SINCE: 1.7.0

The function gpgme_pubkey_algo_string is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. rsa2048 or ed25519). The caller must free the result using gpgme_free. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets ERRNO.

File: gpgme.info, Node: Hash Algorithms, Prev: Public Key Algorithms, Up: Algorithms

4.2 Hash Algorithms

=====
Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

-- Data type: enum gpgme_hash_algo_t

The gpgme_hash_algo_t type specifies the set of all hash algorithms that are supported by GPGME. Possible values are:

GPGME_MD_MD5
GPGME_MD_SHA1
GPGME_MD_RMD160
GPGME_MD_MD2
GPGME_MD_TIGER
GPGME_MD_HAVAL
GPGME_MD_SHA256
GPGME_MD_SHA384
GPGME_MD_SHA512
GPGME_MD_SHA224

SINCE: 1.5.0

GPGME_MD_MD4
GPGME_MD_CRC32
GPGME_MD_CRC32_RFC1510
GPGME_MD_CRC24_RFC2440

-- Function: const char * gpgme_hash_algo_name (gpgme_hash_algo_t ALGO)

The function gpgme_hash_algo_name returns a pointer to a statically allocated string containing a description of the hash algorithm ALGO. This string can be used to output the name of the hash algorithm to the user.

If ALGO is not a valid hash algorithm, NULL is returned.

File: gpgme.info, Node: Error Handling, Next: Exchanging Data, Prev: Algorithms, Up: Top

5 Error Handling

Many functions in GPGME can return an error if they fail. For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the

operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

GPGME uses the libpgp-error library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no information is lost. As a consequence, GPGME does not use its own identifiers for error codes, but uses those provided by libpgp-error. They usually start with GPG_ERR_.

However, GPGME does provide aliases for the functions defined in libpgp-error, which might be preferred for name space consistency.

* Menu:

- * Error Values:: The error value and what it means.
- * Error Sources:: A list of important error sources.
- * Error Codes:: A list of important error codes.
- * Error Strings:: How to get a descriptive string from a value.

File: gpgme.info, Node: Error Values, Next: Error Sources, Up: Error Handling

5.1 Error Values

=====

-- Data type: gpgme_err_code_t

The gpgme_err_code_t type is an alias for the libpgp-error type gpg_err_code_t. The error code indicates the type of an error, or the reason why an operation failed.

A list of important error codes can be found in the next section.

-- Data type: gpgme_err_source_t

The gpgme_err_source_t type is an alias for the libpgp-error type gpg_err_source_t. The error source has not a precisely defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it

is attempted to achieve this goal.

A list of important error sources can be found in the next section.

-- Data type: `gpgme_error_t`

The `gpgme_error_t` type is an alias for the `libgpg-error` type `gpg_error_t`. An error value like this has always two components, an error code and an error source. Both together form the error value.

Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used. However, it is guaranteed that only 0 is used to indicate success (`GPG_ERR_NO_ERROR`), and that in this case all other parts of the error value are set to 0, too.

Note

that in GPGME, the error source is used purely for diagnostical purposes. Only the error code should be checked to test for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

-- Function: `static inline gpgme_err_code_t gpgme_err_code`
`(gpgme_error_t ERR)`

The static inline function `gpgme_err_code` returns the `gpgme_err_code_t` component of the error value `ERR`. This function must be used to extract the error code from an error value in order to compare it with the `GPG_ERR_*` error code macros.

-- Function: `static inline gpgme_err_source_t gpgme_err_source`
`(gpgme_error_t ERR)`

The static inline function `gpgme_err_source` returns the `gpgme_err_source_t` component of the error value `ERR`. This function must be used to extract the error source from an error value in order to compare it with the `GPG_ERR_SOURCE_*` error source macros.

-- Function: `static inline gpgme_error_t gpgme_err_make`
`(gpgme_err_source_t SOURCE, gpgme_err_code_t CODE)`

The static inline function `gpgme_err_make` returns the error value consisting of the error source `SOURCE` and the error code `CODE`.

This function can be used in callback functions to construct an error value to return it to the library.

-- Function: `static inline gpgme_error_t gpgme_error`

(gpgme_err_code_t CODE)

The static inline function `gpgme_error` returns the error value consisting of the default error source and the error code `CODE`.

For GPGME applications, the default error source is `GPG_ERR_SOURCE_USER_1`. You can define `GPGME_ERR_SOURCE_DEFAULT` before including `gpgme.h` to change this default.

This function can be used in callback functions to construct an error value to return it to the library.

The `libgpg-error` library provides error codes for all system error numbers

it knows about. If `ERR` is an unknown error number, the error code `GPG_ERR_UNKNOWN_ERRNO` is used. The following functions can be used to construct error values from system `errno` numbers.

-- Function: `gpgme_error_t gpgme_err_make_from_errno`
(`gpgme_err_source_t SOURCE`, `int ERR`)
The function `gpgme_err_make_from_errno` is like `gpgme_err_make`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

-- Function: `gpgme_error_t gpgme_error_from_errno` (`int ERR`)
The function `gpgme_error_from_errno` is like `gpgme_error`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

-- Function: `gpgme_err_code_t gpgme_err_code_from_errno` (`int ERR`)
The function `gpgme_err_code_from_errno` returns the error code for the system error `ERR`. If `ERR` is not a known system error, the function returns `GPG_ERR_UNKNOWN_ERRNO`.

-- Function: `int gpgme_err_code_to_errno` (`gpgme_err_code_t ERR`)
The function `gpgme_err_code_to_errno` returns the system error for the error code `ERR`. If `ERR` is not an error code representing a system error, or if this system error is not defined on this system, the function returns 0.

File: `gpgme.info`, Node: Error Sources, Next: Error Codes, Prev: Error Values, Up: Error Handling

5.2 Error Sources

=====

The library libgpg-error defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is 0, the whole error value will be 0. In this case the error source part is of course GPG_ERR_SOURCE_UNKNOWN.

The list of error sources that might occur in applications using GPGME is:

GPG_ERR_SOURCE_UNKNOWN

The error source is not known. The value of this error source is 0.

GPG_ERR_SOURCE_GPGME

The error source is GPGME itself. This is the default for errors that occur in the GPGME library.

GPG_ERR_SOURCE_GPG

The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

GPG_ERR_SOURCE_GPGSM

The error source is GPGSM, which is the crypto engine used for the CMS protocol.

GPG_ERR_SOURCE_GCRYPT

The error source is libgcrypt, which is used by crypto engines to perform cryptographic operations.

GPG_ERR_SOURCE_GPGAGENT

The error source is gpg-agent, which is used by crypto engines to perform operations with the secret key.

GPG_ERR_SOURCE_PINENTRY

The error source is pinentry, which is used by gpg-agent to query the passphrase to unlock a secret key.

GPG_ERR_SOURCE_SCD

The error source is the SmartCard Daemon, which is used by gpg-agent to delegate operations with the secret key to a SmartCard.

GPG_ERR_SOURCE_KEYBOX

The error source is libkbox, a library used by the crypto engines to manage local keyrings.

GPG_ERR_SOURCE_USER_1

GPG_ERR_SOURCE_USER_2

GPG_ERR_SOURCE_USER_3

GPG_ERR_SOURCE_USER_4

These error sources are not used by any GnuPG component and can be used by other software. For example, applications using GPGME can use them to mark error values coming from callback handlers. Thus GPG_ERR_SOURCE_USER_1 is the default for errors created with `gpgme_error` and `gpgme_error_from_errno`, unless you define `GPGME_ERR_SOURCE_DEFAULT` before including `gpgme.h`.

File: `gpgme.info`, Node: Error Codes, Next: Error Strings, Prev: Error Sources, Up: Error Handling

5.3 Error Codes

=====

The library `libgpg-error` defines many error values. Most of them are not used by GPGME directly, but might be returned by GPGME because it received them

from the crypto engine. The below list only includes such error codes that have a specific meaning in GPGME, or which are so common that you should know about them.

GPG_ERR_EOF

This value indicates the end of a list, buffer or file.

GPG_ERR_NO_ERROR

This value indicates success. The value of this error code is 0.

Also, it is guaranteed that an error value made from the error code 0 will be 0 itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

GPG_ERR_GENERAL

This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

GPG_ERR_ENOMEM

This value means that an out-of-memory condition occurred.

GPG_ERR_E...

System errors are mapped to GPG_ERR_FOO where FOO is the symbol for the system error.

GPG_ERR_INV_VALUE

This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty `gpgme_data_t` object was expected, but one containing data was provided, this error value is returned.

GPG_ERR_UNUSABLE_PUBKEY

This value means that some recipients for a message were invalid.

GPG_ERR_UNUSABLE_SECKEY

This value means that some signers were invalid.

GPG_ERR_NO_DATA

This value means that a `gpgme_data_t` object which was expected to have content was found empty.

GPG_ERR_CONFLICT

This value means that a conflict of some sort occurred.

GPG_ERR_NOT_IMPLEMENTED

This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

GPG_ERR_DECRYPT_FAILED

This value indicates that a decryption operation was unsuccessful.

GPG_ERR_BAD_PASSPHRASE

This value means that the user did not provide a correct passphrase when requested.

GPG_ERR_CANCELED

This value means that the operation was canceled.

GPG_ERR_INV_ENGINE

This value means that the engine that implements the desired protocol is currently not available. This can either be because the sources were configured to exclude support for this engine, or because the engine is not installed properly.

GPG_ERR_AMBIGUOUS_NAME

This value indicates that a user ID or other specifier did not specify a unique key.

GPG_ERR_WRONG_KEY_USAGE

This value indicates that a key is not used appropriately.

GPG_ERR_CERT_REVOKED

This value indicates that a key signature was revoked.

GPG_ERR_CERT_EXPIRED

This value indicates that a key signature expired.

GPG_ERR_NO_CRL_KNOWN

This value indicates that no certificate revocation list is known for the certificate.

GPG_ERR_NO_POLICY_MATCH

This value indicates that a policy issue occurred.

GPG_ERR_NO_SECKEY

This value indicates that no secret key for the user ID is available.

GPG_ERR_MISSING_CERT

This value indicates that a key could not be imported because the issuer certificate is missing.

GPG_ERR_BAD_CERT_CHAIN

This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

GPG_ERR_UNSUPPORTED_ALGORITHM

This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

GPG_ERR_BAD_SIGNATURE

This value means a verification failed because the signature is bad.

GPG_ERR_NO_PUBKEY

This value means a verification failed because the public key is not available.

GPG_ERR_USER_1

GPG_ERR_USER_2

...

GPG_ERR_USER_16

These error codes are not used by any GnuPG component and can be freely used by other software. Applications using GPGME might use them to mark specific errors returned by callback handlers if no suitable error codes (including the system errors) for these errors exist already.

File: gpgme.info, Node: Error Strings, Prev: Error Codes, Up: Error Handling

5.4 Error Strings

=====

-- Function: `const char * gpgme_strerror (gpgme_error_t ERR)`

The function `gpgme_strerror` returns a pointer to a statically allocated string containing a description of the error code contained in the error value `ERR`. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use `gpgme_strerror_r` in multi-threaded programs.

-- Function: `int gpgme_strerror_r (gpgme_error_t ERR, char *BUF, size_t BUFLen)`

The function `gpgme_strerror_r` returns the error string for `ERR` in the user-supplied buffer `BUF` of size `BUFLen`.

This function is, in

contrast to `gpgme_strerror`, thread-safe if a thread-safe `strerror_r` function is provided by the system. If the function succeeds, 0 is returned and `BUF` contains the string describing the error. If the buffer was not large enough, `ERANGE` is returned and `BUF` contains as much of the beginning of the error string as fits into the buffer.

-- Function: `const char * gpgme_strsource (gpgme_error_t ERR)`

The function `gpgme_strsource` returns a pointer to a statically allocated string containing a description of the error source contained in the error value `ERR`. This string can be used to output a diagnostic message to the user.

The following example illustrates the use of `gpgme_strerror`:

```
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
{
    fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
```

```
    argv[0], gpgme_strerror (err), gpgme_strerror (err));
    exit (1);
}
```

File: gpgme.info, Node: Exchanging Data, Next: Contexts, Prev: Error Handling, Up: Top

6 Exchanging Data

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by GPGME. The user provides and receives the data via `gpgme_data_t` objects, regardless of the communication protocol between GPGME and the crypto engine in use.

-- Data type: `gpgme_data_t`

The `gpgme_data_t` type is a handle for a container for generic data, which is used by GPGME to exchange data with the user.

`gpgme_data_t` objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

-- Data type: `gpgme_off_t`

SINCE: 1.4.1

On POSIX platforms the `gpgme_off_t` type is an alias for `off_t`; it may be used interchangeably. On Windows platforms `gpgme_off_t` is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64 bit signed integer for 64 bit Windows.

-- Data type: `gpgme_ssize_t`

The `gpgme_ssize_t` type is an alias for `ssize_t`. It has only been introduced to overcome portability problems pertaining to the declaration of `ssize_t` by different toolchains.

* Menu:

- * Creating Data Buffers:: Creating new data buffers.
- * Destroying Data Buffers:: Releasing data buffers.
- * Manipulating Data Buffers:: Operations on data buffers.

6.1 Creating Data Buffers

=====

Data

objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

* Menu:

* Memory Based Data Buffers:: Creating memory based data buffers.

* File Based Data Buffers:: Creating file based data buffers.

* Callback Based Data Buffers:: Creating callback based data buffers.

6.1.1 Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source and to its destination, which can often be avoided by using one of the other data object

-- Function: `gpgme_error_t gpgme_data_new (gpgme_data_t *DH)`
The function `gpgme_data_new` creates a new `gpgme_data_t` object

and returns a handle for it in `DH`. The data object is memory based and initially empty.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_mem (gpgme_data_t *DH, const char *BUFFER, size_t SIZE, int COPY)`

The function `gpgme_data_new_from_mem` creates a new `gpgme_data_t` object and fills it with `SIZE` bytes starting from `BUFFER`.

If `COPY` is not zero, a private copy of the data is made. If `COPY` is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains valid for the whole life span of the data object.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `BUFFER` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_file (gpgme_data_t *DH, const char *FILENAME, int COPY)`

The function `gpgme_data_new_from_file` creates a new `gpgme_data_t` object and fills it with the content of the file `FILENAME`.

If `COPY` is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for `COPY` might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `FILENAME` is not a valid pointer, `GPG_ERR_NOT_IMPLEMENTED` if `CODE` is zero, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_filepart (gpgme_data_t *DH, const char *FILENAME, FILE *FP, off_t OFFSET, size_t LENGTH)`

The function `gpgme_data_new_from_filepart` creates a new `gpgme_data_t` object and fills it with a part of the file specified by `FILENAME` or `FP`.

Exactly one of `FILENAME` and `FP` must be non-zero, the other must be zero. The argument that is not zero specifies the file from which `LENGTH` bytes are read into the data object, starting from `OFFSET`.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` and exactly one of `FILENAME` and `FP` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

File: `gpgme.info`, Node: File Based Data Buffers, Next: Callback Based Data Buffers, Prev: Memory Based Data Buffers, Up: Creating Data Buffers

6.1.2 File Based Data Buffers

File based data objects operate directly on file descriptors or streams.

Only a small amount of data is stored

in core at any time, so the size

of the data objects is not limited by GPGME.

-- Function: `gpgme_error_t gpgme_data_new_from_fd (gpgme_data_t *DH,
int FD)`

The function `gpgme_data_new_from_fd` creates a new `gpgme_data_t` object and uses the file descriptor `FD` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_stream
(gpgme_data_t *DH, FILE *STREAM)`

The function `gpgme_data_new_from_stream` creates a new `gpgme_data_t` object and uses the I/O stream `STREAM` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_estream
(gpgme_data_t *DH, gpgmt_stream_t STREAM)`

The function `gpgme_data_new_from_estream` creates

a new

`gpgme_data_t` object and uses the `gpgmt` stream `STREAM` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

File: `gpgme.info`, Node: Callback Based Data Buffers, Prev: File Based Data Buffers, Up: Creating Data Buffers

6.1.3 Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your application, you can implement the functions a data object provides yourself and create a data object from these callback functions.

-- Data type: `ssize_t (*gpgme_data_read_cb_t) (void *HANDLE, void *BUFFER, size_t SIZE)`

The `gpgme_data_read_cb_t` type is the type of functions which GPGME calls if it wants to read data from a user-implemented data object. The function should read up to `SIZE` bytes from the current read position into the space starting at `BUFFER`. The `HANDLE` is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, `ERRNO` should be set to describe the type of the error.

-- Data type: `ssize_t (*gpgme_data_write_cb_t) (void *HANDLE, const void *BUFFER, size_t SIZE)`

The `gpgme_data_write_cb_t` type is the type of functions which GPGME calls if it wants to write data to a user-implemented data object. The function should write up to `SIZE` bytes to the current write position from the space starting at `BUFFER`. The `HANDLE` is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function should return the number of bytes written, and `-1` on error. If an error occurs, `ERRNO` should be set to describe the type of the error.

-- Data type: `off_t (*gpgme_data_seek_cb_t) (void *HANDLE, off_t OFFSET, int WHENCE)`

The `gpgme_data_seek_cb_t` type is the type of functions which GPGME calls if it wants to change the current read/write position in a user-implemented data object, just like the `lseek` function.

The function should return the new read/write position, and `-1` on error. If an error occurs, `ERRNO` should be set to describe the type of the error.

-- Data type: `void (*gpgme_data_release_cb_t) (void *HANDLE)`

The `gpgme_data_release_cb_t` type is the type of functions which GPGME calls if it wants to destroy a user-implemented data object. The `HANDLE` is provided by the user at data object creation time.

-- Data type: `struct gpgme_data_cbs`

This structure is used to store the data callback interface functions described above. It has the following members:

`gpgme_data_read_cb_t read`

This is the function called by GPGME to read data from the data object. It is only required for input data object.

`gpgme_data_write_cb_t write`

This is the function called by GPGME to write data to the data object. It is only required for output data object.

`gpgme_data_seek_cb_t seek`

This is the function called by GPGME to change the current read/write pointer in the data object (if available). It is optional.

gpgme_data_release_cb_t release

This is the function called by GPGME to release a data object.

It is optional.

-- Function: gpgme_error_t gpgme_data_new_from_cbs (gpgme_data_t *DH,
gpgme_data_cbs_t CBS, void *HANDLE)

The function gpgme_data_new_from_cbs creates a new gpgme_data_t object and uses the user-provided callback functions to operate on the data object.

The handle HANDLE is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info, Node: Destroying Data Buffers, Next: Manipulating Data Buffers, Prev: Creating Data Buffers, Up: Exchanging Data

6.2 Destroying Data Buffers

=====

-- Function: void gpgme_data_release (gpgme_data_t DH)

The function gpgme_data_release destroys the data object with the handle DH. It releases all associated resources that were not provided by the user in the first place.

-- Function: char * gpgme_data_release_and_get_mem (gpgme_data_t DH,
size_t *LENGTH)

The function gpgme_data_release_and_get_mem is like gpgme_data_release, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with gpgme_free. In case the user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return NULL. In any case, the data object DH is destroyed.

-- Function: void gpgme_free (void *BUFFER)

SINCE: 1.1.1

The function gpgme_free releases

the memory returned by

`gpgme_data_release_and_get_mem` and `gpgme_pubkey_algo_string`.

It should be used instead of the system libraries `free` function

in case different allocators are used by a program. This is often

the case if `gpgme` is used under Windows as a DLL.

File: `gpgme.info`, Node: Manipulating Data Buffers, Prev: Destroying Data Buffers, Up: Exchanging Data

6.3 Manipulating Data Buffers

=====

Data buffers contain data and meta-data. The following operations can be used to manipulate both.

* Menu:

* Data Buffer I/O Operations:: I/O operations on data buffers.

* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.

* Data Buffer Convenience:: Convenience function for data buffers.

File: `gpgme.info`, Node: Data Buffer I/O Operations, Next: Data Buffer Meta-Data, Up: Manipulating Data Buffers

6.3.1 Data Buffer I/O Operations

-- Function: `ssize_t gpgme_data_read`

(`gpgme_data_t DH`, `void *BUFFER`,
 `size_t LENGTH`)

The function `gpgme_data_read` reads up to `LENGTH` bytes from the data object with the handle `DH` into the space starting at `BUFFER`.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets `ERRNO`.

-- Function: `ssize_t gpgme_data_write` (`gpgme_data_t DH`,
 `const void *BUFFER`, `size_t SIZE`)

The function `gpgme_data_write` writes up to `SIZE` bytes starting from `BUFFER` into the data object with the handle `DH` at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, `ERRNO` is set.

-- Function: `off_t gpgme_data_seek (gpgme_data_t DH, off_t OFFSET, int WHENCE)`

The function `gpgme_data_seek` changes the current read/write position.

The `WHENCE` argument specifies how the `OFFSET` should be interpreted.

It must be one of the following symbolic constants:

`SEEK_SET`

Specifies that `OFFSET` is a count of characters from the beginning of the data object.

`SEEK_CUR`

Specifies that `OFFSET` is a count of characters from the current file position. This count may be positive or negative.

`SEEK_END`

Specifies that `OFFSET` is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with `SEEK_CUR` to read the current read/write position.

If the function fails, `-1` is returned and `ERRNO` is set.

File: `gpgme.info`, Node: Data Buffer Meta-Data, Next: Data Buffer Convenience, Prev: Data Buffer I/O Operations, Up: Manipulating Data Buffers

6.3.2 Data Buffer Meta-Data

-- Function: `char * gpgme_data_get_file_name (gpgme_data_t DH)`
SINCE: 1.1.0

The function `gpgme_data_get_file_name` returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting

or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, NULL will be returned.

-- Function: `gpgme_error_t gpgme_data_set_file_name (gpgme_data_t DH, const char *FILE_NAME)`
SINCE: 1.1.0

The function `gpgme_data_set_file_name` sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code `GPG_ERR_INV_VALUE` if `DH` is not a valid pointer and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Data type: `enum gpgme_data_encoding_t`
The `gpgme_data_encoding_t` type specifies the encoding of a `gpgme_data_t` object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

`GPGME_DATA_ENCODING_NONE`

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

`GPGME_DATA_ENCODING_BINARY`

This specifies that the data is encoding in binary form; i.e. there is no special encoding.

`GPGME_DATA_ENCODING_BASE64`

This specifies that the data is encoded using the Base-64 encoding scheme as used by MIME and other protocols.

`GPGME_DATA_ENCODING_ARMOR`

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

`GPGME_DATA_ENCODING_MIME`

SINCE: 1.7.0

This specifies that the data is encoded as a MIME part.

GPGME_DATA_ENCODING_URL

SINCE: 1.2.0

The data is a list of linefeed delimited URLs. This is only useful with `gpgme_op_import`.

GPGME_DATA_ENCODING_URL0

SINCE: 1.2.0

The data is a list of binary zero delimited URLs. This is only useful with `gpgme_op_import`.

GPGME_DATA_ENCODING_URLESC

SINCE: 1.2.0

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is not yet implemented.

-- Function: `gpgme_data_encoding_t gpgme_data_get_encoding (gpgme_data_t DH)`

The function `gpgme_data_get_encoding` returns the encoding of the data object with the handle `DH`. If `DH` is not a valid pointer (e.g. `NULL`) `GPGME_DATA_ENCODING_NONE` is returned.

-- Function: `gpgme_error_t gpgme_data_set_encoding (gpgme_data_t DH, gpgme_data_encoding_t ENC)`

The function `gpgme_data_set_encoding` changes the encoding of the data object with the handle `DH` to `ENC`.

-- Function: `gpgme_error_t gpgme_data_set_flag (gpgme_data_t DH, const char *NAME, const char *VALUE)`

SINCE: 1.7.0

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for `NAME`:

size-hint

The value is a decimal number with the length `gpgme` shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the application knows the total size of the data. If this is set

the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

This function returns 0 on success.

File: gpgme.info, Node: Data Buffer Convenience, Prev: Data Buffer Meta-Data, Up: Manipulating Data Buffers

6.3.3 Data Buffer Convenience Functions

-- Data type: enum gpgme_data_type_t
SINCE: 1.4.3

The gpgme_data_type_t type is used to return the detected type of the content of a data buffer.

GPGME_DATA_TYPE_INVALID

This is returned by gpgme_data_identify if it was not possible to identify the data. Reasons for this might be a non-seekable stream

or a memory problem. The value is 0.

GPGME_DATA_TYPE_UNKNOWN

The type of the data is not known.

GPGME_DATA_TYPE_PGP_SIGNED

The data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.

GPGME_DATA_TYPE_PGP_ENCRYPTED

SINCE: 1.7.0

The data is an OpenPGP encrypted message.

GPGME_DATA_TYPE_PGP_SIGNATURE

SINCE: 1.7.0

The data is an OpenPGP detached signature.

GPGME_DATA_TYPE_PGP_OTHER

This is a generic OpenPGP message. In most cases this will be encrypted data.

GPGME_DATA_TYPE_PGP_KEY

This is an OpenPGP key (private or public).

GPGME_DATA_TYPE_CMS_SIGNED

This is a CMS signed message.

GPGME_DATA_TYPE_CMS_ENCRYPTED

This is a CMS encrypted (enveloped data) message.

GPGME_DATA_TYPE_CMS_OTHER

This is used for other CMS message types.

GPGME_DATA_TYPE_X509_CERT

The data is a X.509 certificate
GPGME_DATA_TYPE_PKCS12

The data is a PKCS#12 message. This
is commonly used to exchange
private keys for X.509.

-- Function: gpgme_data_type_t gpgme_data_identify (gpgme_data_t DH)
SINCE: 1.4.3

The function gpgme_data_identify returns the type of the data
with the handle DH. If it is not possible to perform the
identification, the function returns zero
(GPGME_DATA_TYPE_INVALID). Note that depending on how the data
object has been created the identification may not be possible or
the data object may change its internal state (file pointer moved).
For file or memory based data object, the state should not change.

File: gpgme.info, Node: Contexts, Next: UI Server Protocol, Prev: Exchanging Data, Up: Top

7 Contexts

All cryptographic operations in GPGME are performed within a context,
which contains the internal state of the operation as well as
configuration parameters. By using several contexts you can run several
cryptographic operations in parallel, with different configuration.

-- Data type: gpgme_ctx_t

The gpgme_ctx_t type is a handle for a GPGME context, which is
used to hold the configuration, status and result of cryptographic
operations.

* Menu:

- * Creating Contexts:: Creating new GPGME contexts.
- * Destroying Contexts:: Releasing GPGME contexts.
- * Result Management:: Managing the result of crypto operations.
- * Context Attributes:: Setting properties of a context.
- * Key Management:: Managing keys with GPGME.
- * Crypto Operations:: Using a context for cryptography.
- * Miscellaneous:: Miscellaneous operations
- * Run Control:: Controlling how operations are run.

File: gpgme.info, Node: Creating Contexts, Next: Destroying Contexts, Up: Contexts

7.1 Creating Contexts

=====

-- Function: `gpgme_error_t gpgme_new (gpgme_ctx_t *CTX)`
The function `gpgme_new` creates a new `gpgme_ctx_t` object and returns a handle for it in `CTX`.

The function returns the error code `GPG_ERR_NO_ERROR` if the context was successfully created, `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available. Also, it returns `GPG_ERR_NOT_OPERATIONAL` if `gpgme_check_version` was not called to initialize GPGME, and `GPG_ERR_SELFTEST_FAILED` if a selftest failed. Currently, the only selftest is for Windows MingW32 targets to see if `-mms-bitfields` was used (as required).

File: `gpgme.info`, Node: Destroying Contexts, Next: Result Management, Prev: Creating Contexts, Up: Contexts

7.2 Destroying Contexts

=====

-- Function: `void gpgme_release (gpgme_ctx_t CTX)`
The function `gpgme_release` destroys the context with the handle `CTX` and releases all associated resources.

File: `gpgme.info`, Node: Result Management, Next: Context Attributes, Prev: Destroying Contexts, Up: Contexts

7.3 Result Management

=====

The detailed result of an operation is returned in operation-specific structures such as `gpgme_decrypt_result_t`. The corresponding retrieval functions such as `gpgme_op_decrypt_result` provide static access to the results after an operation completes. Those structures shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context and give it a lifetime beyond that of the current operation or context.

-- Function: `void gpgme_result_ref (void *RESULT)`
SINCE: 1.2.0

The function `gpgme_result_ref` acquires an additional reference for the result `RESULT`, which may be of any type `gpgme_*_result_t`. As long as the user holds a reference, the result structure is

guaranteed to be valid and unmodified.

-- Function: void gpgme_result_unref (void *RESULT)
SINCE: 1.2.0

The function gpgme_result_unref releases a reference for the result RESULT. If this was the last reference, the result structure will be destroyed and all resources associated to it will be released.

Note that a context may hold its own references to result structures, typically until the context is destroyed or the next operation is started. In fact, these references are accessed through the gpgme_op_*_result functions.

File: gpgme.info, Node: Context Attributes, Next: Key Management, Prev: Result Management, Up: Contexts

7.4 Context Attributes

=====

* Menu:

- * Protocol Selection:: Selecting the protocol used by a context.
- * Crypto Engine:: Configuring the crypto engine.
- * Setting the Sender:: How to tell the engine the sender.
- * ASCII Armor:: Requesting ASCII armored output.
- * Text Mode:: Choosing canonical text mode.
- * Offline Mode:: Choosing offline mode.
- * Pinentry Mode:: Choosing the pinentry mode.
- * Included Certificates:: Including a number of certificates.
- * Key Listing Mode:: Selecting key listing mode.
- * Passphrase Callback:: Getting the passphrase from the user.
- * Progress Meter Callback:: Being informed about the progress.
- * Status Message Callback:: Status messages received from gpg.
- * Context Flags:: Additional flags for a context.
- * Locale:: Setting the locale of a context.
- * Additional Logs:: Additional logs of a context.

File: gpgme.info, Node: Protocol Selection, Next: Crypto Engine, Up: Context Attributes

7.4.1 Protocol Selection

-- Function: gpgme_error_t gpgme_set_protocol (gpgme_ctx_t CTX,

gpgme_protocol_t PROTO)

The function `gpgme_set_protocol` sets the protocol used within the context `CTX` to `PROTO`. All crypto operations will be performed by the crypto engine configured for that protocol. *Note

Protocols

and Engines::.

Setting the protocol with `gpgme_set_protocol` does intentionally not check if the crypto engine for that protocol is available and installed correctly. *Note Engine Version Check::.

The function returns the error code `GPG_ERR_NO_ERROR` if the protocol could be set successfully, and `GPG_ERR_INV_VALUE` if `PROTOCOL` is not a valid protocol.

-- Function: `gpgme_protocol_t gpgme_get_protocol (gpgme_ctx_t CTX)`

The function `gpgme_get_protocol` retrieves the protocol currently use with the context `CTX`.

File: `gpgme.info`, Node: Crypto Engine, Next: Setting the Sender, Prev: Protocol Selection, Up: Context Attributes

7.4.2 Crypto Engine

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context. *Note Engine Information::. The default can also be changed globally. *Note Engine Configuration::.

-- Function: `gpgme_engine_info_t gpgme_ctx_get_engine_info (gpgme_ctx_t CTX)`
SINCE: 1.1.0

The function `gpgme_ctx_get_engine_info` returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context `CTX`.

The result is valid until the next invocation of `gpgme_ctx_set_engine_info` for this particular context.

This function can not fail.

-- Function: `gpgme_error_t gpgme_ctx_set_engine_info (gpgme_ctx_t CTX,`

```
gpgme_protocol_t PROTO, const char *FILE_NAME,  
const char *HOME_DIR)  
SINCE: 1.1.0
```

The function `gpgme_ctx_set_engine_info` changes the configuration of the crypto engine implementing the protocol `PROTO` for the context `CTX`.

`FILE_NAME` is the file name of the executable program implementing this protocol, and `HOME_DIR` is the directory name of the configuration directory for this crypto engine. If `HOME_DIR` is `NULL`, the engines default will be used.

Currently this function must be used before starting the first crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context `CTX`.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

File: `gpgme.info`, Node: Setting the Sender, Next: ASCII Armor, Prev: Crypto Engine, Up: Context Attributes

7.4.3 How to tell the engine the sender.

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. GPGME provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not supported.

```
-- Function: gpgme_error_t  
gpgme_set_sender (gpgme_ctx_t CTX,  
int ADDRESS)
```

SINCE: 1.8.0

The function `gpgme_set_sender` specifies the sender address for use in sign and verify operations. `ADDRESS` is expected to be the `addr-spec` part of an address but may also be a complete mailbox address, in which case this function extracts the `addr-spec` from it. Using `NULL` for `ADDRESS` clears the sender address.

The function returns 0 on success or an error code on failure. The

most likely failure is that no valid addr-spec was found in ADDRESS.

-- Function: const char * gpgme_get_sender (gpgme_ctx_t CTX)

SINCE: 1.8.0

The function gpgme_get_sender returns the current sender address from the context, or NULL if none was set. The returned value is valid as long as the CTX is valid and gpgme_set_sender has not been called again.

File: gpgme.info, Node: ASCII Armor, Next: Text Mode, Prev: Setting the Sender, Up: Context Attributes

7.4.4

ASCII Armor

-- Function: void gpgme_set_armor (gpgme_ctx_t CTX, int YES)

The function gpgme_set_armor specifies if the output should be ASCII armored. By default, output is not ASCII armored.

ASCII armored output is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme_get_armor (gpgme_ctx_t CTX)

The function gpgme_get_armor returns 1 if the output is ASCII armored, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Text Mode, Next: Offline Mode, Prev: ASCII Armor, Up: Context Attributes

7.4.5 Text Mode

-- Function: void gpgme_set_textmode (gpgme_ctx_t CTX, int YES)

The function gpgme_set_textmode specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme_get_textmode (gpgme_ctx_t CTX)

The function gpgme_get_textmode returns 1 if canonical text mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Offline Mode, Next: Pinentry Mode, Prev: Text Mode, Up: Context Attributes

7.4.6 Offline Mode

-- Function: void gpgme_set_offline (gpgme_ctx_t CTX, int YES)

SINCE: 1.6.0

The function gpgme_set_offline specifies if offline mode should be used. Offline mode is disabled if YES is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode GPGME_KEYLIST_MODE_VALIDATE.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

-- Function: int gpgme_get_offline (gpgme_ctx_t CTX)

SINCE: 1.6.0

The function gpgme_get_offline returns 1 if offline mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Pinentry Mode, Next: Included Certificates, Prev: Offline Mode, Up: Context Attributes

7.4.7

Pinentry Mode

-- Function: `gpgme_error_t gpgme_set_pinentry_mode (gpgme_ctx_t CTX, gpgme_pinentry_mode_t MODE)`

SINCE: 1.4.0

The function `gpgme_set_pinentry_mode` specifies the pinentry mode to be used.

For GnuPG \geq 2.1 this option is required to be set to `GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback mechanism in GPGME through `gpgme_set_passphrase_cb`.

-- Function: `gpgme_pinentry_mode_t gpgme_get_pinentry_mode (gpgme_ctx_t CTX)`

SINCE: 1.4.0

The function `gpgme_get_pinentry_mode` returns the mode set for the context.

-- Data type: enum `gpgme_pinentry_mode_t`

SINCE: 1.4.0

The `gpgme_pinentry_mode_t` type specifies the set of possible pinentry modes that are supported by GPGME if GnuPG \geq 2.1 is used. The following modes are supported:

`GPGME_PINENTRY_MODE_DEFAULT`

SINCE: 1.4.0

Use the default of the agent, which is ask.

`GPGME_PINENTRY_MODE_ASK`

SINCE: 1.4.0

Force the use of the Pinentry.

`GPGME_PINENTRY_MODE_CANCEL`

SINCE: 1.4.0

Emulate use of Pinentry's cancel button.

`GPGME_PINENTRY_MODE_ERROR`

SINCE: 1.4.0

Return a Pinentry error No Pinentry.

GPGME_PINENTRY_MODE_LOOPBACK

SINCE: 1.4.0

Redirect Pinentry queries to the caller. This enables the use of `gpgme_set_passphrase_cb` because pinentry queries are redirected to `gpgme`.

Note: For 2.1.0 - 2.1.12 this mode requires `allow-loopback-pinentry` to be enabled in the `gpg-agent.conf` or an agent started with that option.

File: `gpgme.info`, Node: Included Certificates, Next: Key Listing Mode, Prev: Pinentry Mode, Up: Context Attributes

7.4.8 Included Certificates

-- Function: `void gpgme_set_include_certs (gpgme_ctx_t CTX, int NR_OF_CERTS)`

The function `gpgme_set_include_certs` specifies how many certificates should be included in an S/MIME signed message. By default, only the senders certificate is included. The possible values of `NR_OF_CERTS` are:

GPGME_INCLUDE_CERTS_DEFAULT

SINCE: 1.0.3

Fall back to the default of the crypto backend. This is the default for GPGME.

-2

Include all certificates except the root certificate.

-1

Include all certificates.

0

Include no certificates.

1

Include the senders certificate only.

n

Include the first n certificates of the certificates path, starting from the senders certificate. The number n must be positive.

Values of `NR_OF_CERTS` smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by all other engines.

-- Function: int gpgme_get_include_certs (gpgme_ctx_t CTX)

The function gpgme_get_include_certs returns the number of certificates to include into an S/MIME signed message.

File: gpgme.info, Node: Key Listing Mode, Next: Passphrase Callback, Prev: Included Certificates, Up: Context Attributes

7.4.9 Key Listing Mode

-- Function: gpgme_error_t gpgme_set_keylist_mode (gpgme_ctx_t CTX, gpgme_keylist_mode_t MODE)

The function gpgme_set_keylist_mode changes the default behaviour of the key listing functions. The value in MODE is a bitwise-or combination of one or multiple of the following bit values:

GPGME_KEYLIST_MODE_LOCAL

The GPGME_KEYLIST_MODE_LOCAL symbol specifies that the local keyring should be searched for keys in the keylisting operation. This is the default.

Using only this option results in a --list-keys.

GPGME_KEYLIST_MODE_EXTERN

The GPGME_KEYLIST_MODE_EXTERN symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with GPGME_KEYLIST_MODE_LOCAL. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a --search-keys for GPGME_PROTOCOL_OpenPGP and something similar to --list-external-keys for GPGME_PROTOCOL_CMS.

GPGME_KEYLIST_MODE_LOCATE

This is a shortcut for the combination of GPGME_KEYLIST_MODE_LOCAL and GPGME_KEYLIST_MODE_EXTERN, which results in a --locate-keys for GPGME_PROTOCOL_OpenPGP.

GPGME_KEYLIST_MODE_SIGS

The GPGME_KEYLIST_MODE_SIGS symbol specifies that the key

signatures should be included in the listed keys.

GPGME_KEYLIST_MODE_SIG_NOTATIONS

SINCE: 1.1.1

The GPGME_KEYLIST_MODE_SIG_NOTATIONS symbol specifies that the signature notations on key signatures should be included

in the listed keys. This only works if GPGME_KEYLIST_MODE_SIGS is also enabled.

GPGME_KEYLIST_MODE_WITH_TOFU

SINCE: 1.7.0

The GPGME_KEYLIST_MODE_WITH_TOFU symbol specifies that information pertaining to the TOFU trust model should be included in the listed keys.

GPGME_KEYLIST_MODE_WITH_KEYGRIP

SINCE: 1.14.0

The GPGME_KEYLIST_MODE_WITH_KEYRIP symbol specifies that the keygrip is always included in the listing. The default depends on the version of the backend and the used protocol.

GPGME_KEYLIST_MODE_WITH_SECRET

SINCE: 1.5.1

The GPGME_KEYLIST_MODE_WITH_SECRET returns information about the presence of a corresponding secret key in a public key listing. A public key listing with this mode is slower than a standard listing but can be used instead of a second run to list the secret keys.

This is only supported for GnuPG

versions \geq 2.1. Note that using this option also makes sure that the keygrip is available in the output.

GPGME_KEYLIST_MODE_EPHEMERAL

SINCE: 1.2.0

The GPGME_KEYLIST_MODE_EPHEMERAL symbol specifies that keys flagged as ephemeral are included in the listing.

GPGME_KEYLIST_MODE_VALIDATE

SINCE: 0.4.5

The GPGME_KEYLIST_MODE_VALIDATE symbol specifies that the backend should do key or certificate validation and not just

get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

At least one of `GPGME_KEYLIST_MODE_LOCAL` and `GPGME_KEYLIST_MODE_EXTERN` must be specified. For future binary compatibility, you should get the current mode with `gpgme_get_keylist_mode` and modify it by setting or clearing the appropriate bits, and then using that calculated value in the `gpgme_set_keylisting_mode` operation. This will leave all other bits in the mode value intact (in particular those that are not used in the current version of the library).

The function returns the error code `GPG_ERR_NO_ERROR` if the mode could be set correctly, and `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer or `MODE` is not a valid mode.

-- Function: `gpgme_keylist_mode_t gpgme_get_keylist_mode (gpgme_ctx_t CTX)`

The function `gpgme_get_keylist_mode` returns the current key listing mode of the context `CTX`. This value can then be modified and used in a subsequent `gpgme_set_keylist_mode` operation to only affect the desired bits (and leave all others intact).

The function returns 0 if `CTX` is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

File: `gpgme.info`, Node: Passphrase

Callback, Next: Progress Meter Callback, Prev: Key Listing Mode, Up: Context Attributes

7.4.10 Passphrase Callback

-- Data type: `gpgme_error_t (*gpgme_passphrase_cb_t)(void *HOOK, const char *UID_HINT, const char *PASSPHRASE_INFO, int PREV_WAS_BAD, int FD)`

The `gpgme_passphrase_cb_t` type is the type of functions usable as passphrase callback function.

The argument `UID_HINT` might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), `UID_HINT` will be `NULL`.

The argument `PASSPHRASE_INFO`, if not `NULL`, will give further

information about the context in which the passphrase is required.
This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then `PREV_WAS_BAD` is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor `FD`. The function `gpgme_io_writen` should be used for the write operation. Note that if the user returns 0 to indicate success, the user must at least write a newline character before returning from the callback.

If an error occurs, return the corresponding `gpgme_error_t` value. You can use the error code `GPG_ERR_CANCELED` to abort the operation. Otherwise, return 0.

Note: The `passphrase_cb` only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See `gpgme_set_pinentry_mode` for more details on 2.1.x usage.

```
-- Function: void gpgme_set_passphrase_cb (gpgme_ctx_t CTX,  
      gpgme_passphrase_cb_t PASSFUNC, void *HOOK_VALUE)  
The function gpgme_set_passphrase_cb sets the function that is used when a passphrase needs to be provided by the user to PASSFUNC. The function PASSFUNC needs to be implemented by the user, and whenever it is called, it is called with its first argument being HOOK_VALUE. By default, no passphrase callback function is set.
```

Not all crypto engines require this callback to retrieve the passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not even support an external passphrase callback at all, in this case the error code `GPG_ERR_NOT_SUPPORTED` is returned.

For GnuPG \geq 2.1 the pinentry mode has to be set to `GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback. See `gpgme_set_pinentry_mode`.

The user can disable the use of a passphrase callback function by calling `gpgme_set_passphrase_cb` with `PASSFUNC` being `NULL`.

```
-- Function: void gpgme_get_passphrase_cb (gpgme_ctx_t CTX,  
      gpgme_passphrase_cb_t *PASSFUNC, void **HOOK_VALUE)
```

The function `gpgme_get_passphrase_cb` returns the function that is used when a passphrase needs to be provided by the user in `*PASSFUNC`, and the first argument for this function in `*HOOK_VALUE`. If no passphrase callback is set, or `CTX` is not a valid pointer, `NULL` is returned in both variables.

`PASSFUNC` or `HOOK_VALUE` can be `NULL`. In this case, the corresponding value will not be returned.

File: `gpgme.info`, Node: Progress Meter Callback, Next: Status Message Callback, Prev: Passphrase Callback, Up: Context Attributes

7.4.11 Progress Meter Callback

-- Data type: `void (*gpgme_progress_cb_t)(void *HOOK, const char *WHAT, int TYPE, int CURRENT, int TOTAL)`

The `gpgme_progress_cb_t` type is the type of functions usable as progress callback function.

The arguments are specific to the crypto engine. More information about the progress information returned from the GnuPG engine can be found in the GnuPG source code in the file `doc/DETAILS` in the section `PROGRESS`.

-- Function: `void gpgme_set_progress_cb (gpgme_ctx_t CTX, gpgme_progress_cb_t PROGFUNC, void *HOOK_VALUE)`
The function `gpgme_set_progress_cb` sets the function that is used when progress information about a cryptographic operation is available. The function `PROGFUNC` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `HOOK_VALUE`. By default, no progress callback function is set.

Setting a callback function allows an interactive program to display progress information about a long operation to the user.

The user can disable the use of a progress callback function by calling `gpgme_set_progress_cb` with `PROGFUNC` being `NULL`.

-- Function: `void gpgme_get_progress_cb (gpgme_ctx_t CTX, gpgme_progress_cb_t *PROGFUNC, void **HOOK_VALUE)`
The function `gpgme_get_progress_cb` returns the function that is used to inform the user about the progress made in `*PROGFUNC`, and the first argument for this function in `*HOOK_VALUE`. If no

progress callback is set, or CTX is not a valid pointer, NULL is returned in both variables.

PROG_FUNC or HOOK_VALUE can be NULL. In this case, the corresponding value will not be returned.

File: gpgme.info, Node: Status Message Callback, Next: Context Flags, Prev: Progress Meter Callback, Up: Context Attributes

7.4.12 Status Message Callback

-- Data type: gpgme_error_t (*gpgme_status_cb_t)(void *HOOK, const char *KEYWORD, const char *ARGS)

The gpgme_status_cb_t type is the type of function usable as a status message callback function.

The argument KEYWORD is the name of the status message while the ARGS argument contains any arguments for the status message.

If an error occurs, return the corresponding gpgme_error_t value. Otherwise, return 0.

-- Function: void gpgme_set_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t STATUSFUNC, void *HOOK_VALUE)
SINCE: 1.6.0

The function gpgme_set_status_cb sets the function that is used when a status message is received from gpg to STATUSFUNC. The function STATUSFUNC needs to be implemented by the user, and whenever it is called, it is called with its first argument being HOOK_VALUE. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling gpgme_set_status_cb with STATUSFUNC being NULL.

-- Function: void gpgme_get_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t *STATUSFUNC, void **HOOK_VALUE)
SINCE: 1.6.0

The function gpgme_get_status_cb returns the function that is used to process status messages from gpg in *STATUSFUNC, and the first argument for this function in *HOOK_VALUE. If no status message callback

is set, or CTX is not a valid pointer, NULL is returned in both variables.

File: gpgme.info, Node: Context Flags, Next: Locale, Prev: Status Message Callback, Up: Context Attributes

7.4.13 Context Flags

-- Function: gpgme_error_t gpgme_set_ctx_flag (gpgme_ctx_t CTX,
const char *NAME, const char *VALUE)

SINCE: 1.7.0

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for NAME:

"redraw"

This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a Pinentry. A Curses based application may use this information to redraw the screen; for example:

```
err = gpgme_op_keylist_start (ctx, "foo@example.org", 0);
while
(!err)
{
err = gpgme_op_keylist_next (ctx, &key);
if (err)
break;
show_key (key);
gpgme_key_release (key);
}
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
redraw_screen ();
gpgme_release (ctx);
```

"full-status"

Using a VALUE of "1" the status callback set by gpgme_set_status_cb returns all status lines with the exception of PROGRESS lines. With the default of "0" the status callback is only called in certain situations.

"raw-description"

Setting the VALUE to "1" returns human readable strings in a raw format. For example the non breaking space characters

("~") will not be removed from the description field of the gpgme_tofu_info_t object.

"export-session-key"

Using a VALUE of "1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for VALUE, session keys are not exported.

"override-session-key"

The string given in VALUE is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via ps(1).

"auto-key-retrieve"

Setting the VALUE to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can

see which keys

you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

"auto-key-import"

Setting the VALUE to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

"include-key-block"

Setting the VALUE to "1" forces the GPG backend to embed the signing key as well as an encryption subkey into the the signature.

"request-origin"

The string given in VALUE is passed to the GnuPG engines to request restrictions based on the origin of the request.

Valid values are documented in the GnuPG manual and the gpg man page under the option --request-origin. Requires at least GnuPG 2.2.6 to have an effect.

"no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

"ignore-mdc-error"

This flag passes the option `--ignore-mdc-error` to `gpg`. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag `legacy_cipher_nomdc` set. For failsafe reasons this flag is reset after each operation.

"auto-key-locate"

The string given in `VALUE` is passed to `gpg`. This can be used to change the behavior of a `GPGME_KEYLIST_MODE_LOCATE` keylisting. Valid values are documented in the GnuPG manual and the `gpg` man page under the option `--auto-key-locate`. Requires at least GnuPG 2.1.18.

Note: Keys retrieved through `auto-key-locate` are automatically imported in the keyring.

trust-model

SINCE: 1.11.2

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default. If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail. Example: `"tofu+pgp"`.

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future operations. A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

"extended-edit"

This flag passes the option `--expert` to `gpg` key edit. This can be used to get additional callbacks in `gpgme_op_edit`.

This function returns 0 on success.

-- Function: `const char * gpgme_get_ctx_flag (gpgme_ctx_t CTX,`

const char *NAME)

SINCE: 1.8.0

The value of flags settable by `gpgme_set_ctx_flag` can be retrieved by this function. If `NAME` is unknown the function returns `NULL`. For boolean flags an empty string is returned for False and the string "1" is returned for True; either `atoi(3)` or a test for an empty string can be used to get the boolean value.

File: `gpgme.info`, Node: `Locale`, Next: `Additional Logs`, Prev: `Context Flags`, Up: `Context Attributes`

7.4.14 Locale

A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

```
-- Function: gpgme_error_t
gpgme_set_locale (gpgme_ctx_t CTX,
                 int CATEGORY, const char *VALUE)
SINCE: 0.4.3
```

The function `gpgme_set_locale` sets the locale of the context `CTX`, or the default locale if `CTX` is a null pointer.

The locale settings that should be changed are specified by `CATEGORY`. Supported categories are `LC_CTYPE`, `LC_MESSAGES`, and `LC_ALL`, which is a wildcard you can use if you want to change all the categories at once.

The value to be used for the locale setting is `VALUE`, which will be copied to GPGMEs internal data structures. `VALUE` can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default

value at startup.

The function returns an error if not enough memory is available.

File: gpgme.info, Node: Additional Logs, Prev: Locale, Up: Context Attributes

7.4.15 Additional Logs

Additional logs can be associated with a context. These logs are engine specific and can be obtained with `gpgme_op_getauditlog`.

-- Function: `gpgme_error_t gpgme_op_getauditlog (gpgme_ctx_t CTX, gpgme_data_t OUTPUT, unsigned int FLAGS)`

SINCE: 1.1.1

The function `gpgme_op_getauditlog` is used to obtain additional logs as specified by `FLAGS` into the `OUTPUT` data. If

The function returns the error code `GPG_ERR_NO_ERROR` if a log could be queried from the engine, and `GPG_ERR_NOT_IMPLEMENTED` if the log specified in `FLAGS` is not available for this engine. If no log is available `GPG_ERR_NO_DATA` is returned.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_AUDITLOG_DIAG`

SINCE: 1.11.2

Obtain diagnostic output which would be written to `stderr` in interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and `GPG_ERR_NO_DATA` will be returned.

Implemented for: `GPGME_PROTOCOL_OpenPGP`

`GPGME_AUDITLOG_DEFAULT`

SINCE: 1.11.2

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the `GETAUDITLOG` command. For `GPGME_PROTOCOL_CMS` this provides additional information about the X509 certificate chain.

Implemented for: GPGME_PROTOCOL_CMS

GPGME_AUDITLOG_HTML

SINCE: 1.1.1

Same as GPGME_AUDITLOG_DEFAULT but in HTML.

Implemented for: GPGME_PROTOCOL_CMS

-- Function: gpgme_error_t
gpgme_op_getauditlog_start (gpgme_ctx_t CTX,
gpgme_data_t OUTPUT, unsigned int FLAGS)
SINCE: 1.1.1

This is the asynchronous variant of gpgme_op_getauditlog.

File: gpgme.info, Node: Key Management, Next: Crypto Operations, Prev: Context Attributes, Up: Contexts

7.5 Key Management

=====

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

* Menu:

- * Key objects:: Description of the key structures.
- * Listing Keys:: Browsing the list of available keys.
- * Information About Keys:: Requesting detailed information about keys.
- * Manipulating Keys:: Operations on keys.
- * Generating Keys:: Creating new key pairs.
- * Signing Keys:: Adding key signatures to public keys.
- * Exporting Keys:: Retrieving key data from the key ring.
- * Importing Keys:: Adding keys to the key ring.
- * Deleting Keys:: Removing keys from the key ring.
- * Changing Passphrases:: Change the passphrase of a key.
- * Changing TOFU Data:: Changing data pertaining to TOFU.
- * Advanced Key Editing:: Advanced key edit operation.

File: gpgme.info, Node: Key objects, Next: Listing Keys, Up: Key Management

7.5.1 Key objects

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

-- Data type: `gpgme_key_t`

The `gpgme_key_t` type is a pointer to a key object. It has the following members:

`gpgme_keylist_mode_t keylist_mode`
SINCE: 0.9.0

The keylist mode that was active when the key was retrieved.

`unsigned int revoked : 1`
This is true if the key is revoked.

`unsigned int expired : 1`
This is true if the key is expired.

`unsigned int disabled : 1`
This is true if the key is disabled.

`unsigned int invalid : 1`
This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

`unsigned int can_encrypt : 1`
This is true if the key (ie one of its subkeys) can be used for encryption.

`unsigned int can_sign : 1`
This is true if the key (ie one of its subkeys) can be used to create data signatures.

`unsigned int can_certify : 1`
This is true if the key (ie one of its subkeys) can be used to create key certificates.

`unsigned int can_authenticate : 1`
SINCE: 0.4.5

This is true

if the key (ie one of its subkeys) can be used
for authentication.

unsigned int is_qualified : 1
SINCE: 1.1.0

This is true if the key can be used for qualified signatures
according to local government regulations.

unsigned int secret : 1

This is true if the key is a secret key. Note, that this will
always be true even if the corresponding subkey flag may be
false (offline/stub keys). This is only set if a listing of
secret keys has been requested or if
GPGME_KEYLIST_MODE_WITH_SECRET is active.

unsigned int origin : 5
SINCE: 1.8.0

Reserved for the origin of this key.

gpgme_protocol_t protocol

This is the protocol supported by this key.

char *issuer_serial

If protocol is GPGME_PROTOCOL_CMS, then this is the issuer
serial.

char *issuer_name

If protocol is GPGME_PROTOCOL_CMS, then this is the issuer
name.

char *chain_id

If protocol is GPGME_PROTOCOL_CMS, then this is the chain
ID, which can be used to build the certificate chain.

gpgme_validity_t owner_trust

If protocol is GPGME_PROTOCOL_OpenPGP, then this is the
owner trust.

gpgme_subkey_t subkeys

This is a linked list with the subkeys of the key. The first
subkey in the list is the primary key and usually available.

gpgme_user_id_t uids

This is a linked list with the user IDs of the key. The first
user ID in the list is the main (or primary) user ID.

char *fpr
SINCE: 1.7.0

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

unsigned long last_update

SINCE: 1.8.0

Reserved for the time of the last update of this key.

-- Data type: gpgme_subkey_t
SINCE: 1.5.0

The gpgme_subkey_t type is a pointer to a subkey structure. Subkeys are one component of a gpgme_key_t object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One gpgme_key_t can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

gpgme_subkey_t next

This is a pointer to the next subkey structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1

This is true if the subkey is revoked.

unsigned int expired : 1

This is true if the subkey is expired.

unsigned int disabled : 1

This is true if the subkey is disabled.

unsigned int

invalid : 1

This is true if the subkey is invalid.

unsigned int can_encrypt : 1

This is true if the subkey can be used for encryption.

unsigned int can_sign : 1

This is true if the subkey can be used to create data signatures.

unsigned int can_certify : 1

This is true if the subkey can be used to create key certificates.

unsigned int can_authenticate : 1

SINCE: 0.4.5

This is true if the subkey can be used for authentication.

unsigned int is_qualified : 1

SINCE: 1.1.0

This is true if the subkey can be used for qualified signatures according to local government regulations.

unsigned int is_de_vs : 1

SINCE: 1.8.0

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a Brainpool curve.

unsigned int secret : 1

This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if GPGME_KEYLIST_MODE_WITH_SECRET is active.

gpgme_pubkey_algo_t pubkey_algo

This is the public key algorithm supported by this subkey.

unsigned int length

This is the length of the subkey (in bits).

char *keyid

This is the key ID of the subkey in hexadecimal digits.

char *fpr

This is the fingerprint of the subkey in hexadecimal digits, if available.

char *keygrip

SINCE: 1.7.0

The keygrip of the subkey in hex digit form or NULL if not available.

long int timestamp

This is the creation timestamp of the subkey.

This is -1 if

the timestamp is invalid, and 0 if it is not available.

long int expires

This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

unsigned int is_cardkey : 1

SINCE: 1.2.0

True if the secret key is stored on a smart card.

char *card_number

SINCE: 1.2.0

The serial number of a smart card holding this key or NULL.

char *curve

For ECC algorithms the name of the curve.

-- Data type: gpgme_user_id_t

A user ID is a component of a gpgme_key_t object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

gpgme_user_id_t next

This is a pointer to the next user ID structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1

This is true if the user ID is revoked.

unsigned int invalid : 1

This is true if the user ID is invalid.

gpgme_validity_t validity

This specifies the validity of the user ID.

char *uid

This is the user ID string.

char *name

This is the name component of uid, if available.

char *comment

This is the comment component of uid, if available.

char *email

This is the email component of uid, if available.

char *address;

The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the email part of this structure but might be slightly different. If no mail address is available NULL is stored.

gpgme_tofu_info_t tofu

SINCE: 1.7.0

If not NULL information from the TOFU database pertaining to this user id.

gpgme_key_sig_t signatures

This is a linked list with the signatures on this user ID.

unsigned int origin :

5

SINCE: 1.8.0

Reserved for the origin of this user ID.

unsigned long last_update

SINCE: 1.8.0

Reserved for the time of the last update of this user ID.

char *uidhash;

A string used by gpg to identify a user ID. This string can be used at certain prompts of gpgme_op_edit to select a user ID. Users must be prepared to see a NULL value here. The format of the value is not specified and may depend on the GPGME or GnuPG version.

-- Data type: gpgme_tofu_info_t

SINCE: 1.7.0

The `gpgme_tofu_info_t` type is a pointer to a `tofu info` structure. `Tofu info` structures are one component of a `gpgme_user_id_t` object, and provide information from the TOFU database pertaining to the user ID.

The `tofu info` structure has the following members:

`gpgme_key_sig_t next`

This is a pointer to the next `tofu info` structure in the linked list, or `NULL` if this is the last element.

`unsigned int validity : 3`

This is the TOFU validity. It can have the following values:

0

The value 0 indicates a conflict.

1

The value 1 indicates a key without history.

2

The value 2 indicates a key with too little history.

3

The value 3 indicates a key with enough history for basic trust.

4

The value 4 indicates a key with a lot of history.

`unsigned int policy : 4`

This is the TOFU policy, see `gpgme_tofu_policy_t`.

`unsigned short signcount`

This is the number of signatures seen for this binding (or `USHRT_MAX` if there are more than that).

`unsigned short encrcount`

This is the number of encryptions done with this binding (or `USHRT_MAX` if there are more than that).

`unsigned long signfirst`

Number of seconds since Epoch when the first signature was seen with this binding.

unsigned long signlast

Number of seconds since Epoch when the last signature was seen with this binding.

unsigned long encrfirst

Number of seconds since Epoch when the first encryption was done with this binding.

unsigned long enclast

Number of seconds since Epoch when the last encryption was done with this binding.

char *description

A human-readable string summarizing the TOFU data (or NULL).

-- Data type: `gpgme_key_sig_t`

The `gpgme_key_sig_t` type is a pointer to a key signature structure. Key signatures are one component of a `gpgme_key_t` object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIGS` mode enabled, because it can be expensive to retrieve all signatures of a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIG_NOTATIONS` mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

`gpgme_key_sig_t next`

This is a pointer to the next key signature structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1

This is true if the key signature is a revocation signature.

unsigned int expired : 1

This is true if the key signature is expired.

unsigned int invalid : 1

This is true if the key signature is invalid.

unsigned int exportable : 1

This is true if the key signature is exportable.

gpgme_pubkey_algo_t pubkey_algo

This is the public key algorithm used to create the signature.

char *keyid

This is the
key ID of the key (in hexadecimal digits) used to
create the signature.

long int timestamp

This is the creation timestamp of the key signature. This is
-1 if the timestamp is invalid, and 0 if it is not available.

long int expires

This is the expiration timestamp of the key signature, or 0 if
the key signature does not expire.

gpgme_error_t status

This is the status of the signature and has the same meaning
as the member of the same name in a gpgme_signature_t
object.

unsigned int sig_class

This specifies the signature class of the key signature. The
meaning is specific to the crypto engine.

char *uid

This is the main user ID of the key used to create the
signature.

char *name

This is the name component of uid, if available.

char *comment

This is the comment component of uid, if available.

char *email

This is the email component of uid, if available.

gpgme_sig_notation_t notations

This is a linked list with the notation data and policy URLs.

File: gpgme.info, Node: Listing Keys, Next: Information About Keys, Prev: Key objects, Up: Key Management

7.5.2 Listing Keys

-- Function: `gpgme_error_t gpgme_op_keylist_start (gpgme_ctx_t CTX,
const char *PATTERN, int SECRET_ONLY)`

The function `gpgme_op_keylist_start` initiates a key listing operation inside the context `CTX`. It sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys in the list.

If `PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `SECRET_ONLY` is not 0, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_keylist_ext_start (gpgme_ctx_t CTX,
const char *PATTERN[], int SECRET_ONLY, int RESERVED)`

The function `gpgme_op_keylist_ext_start` initiates an extended key listing operation inside the context `CTX`. It sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys in the list.

If `PATTERN` or `*PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` is a `NULL` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or

user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `SECRET_ONLY` is not 0, the list is restricted to secret keys only.

The value of `RESERVED` must be 0.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_keylist_from_data_start`
(`gpgme_ctx_t CTX`, `gpgme_data_t DATA`, `int RESERVED`)

SINCE: 1.8.0

The function `gpgme_op_keylist_from_data_start` initiates a key listing operation inside the context `CTX`. In contrast to the other key listing operation the keys are read from the supplied `DATA` and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys from `DATA`.

The value of `RESERVED` must be 0.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation. While the context is busy `DATA` may not be released.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_keylist_next` (`gpgme_ctx_t CTX`,
`gpgme_key_t *R_KEY`)

The function `gpgme_op_keylist_next` returns the next key in the list created by a previous `gpgme_op_keylist_start` operation in the context `CTX`. The key will have one reference for the user.
*Note Manipulating Keys::.

This is the only way to get at `gpgme_key_t` objects in GPGME.

If the last key in the list has already been returned, `gpgme_op_keylist_next` returns `GPG_ERR_EOF`.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` or `R_KEY` is not a valid pointer, and `GPG_ERR_ENOMEM` if there is not enough memory for the operation.

-- Function: `gpgme_error_t gpgme_op_keylist_end (gpgme_ctx_t CTX)`

The function `gpgme_op_keylist_end` ends a pending key list operation in the context `CTX`.

After the operation completed successfully, the result of the key listing operation can be retrieved with `gpgme_op_keylist_result`.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

The following example illustrates how all keys containing a certain string (`g10code`) can be listed with their key ID and the name and email address of the main user ID:

```
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
{
    err = gpgme_op_keylist_start (ctx, "g10code", 0);
    while (!err)
    {
        err = gpgme_op_keylist_next (ctx, &key);
        if (err)

break;
        printf ("%s:", key->subkeys->keyid);
        if (key->uids && key->uids->name)
            printf (" %s", key->uids->name);
        if (key->uids && key->uids->email)
```



```

        printf (" <%s>", key->uids->email);
        putchar ('\n');
        gpgme_key_release (key);
    }
    gpgme_release (ctx);
}
if (gpg_err_code (err) != GPG_ERR_EOF)
{
    fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
    exit (1);
}

```

-- Data type: `gpgme_keylist_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_keylist_*` operation. After successfully ending a key listing operation, you can retrieve the pointer to the result with `gpgme_op_keylist_result`. The structure contains the following member:

`unsigned int truncated : 1`

This is true if the crypto backend had to truncate the result, and less than the desired keys

could be listed.

-- Function: `gpgme_keylist_result_t gpgme_op_keylist_result (gpgme_ctx_t CTX)`

The function `gpgme_op_keylist_result` returns a `gpgme_keylist_result_t` pointer to a structure holding the result of a `gpgme_op_keylist_*` operation. The pointer is only valid if the last operation on the context was a key listing operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

In a simple program, for which a blocking operation is acceptable, the following function can be used to retrieve a single key.

-- Function: `gpgme_error_t gpgme_get_key (gpgme_ctx_t CTX, const char *FPR, gpgme_key_t *R_KEY, int SECRET)`

The function `gpgme_get_key` gets the key with the fingerprint (or key ID) `FPR` from the crypto backend and return it in `R_KEY`. If `SECRET` is true, get the secret key. The currently active keylist mode is used to retrieve

the key. The key will have one reference for the user.

If the key is not found in the keyring, `gpgme_get_key` returns the error code `GPG_ERR_EOF` and `*R_KEY` will be set to `NULL`.

The function returns the error code GPG_ERR_INV_VALUE if CTX or R_KEY is not a valid pointer or FPR is not a fingerprint or key ID, GPG_ERR_AMBIGUOUS_NAME if the key ID was not a unique specifier for a key, and GPG_ERR_ENOMEM if at some time during the operation there was not enough memory available.

File: gpgme.info, Node: Information About Keys, Next: Manipulating Keys, Prev: Listing Keys, Up: Key Management

7.5.3 Information About Keys

Please see the beginning of this section for more information about gpgme_key_t objects.

-- Data type: gpgme_validity_t

The gpgme_validity_t type is used to specify the validity of a user ID in a key. The following validities are defined:

GPGME_VALIDITY_UNKNOWN

The user ID is of unknown validity. The string representation of this validity is ?.

GPGME_VALIDITY_UNDEFINED

The validity of the user ID is undefined. The string representation of this validity is q.

GPGME_VALIDITY_NEVER

The user ID is never valid. The string representation of this validity is n.

GPGME_VALIDITY_MARGINAL

The user ID is marginally valid. The string representation of this validity is m.

GPGME_VALIDITY_FULL

The user ID is fully valid. The string representation of this validity is f.

GPGME_VALIDITY_ULTIMATE

The user ID is ultimately valid. The string representation of this validity is u.

File: gpgme.info, Node: Manipulating Keys, Next: Generating Keys, Prev: Information About Keys, Up: Key Management

7.5.4 Manipulating Keys

-- Function: void gpgme_key_ref (gpgme_key_t KEY)

The function gpgme_key_ref acquires an additional reference for the key KEY.

-- Function: void gpgme_key_unref (gpgme_key_t KEY)

The function gpgme_key_unref releases a reference for the key KEY. If this was the last reference, the key will be destroyed and all resources associated to it will be released.

-- Function: gpgme_error_t gpgme_op_setexpire (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS, unsigned int RESERVED);

SINCE: 1.14.1

The function gpgme_op_setexpire sets the expiration time of the key KEY or of the specified subkeys. This function requires at least version 2.1.22 of GnuPG.

KEY specifies the key to operate on.

EXPIRES specifies the expiration time in seconds from now. To be similar to other usages where expiration times are provided in unsigned long this is similar to the key creation date and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time. Note

that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

SUBFPRS selects the subkey(s) for which the expiration time should be set. If SUBFPRS is set to NULL, then the expiration time of the primary key is set. If SUBFPRS is an asterisk (*), then the expiration times of all non-revoked and not yet expired subkeys are set. To select more than one subkey put all subkey fingerprints into one string separated by linefeeds characters (\n).

RESERVED is reserved for later use and must be 0.

-- Function: gpgme_error_t gpgme_op_setexpire_start (gpgme_ctx_t CTX,

gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS,
unsigned int FLAGS);

SINCE: 1.14.1

The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

-- Function: `gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);`

SINCE: 1.14.1

The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

File: `gpgme.info`, Node: Generating Keys, Next: Signing Keys, Prev: Manipulating Keys, Up: Key Management

7.5.5 Generating Keys

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the `gpgme_op_genkey` function can be used. Existing code which wants to update to the new functions or new code which shall supports older

GnuPG versions may try the new functions first and provide a fallback to the old function if the error code `GPG_ERR_NOT_SUPPORTED` is received.

-- Function: `gpgme_error_t gpgme_op_createkey (gpgme_ctx_t CTX, const char *USERID, const char *ALGO, unsigned long RESERVED, unsigned long EXPIRES, gpgme_key_t EXTRAKEY, unsigned int FLAGS);`

SINCE: 1.7.0

The function `gpgme_op_createkey` generates a new key for the protocol active in the context `CTX`. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

USERID is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

ALGO specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see the GnuPG manual. If ALGO is NULL or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via FLAGS, triggers the creation of a primary key plus a secondary key (subkey).

RESERVED must be set to zero.

EXPIRES specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag GPGME_CREATE_NOEXPIRE to create keys that do not expire. Note that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t.

Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

EXTRAKEY is currently not used and must be set to NULL. A future version of GPGME may use this parameter to create X.509 keys.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_CREATE_SIGN
GPGME_CREATE_ENCR
GPGME_CREATE_CERT
GPGME_CREATE_AUTH
SINCE: 1.7.0

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: signing, encryption, certification, or authentication. The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been

selected only one key is created in the case of the OpenPGP protocol.

GPGME_CREATE_NOPASSWD

SINCE: 1.7.0

Request generation of the key without password protection.

GPGME_CREATE_SELFSIGNED

SINCE: 1.7.0

For an X.509 key do not create a CSR but a self-signed certificate. This has not yet been implemented.

GPGME_CREATE_NOSTORE

SINCE: 1.7.0

Do not store the created key in the local key database. This has not yet been implemented.

GPGME_CREATE_WANTPUB

GPGME_CREATE_WANTSEC

SINCE: 1.7.0

Return the public or secret key as part of the result structure. This has not yet been implemented.

GPGME_CREATE_FORCE

SINCE: 1.7.0

The engine does not allow the creation of a key with a user ID already existing in the local key database. This flag can be used to override this check.

GPGME_CREATE_NOEXPIRE

SINCE: 1.9.0

Request generation of keys that do not expire.

After the operation completed successfully, information about the created key can be retrieved with `gpgme_op_genkey_result`.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

-- Function: `gpgme_error_t gpgme_op_createkey_start (gpgme_ctx_t CTX,`

```
const char *USERID, const char *ALGO, unsigned long RESERVED,  
unsigned long EXPIRES, gpgme_key_t EXTRAKEY,  
unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createkey_start` initiates a `gpgme_op_createkey` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_createsubkey (gpgme_ctx_t CTX,  
gpgme_key_t KEY, const char *ALGO, unsigned long RESERVED,  
unsigned long EXPIRES, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createsubkey` creates and adds a new subkey to the primary OpenPGP key given by `KEY`. The only allowed protocol in `CTX` is `GPGME_PROTOCOL_OPENPGP`. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY` specifies the key to operate on.

`ALGO` specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If `ALGO` is `NULL` or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

`RESERVED` must be set to zero.

`EXPIRES` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag `GPGME_CREATE_NOEXPIRE` to create keys that do not expire. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`FLAGS` takes the same values as described above for

gpgme_op_createkey.

After the operation completed successfully, information about the created key can be retrieved with `gpgme_op_genkey_result`.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_createsubkey_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *ALGO,
 unsigned long RESERVED, unsigned long EXPIRES,
 unsigned int FLAGS);
```

SINCE:

1.7.0

The function `gpgme_op_createsubkey_start` initiates a `gpgme_op_createsubkey` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_adduid (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_adduid` adds a new user ID to the OpenPGP key given by `KEY`. Adding additional user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY` specifies the key to operate on.

`USERID` is the user ID to add to the key. A user ID is commonly the mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested.

The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`FLAGS` are currently not used and must be set to zero.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

-- Function: `gpgme_error_t gpgme_op_adduid_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);`

SINCE: 1.7.0

The function `gpgme_op_adduid_start` initiates a `gpgme_op_adduid` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

-- Function: `gpgme_error_t gpgme_op_revuid (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);`

SINCE: 1.7.0

The function `gpgme_op_revuid` revokes a user ID from the OpenPGP key given by `KEY`. Revoking user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY` specifies the key to operate on.

`USERID` is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. This is a required parameter.

`FLAGS` are currently not used and must be set to zero.

Note that the engine wont allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

-- Function: `gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, const
char *USERID, unsigned int FLAGS);`

SINCE: 1.7.0

The function `gpgme_op_revuid_start` initiates a `gpgme_op_revuid` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_set_ui_flag (gpgme_ctx_t CTX,  
    gpgme_key_t KEY, const char *USERID, const char * NAME,  
    const char * VALUE);
```

SINCE: 1.8.0

The function `gpgme_op_set_ui_flag` is used to set flags on a user ID from the OpenPGP key given by `KEY`. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP.

`KEY` specifies the key to operate on. This parameter is required.

`USERID` is the user ID of the key to be manipulated. This user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object

(`gpgme_user_id_t`) is to be used. This is a required parameter.

`NAME` names the flag which is to be changed. The only currently supported flag is:

`primary`

This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. `VALUE` must be given as `NULL`. For technical reasons this function bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_set_uid_flag_start  
    (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID,  
    const char * NAME, const char * VALUE);
```

SINCE: 1.8.0

The function `gpgme_op_set_uid_flag_start` initiates a `gpgme_op_set_uid_flag` operation; see there for details. It must

be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_genkey (gpgme_ctx_t CTX,  
    const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)
```

The function `gpgme_op_genkey` generates a new key pair in the context `CTX`. The meaning of `PUBLIC` and `SECRET` depends on the crypto backend.

GPG does not support `PUBLIC` and `SECRET`, they should be `NULL`. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with `gpgme_op_genkey_result`.

GpgSM requires `PUBLIC` to be a writable data object. GpgSM will generate a secret key (which will be stored by `gpg-agent`, and return a certificate request in `PUBLIC`, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument `PARMS` specifies parameters for the key in an string that looks something like XML. The details about the format of `PARMS` are specific to the crypto engine used by `CTX`. The first line of the parameters must be `<GnupgKeyParams format="internal">` and the last line must be `</GnupgKeyParams>`. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters `<`, `>`, or `&`.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

```
<GnupgKeyParams format="internal">
Key-Type: default
Subkey-Type: default
Name-Real: Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParams>
```

Here is an example for GpgSM as the crypto engine (all parameters of OpenPGP key generation are documented in the GPGSM manual):

```
<GnupgKeyParams format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@foo.bar
```

</GnupgKeyParms>

Strings should be given in UTF-8 encoding. The only format supported for now is internal. The content of the GnupgKeyParms container is passed verbatim to the crypto backend. Control statements are not allowed.

After the operation completed successfully, the result can be retrieved with `gpgme_op_genkey_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `PARMS` is not a well-formed string (e.g. does not have the expected tag-like headers and footers), `GPG_ERR_NOT_SUPPORTED` if `PUBLIC` or `SECRET` is not valid, and `GPG_ERR_GENERAL` if no key was created by the backend.

```
-- Function: gpgme_error_t
gpgme_op_genkey_start (gpgme_ctx_t CTX,
    const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)
```

The function `gpgme_op_genkey_start` initiates a `gpgme_op_genkey` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `PARMS` is not a valid XML string, and `GPG_ERR_NOT_SUPPORTED` if `PUBLIC` or `SECRET` is not NULL.

```
-- Data type: gpgme_genkey_result_t
```

This is a pointer to a structure used to store the result of a `gpgme_op_genkey` operation. After successfully generating a key, you can retrieve the pointer to the result with `gpgme_op_genkey_result`. The structure contains the following members:

unsigned int primary : 1

This flag is set to 1 if a primary key was created and to 0 if not.

unsigned int sub : 1

This flag is set to 1 if a subkey was created and to 0 if not.

unsigned int uid : 1

This flag is set to 1 if a user ID was created and to 0 if

not.

char *fpr

This is the fingerprint of the key that was created. If both a primary and a subkey were generated, the fingerprint of the primary key will be returned. If the crypto engine does not provide the fingerprint, fpr will be a null pointer.

gpgme_data_t pubkey

SINCE: 1.7.0

This will eventually be used to return the public key. It is currently not used.

gpgme_data_t seckey

SINCE: 1.7.0

This will eventually be used to return the secret key. It is currently not used.

-- Function: gpgme_genkey_result_t gpgme_op_genkey_result
(gpgme_ctx_t CTX)

The function gpgme_op_genkey_result returns a gpgme_genkey_result_t pointer to a structure holding the result of a gpgme_op_genkey operation. The pointer is only valid if the last operation on the context was a gpgme_op_genkey or gpgme_op_genkey_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Signing Keys, Next: Exporting Keys, Prev: Generating Keys, Up: Key Management

7.5.6 Signing Keys

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the gpgme_op_interact function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

-- Function: gpgme_error_t gpgme_op_keysign (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES,
unsigned int FLAGS);

SINCE: 1.7.0

The function `gpgme_op_keysign` adds a new key signature to the public key `KEY`. This function requires at least version 2.1.12 of GnuPG.

`CTX` is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, `gpgme_signers_add` can be used. *Note Selecting Signers::.

`KEY` specifies the key to operate on.

`USERID` selects the user ID or user IDs to be signed. If `USERID` is set to `NULL` all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (`\n`) and set the flag `GPGME_KEYSIGN_LFSEP`.

EXPIRES

specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag `GPGME_KEYSIGN_NOEXPIRE` is used. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`FLAGS` can be set to the bit-wise OR of the following flags:

`GPGME_KEYSIGN_LOCAL`

SINCE: 1.7.0

Instead of creating an exportable key signature, create a key signature which is marked as non-exportable.

`GPGME_KEYSIGN_LFSEP`

SINCE: 1.7.0

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that

USERID may contain several
linefeed separated user IDs.

GPGME_KEYSIGN_NOEXPIRE

Force the creation of a key signature without an expiration date. This overrides EXPIRE and any local configuration of the engine.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_keysign_start (gpgme_ctx_t CTX,  
    gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES,  
    unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_keysign_start` initiates a `gpgme_op_keysign` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion:.

```
-- Function: gpgme_error_t gpgme_op_revsig (gpgme_ctx_t CTX,  
    gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID,  
    unsigned int FLAGS);
```

SINCE: 1.14.1

The function `gpgme_op_revsig` revokes key signatures of the public key `KEY` made with the key `SIGNING_KEY`. This function requires at least version 2.2.24 of GnuPG.

`KEY` specifies the key to operate on.

`SIGNING_KEY` specifies the key whose signatures shall be revoked.

`USERID` selects the user ID or user IDs whose signatures shall be revoked. If `USERID` is set to `NULL` the signatures on all user IDs are revoked. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (`\n`) and set the flag `GPGME_REVSIG_LFSEP`.

`FLAGS` can be set to the bit-wise OR of the following flags:

`GPGME_REVSIG_LFSEP`

SINCE: 1.14.1

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that USERID may contain several linefeed separated user IDs.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_revsig_start (gpgme_ctx_t CTX,  
gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID,  
unsigned int FLAGS);
```

SINCE: 1.14.1

The function gpgme_op_revsig_start initiates a gpgme_op_revsig operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

File: gpgme.info, Node: Exporting Keys, Next: Importing Keys, Prev: Signing Keys, Up: Key Management

7.5.7 Exporting Keys

Exporting keys means the same as running gpg with the command --export. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

GPGME_EXPORT_MODE_EXTERN

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the KEYDATA argument of the export function is set to NULL.

GPGME_EXPORT_MODE_MINIMAL

SINCE: 1.3.1

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

GPGME_EXPORT_MODE_SSH

SINCE: 1.4.0

If this bit is set, the latest authentication key of the requested OpenPGP key is exported in the OpenSSH public key format. This accepts just a single key; to force the export of a specific subkey a fingerprint pattern with an appended exclamation mark may be used.

GPGME_EXPORT_MODE_SECRET

SINCE: 1.6.0

Instead of exporting the public key, the secret key is exported.

This may not be combined with GPGME_EXPORT_MODE_EXTERN. For X.509 the export format is PKCS#8.

GPGME_EXPORT_MODE_RAW

SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_PKCS12

SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_NOUID

SINCE: 1.12.0 - experimental Do not export user ids. Works only with certain gpg version.

-- Function: gpgme_error_t gpgme_op_export (gpgme_ctx_t CTX, const char *PATTERN, gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)

The function gpgme_op_export extracts public keys and returns them in the data buffer KEYDATA. The output format of the key data

returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

If PATTERN is NULL, all available keys are returned. Otherwise, PATTERN contains an engine specific expression that is used to limit the list to all keys matching the pattern.

MODE is usually 0; other values are described above.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_export_start (gpgme_ctx_t CTX, const char *PATTERN, gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)`

The function `gpgme_op_export_start` initiates a `gpgme_op_export` operation. It can be completed by calling `gpgme_wait` on the context.

*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer.

-- Function: `gpgme_error_t gpgme_op_export_ext (gpgme_ctx_t CTX, const char *PATTERN[], gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)`

The function `gpgme_op_export_ext` extracts public keys and returns them in the data buffer `KEYDATA`. The output format of the key data returned is determined by the ASCII armor attribute set for the context `CTX`, or, if that is not set, by the encoding specified for `KEYDATA`.

If `PATTERN` or `*PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` is a `NULL` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim.

`MODE` is usually 0; other values are described above.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_export_ext_start (gpgme_ctx_t CTX, const char *PATTERN[], gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)`

The function `gpgme_op_export_ext_start` initiates a `gpgme_op_export_ext` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the

operation could be started successfully, and GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer.

```
-- Function: gpgme_error_t gpgme_op_export_keys (gpgme_ctx_t CTX,  
        gpgme_key_t keys[], gpgme_export_mode_t MODE,  
        gpgme_data_t KEYDATA)  
SINCE: 1.2.0
```

The function `gpgme_op_export_keys` extracts public keys and returns them in the data buffer `KEYDATA`. The output format of the key data returned is determined by the ASCII armor attribute set for the context `CTX`, or, if that is not set, by the encoding specified for `KEYDATA`.

The keys to export are taken from the NULL terminated array `KEYS`. Only keys of the currently selected protocol of `CTX` which do have a fingerprint set are considered for export. Other keys specified by the `KEYS` are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

`MODE` is usually 0; other values are described above.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer, `GPG_ERR_NO_DATA` if no useful keys are in `KEYS` and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_export_keys_start  
(gpgme_ctx_t CTX,  
        gpgme_key_t KEYS[], gpgme_export_mode_t MODE,  
        gpgme_data_t KEYDATA)  
SINCE: 1.2.0
```

The function `gpgme_op_export_keys_start` initiates a `gpgme_op_export_ext` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer, `GPG_ERR_NO_DATA` if no useful keys are in `KEYS` and passes through any errors that are reported by the crypto engine support routines.

File: `gpgme.info`, Node: Importing Keys, Next: Deleting Keys, Prev: Exporting Keys, Up: Key Management

7.5.8 Importing Keys

Importing keys means the same as running gpg with the command --import.

-- Function: gpgme_error_t gpgme_op_import (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)

The function gpgme_op_import adds the keys in the data buffer

KEYDATA to the key ring of the crypto engine used by CTX. The format of KEYDATA can be ASCII armored, for example, but the details are specific to the crypto engine.

After the operation completed successfully, the result can be retrieved with gpgme_op_import_result.

The function returns the error code GPG_ERR_NO_ERROR if the import was completed successfully, GPG_ERR_INV_VALUE if KEYDATA if CTX or KEYDATA is not a valid pointer, and GPG_ERR_NO_DATA if KEYDATA is an empty data buffer.

-- Function: gpgme_error_t gpgme_op_import_start (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)

The function gpgme_op_import_start initiates a gpgme_op_import operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the import could be started successfully, GPG_ERR_INV_VALUE if CTX or KEYDATA is not a valid pointer, and GPG_ERR_NO_DATA if KEYDATA is an empty data buffer.

-- Function: gpgme_error_t gpgme_op_import_keys (gpgme_ctx_t CTX, gpgme_key_t *KEYS)

SINCE: 1.2.0

The function gpgme_op_import_keys adds the keys described by the NULL terminated array KEYS to the key ring of the crypto engine used by CTX. It is used to actually import and make keys permanent which have been retrieved from an external source (i.e. using GPGME_KEYLIST_MODE_EXTERN) earlier. The external keylisting must have been made with the same context configuration (in particular the same home directory). (1) Note that for OpenPGP this may require another access to the keyserver over the network.

Only keys of the currently selected protocol of CTX are considered

for import. Other keys specified by the KEYS are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully, the result can be retrieved with `gpgme_op_import_result`.

To move keys from one home directory to another, export and import the keydata using `gpgme_op_export` and `gpgme_op_import`.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for export.

```
-- Function: gpgme_error_t gpgme_op_import_keys_start (gpgme_ctx_t CTX,  
    gpgme_key_t *KEYS)  
SINCE: 1.2.0
```

The function `gpgme_op_import_keys_start` initiates a `gpgme_op_import_keys` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for export.

```
-- Data type: gpgme_import_status_t  
This is a pointer to a structure used to store a part of the result of a gpgme_op_import operation. For each considered key one status is added that contains information about the result of the import. The structure contains the following members:
```

```
gpgme_import_status_t next  
    This is a pointer to the next status structure in the linked list, or NULL if this is the last element.
```

```
char *fpr  
    This is the fingerprint of the key that was considered.
```

```
gpgme_error_t result  
    If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is
```

GPG_ERR_NO_ERROR.

unsigned int status

This is a bit-wise OR of the following flags that give more information about what part of the key was imported. If the key was already known, this might be 0.

GPGME_IMPORT_NEW

The key was new.

GPGME_IMPORT_UID

The key contained new user IDs.

GPGME_IMPORT_SIG

The key contained new signatures.

GPGME_IMPORT_SUBKEY

The key contained new sub keys.

GPGME_IMPORT_SECRET

The key contained a secret key.

-- Data type: gpgme_import_result_t

This is a pointer to a structure used to store the result of a gpgme_op_import operation. After a successful import operation, you can retrieve the pointer to the result with gpgme_op_import_result. The structure contains the following members:

int considered

The total number of considered keys.

int no_user_id

The number of keys without user ID.

int imported

The total number of imported keys.

int imported_rsa

The number of imported RSA keys.

int unchanged

The number of unchanged keys.

int new_user_ids

The number of new user IDs.

int new_sub_keys

The number of new sub keys.

int new_signatures

The number of new signatures.

int new_revocations

The number of new revocations.

int secret_read

The total number of secret keys read.

int secret_imported

The number of imported secret keys.

int secret_unchanged

The number of unchanged secret keys.

int not_imported

The number of keys not imported.

gpgme_import_status_t imports

A list of gpgme_import_status_t objects which contain more information about the keys for which an import was attempted.

int skipped_v3_keys

For security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP

2.x) and ignores them on

import. This counter provides the number of such skipped v3 keys.

-- Function: gpgme_import_result_t gpgme_op_import_result

(gpgme_ctx_t CTX)

The function gpgme_op_import_result returns a gpgme_import_result_t pointer to a structure holding the result of a gpgme_op_import operation. The pointer is only valid if the last operation on the context was a gpgme_op_import or gpgme_op_import_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

----- Footnotes -----

(1) Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.

7.5.9 Deleting Keys

```
-- Function: gpgme_error_t gpgme_op_delete_ext
(gpgme_ctx_t CTX,
  const gpgme_key_t KEY, unsigned int FLAGS)
SINCE: 1.9.1
```

The function `gpgme_op_delete_ext` deletes the key `KEY` from the key ring of the crypto engine used by `CTX`.

`FLAGS` can be set to the bit-wise OR of the following flags:

`GPGME_DELETE_ALLOW_SECRET`
SINCE: 1.9.1

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

`GPGME_DELETE_FORCE`
SINCE: 1.9.1

If set, the user is not asked to confirm the deletion.

The function returns the error code `GPG_ERR_NO_ERROR` if the key was deleted successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer, `GPG_ERR_NO_PUBKEY` if `KEY` could not be found in the keyring, `GPG_ERR_AMBIGUOUS_NAME` if the key was not specified unambiguously, and `GPG_ERR_CONFLICT` if the secret key for `KEY` is available, but `ALLOW_SECRET` is zero.

```
-- Function: gpgme_error_t gpgme_op_delete_ext_start
(gpgme_ctx_t CTX,
  const gpgme_key_t KEY, unsigned int FLAGS)
SINCE: 1.9.1
```

The function `gpgme_op_delete_ext_start` initiates a `gpgme_op_delete` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

The following functions allow only to use one particular flag.

- Function: `gpgme_error_t gpgme_op_delete (gpgme_ctx_t CTX, const gpgme_key_t KEY, int ALLOW_SECRET)`
Similar to `gpgme_op_delete_ext`, but only the flag `GPGME_DELETE_ALLOW_SECRET` can be provided.

- Function: `gpgme_error_t gpgme_op_delete_start (gpgme_ctx_t CTX, const gpgme_key_t KEY, int ALLOW_SECRET)`
Similar to `gpgme_op_delete_ext_start`, but only the flag `GPGME_DELETE_ALLOW_SECRET` can be provided.

File: `gpgme.info`, Node:

Changing Passphrases, Next: Changing TOFU Data, Prev: Deleting Keys, Up: Key Management

7.5.10 Changing Passphrases

- Function: `gpgme_error_t gpgme_op_passwd (gpgme_ctx_t CTX, const gpgme_key_t KEY, unsigned int FLAGS)`

SINCE: 1.3.0

The function `gpgme_op_passwd` changes the passphrase of the private key associated with `KEY`. The only allowed value for `FLAGS` is 0. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old `gpg` engines (before version 2.0.15) do not support this command and will silently ignore it.

- Function: `gpgme_error_t gpgme_op_passwd_start (gpgme_ctx_t CTX, const gpgme_key_t KEY, unsigned int FLAGS)`

SINCE: 1.3.0

The function `gpgme_op_passwd_start` initiates a `gpgme_op_passwd` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

7.5.11 Changing TOFU Data

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

-- Data type: enum `gpgme_tofu_policy_t`
SINCE: 1.7.0

The `gpgme_tofu_policy_t` type specifies the set of possible policy values that are supported by GPGME:

`GPGME_TOFU_POLICY_AUTO`

Set the policy to auto.

`GPGME_TOFU_POLICY_GOOD`

Set the policy to good.

`GPGME_TOFU_POLICY_BAD`

Set the policy to

bad.

`GPGME_TOFU_POLICY_ASK`

Set the policy to ask.

`GPGME_TOFU_POLICY_UNKNOWN`

Set the policy to unknown.

To change the policy for a key the following functions can be used:

-- Function: `gpgme_error_t gpgme_op_tofu_policy (gpgme_ctx_t CTX, const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)`

SINCE: 1.7.0

The function `gpgme_op_tofu_policy` changes the TOFU policy of `KEY`. The valid values for `POLICY` are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

-- Function: `gpgme_error_t gpgme_op_tofu_policy_start (gpgme_ctx_t CTX, const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)`

SINCE: 1.7.0

The function `gpgme_op_tofu_policy_start` initiates a `gpgme_op_tofu_policy` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

File: `gpgme.info`, Node: Advanced Key Editing, Prev: Changing TOFU Data, Up: Key Management

7.5.12 Advanced Key Editing

-- Data type: `gpgme_error_t (*gpgme_interact_cb_t) (void *HANDLE, const char *STATUS, const char *ARGS, int FD)`

SINCE: 1.7.0

The `gpgme_interact_cb_t` type is the type of functions which GPGME calls if it a key interact operation is on-going. The status keyword `STATUS` and the argument line `ARGS` are passed through by GPGME from the crypto engine. An empty string represents EOF. The file descriptor `FD` is -1 for normal status messages. If `STATUS` indicates a command rather than a status message, the response to the command should be written to `FD`. The `HANDLE` is provided by the user at start of operation.

The function should return `GPG_ERR_FALSE` if it did not handle the status code, 0 for success, or any other error value.

-- Function: `gpgme_error_t gpgme_op_interact (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

SINCE: 1.7.0

The function `gpgme_op_interact` processes the key `KEY` interactively, using the interact callback function `FNC` with the handle `HANDLE`. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object `OUT`.

Note that the protocol between the callback function and the crypto

engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

FLAGS modifies the behaviour of the function; the only defined bit

value is:

GPGME_INTERACT_CARD

SINCE: 1.7.0

This is used for smartcard based keys and uses gpgs --card-edit command.

The function returns 0 if the edit operation completes successfully, GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: gpgme_error_t gpgme_op_interact_start (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

SINCE: 1.7.0

The function gpgme_op_interact_start initiates a gpgme_op_interact operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer.

File: gpgme.info, Node: Crypto Operations, Next: Miscellaneous, Prev: Key Management, Up: Contexts

7.6 Crypto Operations

=====

Sometimes, the result of a crypto operation returns a list of invalid keys encountered in processing the request. The following structure is used to hold information about such a key.

-- Data type: gpgme_invalid_key_t

This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter. The structure contains the following members:

gpgme_invalid_key_t next

This is a pointer to the next invalid key structure in the linked list, or NULL if this is the last element.

char *fpr

The fingerprint or key ID of the invalid key encountered.

gpgme_error_t reason

An error code describing the reason why the key was found invalid.

* Menu:

* Decrypt:: Decrypting a ciphertext.

* Verify:: Verifying a signature.

* Decrypt and Verify:: Decrypting
a signed ciphertext.

* Sign:: Creating a signature.

* Encrypt:: Encrypting a plaintext.

File: gpgme.info, Node: Decrypt, Next: Verify, Up: Crypto Operations

7.6.1 Decrypt

-- Function: gpgme_error_t gpgme_op_decrypt (gpgme_ctx_t CTX,
gpgme_data_t CIPHER, gpgme_data_t PLAIN)

The function gpgme_op_decrypt decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be decrypted successfully, GPG_ERR_INV_VALUE if CTX, CIPHER or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt, GPG_ERR_DECRYPT_FAILED if CIPHER is not a valid cipher text, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_decrypt_start (gpgme_ctx_t CTX,
gpgme_data_t CIPHER, gpgme_data_t PLAIN)

The function gpgme_op_decrypt_start initiates a gpgme_op_decrypt operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CIPHER or PLAIN is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_decrypt_ext (gpgme_ctx_t CTX,
gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER,
gpgme_data_t PLAIN)`

SINCE: 1.8.0

The function `gpgme_op_decrypt_ext` is the same as `gpgme_op_decrypt` but has an additional argument `FLAGS`. If `FLAGS` is 0 both function behave identically.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_DECRYPT_VERIFY`

SINCE: 1.8.0

The `GPGME_DECRYPT_VERIFY` symbol specifies that this function shall exactly act as `gpgme_op_decrypt_verify`.

`GPGME_DECRYPT_UNWRAP`

SINCE: 1.8.0

The `GPGME_DECRYPT_UNWRAP` symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to `GPGME_ENCRYPT_WRAP`.

The function returns the error codes as described for `gpgme_op_decrypt`.

-- Function: `gpgme_error_t gpgme_op_decrypt_ext_start (gpgme_ctx_t CTX, gpgme_decrypt_flags_t FLAGS,
gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

SINCE: 1.8.0

The function `gpgme_op_decrypt_ext_start` initiates a `gpgme_op_decrypt_ext` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully,
and `GPG_ERR_INV_VALUE` if
`CIPHER` or `PLAIN` is not a valid pointer.

-- Data type: `gpgme_recipient_t`

SINCE: 1.1.0

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a `gpgme_op_decrypt` operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

`gpgme_recipient_t next`

This is a pointer to the next recipient structure in the linked list, or NULL if this is the last element.

`gpgme_pubkey_algo_t`

The public key algorithm used in the encryption.

`char *keyid`

This is the key ID of the key (in hexadecimal digits) used as recipient.

`gpgme_error_t status`

This is an error number with the error code `GPG_ERR_NO_SECKEY` if the secret key for this recipient is not available, and 0 otherwise.

-- Data type: `gpgme_decrypt_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_decrypt` operation. After successfully decrypting data, you can retrieve the pointer to the result with `gpgme_op_decrypt_result`. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a structure on its own. The structure contains the following members:

`char *unsupported_algorithm`

If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

`unsigned int wrong_key_usage : 1`

SINCE: 0.9.0 This is true if the key was not used according to its policy.

`unsigned int legacy_cipher_nomdc : 1`

SINCE: 1.11.2 The message was made by a legacy algorithm without any integrity protection. This might be an old but

legitimate message.

unsigned int is_mime : 1;

SINCE: 1.11.0 The message claims that the content is a MIME object.

unsigned int is_de_vs : 1;

SINCE: 1.10.0 The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

gpgme_recipient_t recipients

SINCE: 1.1.0

This is a linked list of recipients to which this message was encrypted.

char *file_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

char *session_key

SINCE: 1.8.0

A textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session keys (see `gpgme_set_ctx_flag`, "export-session-key"), and a session key was available for the

most recent decryption operation.

Otherwise, this is a null pointer.

You must not try to access this member of the struct unless `gpgme_set_ctx_flag` (ctx, "export-session-key") returns success or `gpgme_get_ctx_flag` (ctx, "export-session-key") returns true (non-empty string).

char *symkey_algo

SINCE: 1.11.0

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

-- Function: `gpgme_decrypt_result_t gpgme_op_decrypt_result`
(`gpgme_ctx_t` CTX)

The function `gpgme_op_decrypt_result` returns a `gpgme_decrypt_result_t` pointer to a structure holding the result

of a `gpgme_op_decrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_decrypt` or `gpgme_op_decrypt_start` operation. If the operation failed this

might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: `gpgme.info`, Node: Verify, Next: Decrypt and Verify, Prev: Decrypt, Up: Crypto Operations

7.6.2 Verify

-- Function: `gpgme_error_t gpgme_op_verify (gpgme_ctx_t CTX, gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT, gpgme_data_t PLAIN)`

The function `gpgme_op_verify` verifies that the signature in the data object `SIG` is a valid signature. If `SIG` is a detached signature, then the signed text should be provided in `SIGNED_TEXT` and `PLAIN` should be a null pointer. Otherwise, if `SIG` is a normal (or cleartext) signature, `SIGNED_TEXT` should be a null pointer and `PLAIN` should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with `gpgme_op_verify_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be completed successfully, `GPG_ERR_INV_VALUE` if `CTX`, `SIG` or `PLAIN` is not a valid pointer, `GPG_ERR_NO_DATA` if `SIG` does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_verify_start (gpgme_ctx_t CTX, gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT, gpgme_data_t PLAIN)`

The function `gpgme_op_verify_start` initiates a `gpgme_op_verify` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `CTX`, `SIG` or `PLAIN` is not a valid pointer, and `GPG_ERR_NO_DATA` if `SIG` or `PLAIN` does not contain any data to verify.

-- Data type: `gpgme_sig_notation_t`

This is a pointer to a structure used to store a part of the result

of a `gpgme_op_verify` operation. The structure contains the following members:

`gpgme_sig_notation_t next`

This is a pointer to the next new signature notation structure in the linked list, or `NULL` if this is the last element.

`char *name`

The name of the notation field. If this is `NULL`, then the member value will contain a policy URL.

`int name_len`

The length of the name field. For strings the length is counted without the trailing binary zero.

`char *value`

The value of the notation field. If `name` is `NULL`, then this is a policy URL.

`int value_len`

The length of the value field. For strings the length is counted without the trailing binary zero.

`gpgme_sig_notation_flags_t flags`

The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used

as an argument to the function

`gpgme_sig_notation_add`. The value `flags` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_SIG_NOTATION_HUMAN_READABLE`

SINCE: 1.1.0

The `GPGME_SIG_NOTATION_HUMAN_READABLE` symbol specifies that the notation data is in human readable form

`GPGME_SIG_NOTATION_CRITICAL`

SINCE: 1.1.0

The `GPGME_SIG_NOTATION_CRITICAL` symbol specifies that the notation data is critical.

`unsigned int human_readable : 1`

This is true if the `GPGME_SIG_NOTATION_HUMAN_READABLE` flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

unsigned int critical : 1

This is true if the GPGME_SIG_NOTATION_CRITICAL flag is set and false otherwise. This flag is valid for notation data and policy URLs.

-- Data type: gpgme_signature_t

This is a pointer to a structure used to store a part of the result of a gpgme_op_verify operation. The structure contains the following members:

gpgme_signature_t next

This is a pointer to the next new signature structure in the linked list, or NULL if this is the last element.

gpgme_sigsum_t summary

This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for GPGME_SIGSUM_VALID like this:

```
if ((sig.summary & GPGME_SIGSUM_VALID))
{
    ..do stuff if valid..
}
else
{
    ..do stuff if not fully valid..
}
```

The defined bits are:

GPGME_SIGSUM_VALID

The signature is fully valid.

GPGME_SIGSUM_GREEN

The signature is good but one might want to display some extra information. Check the other bits.

GPGME_SIGSUM_RED

The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

GPGME_SIGSUM_KEY_REVOKED

The key or at least one certificate has been revoked.

GPGME_SIGSUM_KEY_EXPIRED

The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

GPGME_SIGSUM_SIG_EXPIRED

The signature has expired.

GPGME_SIGSUM_KEY_MISSING

Cant verify due to a missing key or certificate.

GPGME_SIGSUM_CRL_MISSING

The CRL (or an equivalent mechanism) is not available.

GPGME_SIGSUM_CRL_TOO_OLD

Available CRL is too old.

GPGME_SIGSUM_BAD_POLICY

A policy requirement was not met.

GPGME_SIGSUM_SYS_ERROR

A system error occurred.

GPGME_SIGSUM_TOFU_CONFLICT

A TOFU conflict was detected.

char *fpr

This is the fingerprint or key ID of the signature.

gpgme_error_t status

This is the status of the signature. In particular, the following status codes are of interest:

GPG_ERR_NO_ERROR

This status indicates that the signature could be verified or that there is no signature. For the combined result this status means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check the summary field for that.

For example a `gpgme_op_decrypt_verify` returns a verification result with `GPG_ERR_NO_ERROR` for encrypted but unsigned data.

GPG_ERR_SIG_EXPIRED

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

GPG_ERR_KEY_EXPIRED

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

GPG_ERR_CERT_REVOKED

This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures are valid and all keys are revoked.

GPG_ERR_BAD_SIGNATURE

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

GPG_ERR_NO_PUBKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

GPG_ERR_GENERAL

This status indicates that there was some other error which prevented the signature verification.

gpgme_sig_notation_t notations

This is a linked list with the notation data and policy URLs.

unsigned long timestamp

The creation timestamp of this signature.

unsigned long exp_timestamp

The expiration timestamp of this signature, or 0 if the signature does not expire.

unsigned int wrong_key_usage : 1

This is true if the key was not used according to its policy.

unsigned int pka_trust : 2

This is set to the trust information gained by means of the PKA system. Values are:

0

No PKA information available or verification not possible.

1

PKA verification failed.

2

PKA verification succeeded.

3

Reserved for future use.

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

unsigned int chain_model : 1

SINCE: 1.1.6

This is true if the validity of the signature has been checked using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

gpgme_validity_t validity

The validity of the signature.

gpgme_error_t validity_reason

If a signature is not valid, this provides a reason why.

gpgme_pubkey_algo_t

The public key algorithm used to create this signature.

gpgme_hash_algo_t

The hash algorithm used to create this signature.

char *pka_address

The mailbox from the PKA information or NULL.

gpgme_key_t key

SINCE: 1.7.0

An object describing the key used to create the signature. This key object may be incomplete in that it only conveys information available directly with a signature. It may also be NULL if such information is not readily available.

-- Data type: `gpgme_verify_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_verify` operation. After verifying a signature, you can retrieve the pointer to the result with `gpgme_op_verify_result`. If the operation failed this might be a NULL pointer. The structure contains the following member:

`gpgme_signature_t` signatures

A linked list with information about all signatures for which a verification was attempted.

`char *file_name`

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

`unsigned int is_mime : 1;`

SINCE: 1.11.0

The message claims that the content is a MIME object.

Warning: This flag is not covered by the signature.

-- Function: `gpgme_verify_result_t gpgme_op_verify_result`
(`gpgme_ctx_t` CTX)

The function `gpgme_op_verify_result` returns a `gpgme_verify_result_t` pointer to a structure holding the result of a `gpgme_op_verify` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_verify`, `gpgme_op_verify_start`, `gpgme_op_decrypt_verify` or `gpgme_op_decrypt_verify_start` operation, and if this operation finished successfully (for `gpgme_op_decrypt_verify` and `gpgme_op_decrypt_verify_start`, the error code `GPG_ERR_NO_DATA` counts as successful in this context). The returned pointer is only valid until the next operation is started on the context.

File: `gpgme.info`, Node: Decrypt and Verify, Next: Sign, Prev: Verify, Up: Crypto Operations

7.6.3 Decrypt and Verify

-- Function: `gpgme_error_t gpgme_op_decrypt_verify` (`gpgme_ctx_t` CTX,
`gpgme_data_t` CIPHER, `gpgme_data_t` PLAIN)

The function `gpgme_op_decrypt_verify` decrypts the ciphertext in the data object CIPHER and

stores it into the data object PLAIN.

If CIPHER contains signatures, they will be verified.

After the operation completed, `gpgme_op_decrypt_result` and `gpgme_op_verify_result` can be used to retrieve more information about the signatures.

If the error code `GPG_ERR_NO_DATA` is returned, CIPHER does not contain any data to decrypt. However, it might still be signed.

The information about detected signatures is available with `gpgme_op_verify_result` in this case.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be decrypted successfully, `GPG_ERR_INV_VALUE` if `CTX`, `CIPHER` or `PLAIN` is not a valid pointer, `GPG_ERR_NO_DATA` if `CIPHER` does not contain any data to decrypt, `GPG_ERR_DECRYPT_FAILED` if `CIPHER` is not a valid cipher text, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_decrypt_verify_start  
           (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)
```

The function `gpgme_op_decrypt_verify_start` initiates a `gpgme_op_decrypt_verify` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `CTX`, `CIPHER`, `PLAIN` or `R_STAT` is not a valid pointer, and `GPG_ERR_NO_DATA` if `CIPHER` does not contain any data to decrypt.

When processing mails it is sometimes useful to extract the actual mail address (the `addr-spec`) from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

```
-- Function: char * gpgme_addrspec_from_uid (const char *UID)
```

SINCE: 1.7.1

Return the mail address (called `addr-spec` in RFC-5322) from the string

`UID` which is assumed to be a user id (called `address` in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must

free the result using `gpgme_free`. Returns NULL if no valid address was found (in which case `ERRNO` is set to `EINVAL`) or for other errors.

File: `gpgme.info`, Node: Sign, Next: Encrypt, Prev: Decrypt and Verify, Up: Crypto Operations

7.6.4 Sign

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

* Menu:

- * Selecting Signers:: How to choose the keys to sign with.
- * Creating a Signature:: How to create a signature.
- * Signature Notation Data:: How to add notation data to a signature.

File: `gpgme.info`, Node: Selecting Signers, Next: Creating a Signature, Up: Sign

7.6.4.1

Selecting Signers

.....

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list. If no signer has been set into the context a default key is used for signing.

-- Function: `void gpgme_signers_clear (gpgme_ctx_t CTX)`

The function `gpgme_signers_clear` releases a reference for each key on the signers list and removes the list of signers from the context `CTX`.

Every context starts with an empty list.

-- Function: `gpgme_error_t gpgme_signers_add (gpgme_ctx_t CTX, const gpgme_key_t KEY)`

The function `gpgme_signers_add` adds the key `KEY` to the list of signers in the context `CTX`.

Calling this function acquires an additional reference for the key.

-- Function: `unsigned int gpgme_signers_count (const gpgme_ctx_t CTX)`

SINCE: 1.4.3

The function `gpgme_signers_count` returns the number of signer keys in the context `CTX`.

-- Function:

```
gpgme_key_t gpgme_signers_enum (const gpgme_ctx_t CTX,  
    int SEQ)
```

The function `gpgme_signers_enum` returns the `SEQ`th key in the list of signers in the context `CTX`. An additional reference is acquired for the user.

If `SEQ` is out of range, `NULL` is returned.

File: `gpgme.info`, Node: Creating a Signature, Next: Signature Notation Data, Prev: Selecting Signers, Up: Sign

7.6.4.2 Creating a Signature

.....

-- Data type: `enum gpgme_sig_mode_t`

The `gpgme_sig_mode_t` type is used to specify the desired type of a signature. The following modes are available:

`GPGME_SIG_MODE_NORMAL`

A normal signature is made, the output includes the plaintext and the signature.

`GPGME_SIG_MODE_DETACH`

A detached signature is made.

`GPGME_SIG_MODE_CLEAR`

A clear text signature is made. The ASCII armor and text mode settings of the context are ignored.

-- Function: `gpgme_error_t gpgme_op_sign`

```
(gpgme_ctx_t CTX,  
    gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)
```

The function `gpgme_op_sign` creates a signature for the text in the data object `PLAIN` and returns it in the data object `SIG`. The type of the signature created is determined by the ASCII armor (or, if that is not set, by the encoding specified for `SIG`), the text mode attributes set for the context `CTX` and the requested signature mode `MODE`.

After the operation completed successfully, the result can be retrieved with `gpgme_op_sign_result`.

If an S/MIME signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with `gpgme_set_include_certs`. *Note Included Certificates::.

The function returns the error code `GPG_ERR_NO_ERROR` if the signature could be created successfully, `GPG_ERR_INV_VALUE` if `CTX`, `PLAIN` or `SIG` is not a valid pointer, `GPG_ERR_NO_DATA` if the signature could not be created, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, `GPG_ERR_UNUSABLE_SECKEY` if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_sign_start (gpgme_ctx_t CTX, gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)`
The function `gpgme_op_sign_start` initiates a `gpgme_op_sign` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `CTX`, `PLAIN` or `SIG` is not a valid pointer.

-- Data type: `gpgme_new_signature_t`
This is a pointer to a structure used to store a part of the result of a `gpgme_op_sign` operation. The structure contains the following members:

`gpgme_new_signature_t`

next

This is a pointer to the next new signature structure in the linked list, or `NULL` if this is the last element.

`gpgme_sig_mode_t` type

The type of this signature.

`gpgme_pubkey_algo_t` pubkey_algo

The public key algorithm used to create this signature.

`gpgme_hash_algo_t` hash_algo

The hash algorithm used to create this signature.

unsigned int sig_class

The signature class of this signature.

long int timestamp

The creation timestamp of this signature.

char *fpr

The fingerprint of the key which was used to create this signature.

-- Data type: `gpgme_sign_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_sign` operation. After successfully generating a signature, you can retrieve the pointer to the result with `gpgme_op_sign_result`. The structure contains the following members:

`gpgme_invalid_key_t`

`invalid_signers`

A linked list with information about all invalid keys for which a signature could not be created.

`gpgme_new_signature_t` `signatures`

A linked list with information about all signatures created.

-- Function: `gpgme_sign_result_t gpgme_op_sign_result (gpgme_ctx_t CTX)`

The function `gpgme_op_sign_result` returns a `gpgme_sign_result_t` pointer to a structure holding the result of a `gpgme_op_sign` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_sign`, `gpgme_op_sign_start`, `gpgme_op_encrypt_sign` or `gpgme_op_encrypt_sign_start` operation. If that operation failed, the function might return a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: `gpgme.info`, Node: Signature Notation Data, Prev: Creating a Signature, Up: Sign

7.6.4.3 Signature Notation Data

.....

Using the following

functions, you can attach arbitrary notation data to a signature. This information is then available to the user when the signature is verified.

-- Function: `void gpgme_sig_notation_clear (gpgme_ctx_t CTX)`

SINCE: 1.1.0

The function `gpgme_sig_notation_clear` removes the notation data from the context `CTX`. Subsequent signing operations from this context will not include any notation data.

Every context starts with an empty notation data list.

```
-- Function: gpgme_error_t gpgme_sig_notation_add (gpgme_ctx_t CTX,  
    const char *NAME, const char *VALUE,  
    gpgme_sig_notation_flags_t FLAGS)  
SINCE: 1.1.0
```

The function `gpgme_sig_notation_add` adds the notation data with the name `NAME` and the value `VALUE` to the context `CTX`.

Subsequent signing operations will include this notation data, as well as any other notation data that was added since the creation of the context or the last `gpgme_sig_notation_clear` operation.

The arguments `NAME` and `VALUE` must be NUL-terminated strings in human-readable form. The flag `GPGME_SIG_NOTATION_HUMAN_READABLE` is implied (non-human-readable notation data is currently not supported). The strings must be in UTF-8 encoding.

If `NAME` is `NULL`, then `VALUE` should be a policy URL.

The function `gpgme_sig_notation_add` returns the error code `GPG_ERR_NO_ERROR` if the notation data could be added successfully, `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, or if `NAME`, `VALUE` and `FLAGS` are an invalid combination. The function also passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_sig_notation_t gpgme_sig_notation_get  
    (const gpgme_ctx_t CTX)  
SINCE: 1.1.0
```

The function `gpgme_sig_notation_get` returns the linked list of notation data structures that are contained in the context `CTX`.

If `CTX` is not a valid pointer, or there is no notation data added for this context, `NULL` is returned.

File: `gpgme.info`, Node: Encrypt, Prev: Sign, Up: Crypto Operations

7.6.5 Encrypt

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then

passed to the encryption operation.

* Menu:

* Encrypting a Plaintext:: How to encrypt a plaintext.

File: gpgme.info, Node: Encrypting a Plaintext, Up: Encrypt

7.6.5.1 Encrypting a Plaintext

.....

-- Function: gpgme_error_t gpgme_op_encrypt (gpgme_ctx_t CTX,
 gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,
 gpgme_data_t PLAIN, gpgme_data_t CIPHER)

The function `gpgme_op_encrypt` encrypts the plaintext in the data object `PLAIN` for the recipients `RECP` and stores the ciphertext in the data object `CIPHER`. The type of the ciphertext created is determined by the ASCII armor (or, if that is not set, by the encoding specified for `CIPHER`) and the text mode attributes set for the context `CTX`.

`RECP` must be a NULL-terminated array of keys. The user must keep references for all keys during the whole duration of the call (but see `gpgme_op_encrypt_start` for the requirements with the asynchronous variant).

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

GPGME_ENCRYPT_ALWAYS_TRUST

The `GPGME_ENCRYPT_ALWAYS_TRUST` symbol specifies that all the recipients in `RECP` should be trusted, even if the keys do not have a high enough validity in the keyring. This flag should be used with care; in general it is not a good idea to use any untrusted keys.

GPGME_ENCRYPT_NO_ENCRYPT_TO

SINCE: 1.2.0

The `GPGME_ENCRYPT_NO_ENCRYPT_TO` symbol specifies that no default or hidden default recipients as configured in the crypto backend should be included. This can be useful for managing different user profiles.

GPGME_ENCRYPT_NO_COMPRESS

SINCE: 1.5.0

The GPGME_ENCRYPT_NO_COMPRESS symbol specifies that the plaintext shall not be compressed before it is encrypted.

This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

GPGME_ENCRYPT_PREPARE

GPGME_ENCRYPT_EXPECT_SIGN

The GPGME_ENCRYPT_PREPARE symbol is used with the UI Server protocol to prepare an encryption (i.e. sending the PREP_ENCRYPT command). With the GPGME_ENCRYPT_EXPECT_SIGN symbol the UI Server is advised to also expect a sign command.

GPGME_ENCRYPT_SYMMETRIC

SINCE: 1.7.0

The GPGME_ENCRYPT_SYMMETRIC symbol specifies that the output should be additionally encrypted symmetrically even if recipients are provided. This feature is only supported for the OpenPGP

crypto engine.

GPGME_ENCRYPT_THROW_KEYIDS

SINCE: 1.8.0

The GPGME_ENCRYPT_THROW_KEYIDS symbol requests that the identifiers for the decryption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

GPGME_ENCRYPT_WRAP

SINCE: 1.8.0

The GPGME_ENCRYPT_WRAP symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to GPGME_DECRYPT_UNWRAP.

GPGME_ENCRYPT_WANT_ADDRESS

SINCE: 1.11.0

The GPGME_ENCRYPT_WANT_ADDRESS symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code GPG_ERR_INV_USER_ID

is

returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the RECPSTRING argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

If GPG_ERR_UNUSABLE_PUBKEY is returned, some recipients in RECP are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in CIPHER (if this happens depends on the crypto engine). More information about the invalid recipients is available with gpgme_op_encrypt_result.

If RECP is NULL, symmetric rather than public key encryption is performed. Symmetrically encrypted cipher text can be deciphered with gpgme_op_decrypt. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption is currently only supported for the OpenPGP crypto backend.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be created successfully, GPG_ERR_INV_VALUE if CTX, RECP, PLAIN or CIPHER is not a valid pointer, GPG_ERR_UNUSABLE_PUBKEY if RECP contains some invalid recipients, GPG_ERR_BAD_PASSPHRASE if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_encrypt_start (gpgme_ctx_t CTX,  
          gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,  
          gpgme_data_t PLAIN, gpgme_data_t CIPHER)
```

The function gpgme_op_encrypt_start initiates a gpgme_op_encrypt operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even if the operation is not yet finished.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if CTX, RSET, PLAIN or CIPHER is not a valid pointer, and GPG_ERR_UNUSABLE_PUBKEY if RSET does not contain any valid recipients.

```
-- Function: gpgme_error_t gpgme_op_encrypt_ext (gpgme_ctx_t CTX,  
          gpgme_key_t RECP[], const char *RECPSTRING,
```



```
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,  
gpgme_data_t CIPHER)
```

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is removed from each line in `RECPSTRING`. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

`--hidden`

`--no-hidden`

These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the `gpg` option `-R` (or `-F` in file mode) is used instead of `-r` (`-f` in file mode).

`--file`

`--no-file`

These keywords toggle between regular and file mode for all following key specification. In file mode the option `-f` or `-F` is passed to `gpg`. At least `GnuPG` version 2.1.14 is required to handle these options. The `GPGME_ENCRYPT_WANT_ADDRESS` flag is ignored in file mode.

`--`

This keyword disables all keyword detection up to the end of the string. All keywords are treated as verbatim arguments.

To create a `RECPSTRING` it is often useful to employ a `strconcat` style function. For example this function creates a string to encrypt to two keys:

```
char *  
xbuild_recstring (const char *key1, const char *key2)  
{  
    char *result = gpgmt_strconcat ("--\n", key1, "\n", key2, NULL);  
    if (!result)
```

```

    { perror ("strconcat failed"); exit (2); }
    return result;
}

```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used strconcat function is available in Libpgg-error 1.28 and later; Libpgg-error (aka Gpgrt) is a dependency of GPGME. The number of arguments to gpgrt_strconcat is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```

char *
xbuild_long_recpstring (void)
{
    gpgrt_stream_t memfp;
    const char *s;
    void *result;

    memfp = gpgrt_fopenmem (0, "w+b");
    if (!memfp)
        { perror ("fopenmem failed"); exit (2); }
    gpgrt_fputs ("--", memfp);
    while ((s = get_next_keyspec ()))
        {
            gpgrt_fputc ('\n', memfp);
            gpgrt_fputs (s, memfp);
        }
    gpgrt_fputc (0, memfp);
    if (gpgrt_ferror (memfp))
        { perror ("writing to memstream failed"); exit (2); }
    if (gpgrt_fclose_snatch (memfp, &result, NULL))
        { perror ("fclose_snatch failed"); exit (2); }
    return result;
}

```

In this example get_next_keyspec is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to gpg which has as a platform specific length limitation.

```

-- Function: gpgme_error_t gpgme_op_encrypt_ext_start (gpgme_ctx_t CTX,
    gpgme_key_t RECP[], const char *RECPSTRING,

```

gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_start` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

-- Data type: `gpgme_encrypt_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_encrypt`

operation. After successfully encrypting data,

you can retrieve the pointer to the result with

`gpgme_op_encrypt_result`. The structure contains the following members:

`gpgme_invalid_key_t invalid_recipients`

A linked list with information about all invalid keys for which the data could not be encrypted.

-- Function: `gpgme_encrypt_result_t gpgme_op_encrypt_result`
(`gpgme_ctx_t CTX`)

The function `gpgme_op_encrypt_result` returns a `gpgme_encrypt_result_t` pointer to a structure holding the result of a `gpgme_op_encrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_encrypt`, `gpgme_op_encrypt_start`, `gpgme_op_sign` or `gpgme_op_sign_start` operation. If this operation failed, this might be a `NULL` pointer. The returned pointer is only valid until the next operation is started on the context.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign` (`gpgme_ctx_t CTX`,
`gpgme_key_t RECP[]`, `gpgme_encrypt_flags_t FLAGS`,
`gpgme_data_t PLAIN`, `gpgme_data_t CIPHER`)

The function `gpgme_op_encrypt_sign` does a combined encrypt and sign operation. It is used like `gpgme_op_encrypt`, but the ciphertext also contains signatures for the signers listed in `CTX`.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_start`
(`gpgme_ctx_t CTX`, `gpgme_key_t RECP[]`,

gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

The function `gpgme_op_encrypt_sign_start` initiates a `gpgme_op_encrypt_sign` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `CTX`, `RSET`, `PLAIN` or `CIPHER` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_ext (gpgme_ctx_t CTX,
gpgme_key_t RECP[], const char *RECPSTRING,
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)`

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_sign` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_ext_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING,
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)`

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_sign_start` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

File: `gpgme.info`, Node: Miscellaneous, Next: Run Control, Prev: Crypto Operations, Up: Contexts

7.7 Miscellaneous operations

=====

Here are some support functions which are sometimes useful.

* Menu:

* Running other Programs:: Running other Programs

* Using the Assuan protocol:: Using the Assuan protocol

* Checking for updates:: How to check for software updates

File: gpgme.info, Node: Running other Programs, Next: Using the Assuan protocol, Up: Miscellaneous

7.7.1 Running other Programs

GPGME features an internal subsystem to run the actual backend engines.

Along

with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

```
-- Function: gpgme_error_t gpgme_op_spawn (gpgme_ctx_t CTX,  
      const char *FILE, const char *ARGV[], gpgme_data_t DATAIN,  
      gpgme_data_t DATAOUT, gpgme_data_t DATAERR,  
      unsigned int FLAGS)
```

SINCE: 1.5.0

The function `gpgme_op_spawn` runs the program `FILE` with the arguments taken from the NULL terminated array `ARGV`. If no arguments are required `ARGV` may be given as NULL. In the latter case or if `argv[0]` is the empty string, GPGME uses the basename of `FILE` for `argv[0]`. The file descriptors `stdin`, `stdout`, and `stderr` are connected to the data objects `DATAIN`, `DATAOUT`, and `DATAERR`. If NULL is passed for one of these data objects the corresponding file descriptor is connected to `/dev/null`.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

GPGME_SPAWN_DETACHED

SINCE: 1.5.0

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

GPGME_SPAWN_ALLOW_SET_FG

SINCE: 1.5.0

Under Windows this flag allows the called program to put itself into the foreground.

-- Function: `gpgme_error_t gpgme_op_spawn_start (gpgme_ctx_t CTX, const char *FILE, const char *ARGV[], gpgme_data_t DATAIN, gpgme_data_t DATAOUT, gpgme_data_t DATAERR, unsigned int FLAGS)`

SINCE: 1.5.0

This is the asynchronous variant of `gpgme_op_spawn`.

File: `gpgme.info`, Node: Using the Assuan protocol, Next: Checking for updates, Prev: Running other Programs, Up: Miscellaneous

7.7.2

Using the Assuan protocol

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using `gpgme_ctx_set_engine_info`, passing the location of the servers socket as `FILE_NAME` argument, and an empty string as `HOME_DIR` argument.

The Assuan protocol functions use three kinds of callbacks to transfer data:

-- Data type: `gpgme_error_t (*gpgme_assuan_data_cb_t) (void *OPAQUE, const void *DATA, size_t DATALEN)`

SINCE: 1.2.0

This callback receives any data sent by the server. `OPAQUE` is the pointer passed to `gpgme_op_assuan_transact_start`, `DATA` of length `DATALEN` refers to the data sent.

-- Data type: `gpgme_error_t (*gpgme_assuan_inquire_cb_t) (void *OPAQUE, const char *NAME, const char *ARGS, gpgme_data_t *R_DATA)`

SINCE: 1.2.0

This callback is used to provide additional data to the Assuan

server. OPAQUE is the pointer passed to gpgme_op_assuan_transact_start, NAME and ARGS specify what kind of data the server requested, and R_DATA is used to return the actual data.

Note: Returning data is currently not implemented in GPGME.

-- Data type: gpgme_error_t (*gpgme_assuan_status_cb_t) (void *OPAQUE, const char *STATUS, const char *ARGS)

SINCE: 1.2.0

This callback receives any status lines sent by the server. OPAQUE is the pointer passed to gpgme_op_assuan_transact_start, STATUS and ARGS denote the status update sent.

-- Function: gpgme_error_t gpgme_op_assuan_transact_start (gpgme_ctx_t CTX, const char *COMMAND, gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE, gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE, gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE)

SINCE: 1.2.0

Send the Assuan COMMAND and return results via the callbacks. Any callback may be NULL. The result of the operation may be retrieved using gpgme_wait_ext.

Asynchronous variant.

-- Function: gpgme_error_t gpgme_op_assuan_transact_ext (gpgme_ctx_t CTX, const char *COMMAND, gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE, gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE, gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE, gpgme_error_t *OP_ERR)

Send the Assuan COMMAND and return results via the callbacks. The result of the operation is returned in OP_ERR.

Synchronous variant.

File: gpgme.info, Node: Checking for updates, Prev: Using the Assuan protocol, Up: Miscellaneous

7.7.3 How to check for software updates

The GnuPG Project operates a server to query the current versions of software packages related to GnuPG. GPGME can be used to access this online database and check whether a new version of a software package is available.

-- Data type: `gpgme_query_swdb_result_t`
SINCE: 1.8.0

This is a pointer to a structure used to store the result of a `gpgme_op_query_swdb` operation. After success full call to that function, you can retrieve the pointer to the result with `gpgme_op_query_swdb_result`. The structure contains the following member:

`name`

This is the name of the package.

`iversion`

The currently installed version or an empty string. This value is either a copy of the argument given to `gpgme_op_query_swdb` or the version of the installed software as figured out by GPGME or GnuPG.

`created`

This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

`retrieved`

This gives the date the file was downloaded.

`warning`

If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could not be figured out, the update flag may not reflect a required update status.

`update`

If this flag is set an update of the software is available.

`urgent`

If this flag is set an available update is important.

`noinfo`

If this flag is set, no valid information could be retrieved.

unknown

If this flag is set the given name is not known.

toold

If this flag is set the available information is not fresh enough.

error

If this flag is set some other error has occurred.

version

The version string of the latest released version.

reldate

The release date of the latest released version.

-- Function: `gpgme_error_t gpgme_op_query_swdb (gpgme_ctx_t CTX, const char *NAME, const char *IVERSION, gpgme_data_t RESERVED)`

SINCE: 1.8.0

Query the software version database for software package NAME and check against the installed version given by IVERSION. If IVERSION is given as NULL a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If NULL is used for NAME the current gpgme version is checked. RESERVED must be set to 0.

-- Function: `gpgme_query_swdb_result_t gpgme_op_query_swdb_result (gpgme_ctx_t CTX)`

SINCE: 1.8.0

The function `gpgme_op_query_swdb_result` returns a `gpgme_query_swdb_result_t` pointer to a structure holding the result of a `gpgme_op_query_swdb` operation. The pointer is only valid if the last operation on the context was a successful call to `gpgme_op_query_swdb`. If that call failed, the result might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context CTX.

Here is an example on how to check whether GnuPG is current:

```
#include <gpgme.h>
```

```
int
```

```
main (void)
```

```

{
    gpg_error_t err;
    gpgme_ctx_t ctx;
    gpgme_query_swdb_result_t result;

    gpgme_check_version (NULL);
    err = gpgme_new (&ctx);
    if (err)
        fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
    else
        {
            gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

            err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
            if (err)
                fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
            else
                {
                    result = gpgme_op_query_swdb_result (ctx);
                    if (!result)
                        fprintf (stderr, "error querying swdb\n");
                    if (!result->warning && !result->update)
                        printf ("GnuPG version %s is current\n",
                               result->iversion);
                    else if (!result->warning && result->update)

                        printf ("GnuPG version %s can be updated to %s\n",
                               result->iversion, result->version);
                    else
                        fprintf (stderr, "error finding the update status\n");
                }
            gpgme_release (ctx);
        }
    return 0;
}

```

File: gpgme.info, Node: Run Control, Prev: Miscellaneous, Up: Contexts

7.8 Run Control

=====

GPGME supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when GPGME runs. This ensures that GPGME only runs when necessary and

also prevents it from blocking for a long time.

* Menu:

* Waiting For Completion:: Waiting until an operation is completed.

* Using External Event Loops:: Advanced control over what happens when.

* Cancellation:: How to
end pending operations prematurely.

File: gpgme.info, Node: Waiting For Completion, Next: Using External Event Loops, Up: Run Control

7.8.1 Waiting For Completion

-- Function: gpgme_ctx_t gpgme_wait (gpgme_ctx_t CTX,
 gpgme_error_t *STATUS, int HANG)

The function gpgme_wait continues the pending operation within the context CTX. In particular, it ensures the data exchange between GPGME and the crypto backend and watches over the run time status of the backend process.

If HANG is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in STATUS if gpgme_wait does not return NULL.

The CTX argument can be NULL. In that case, gpgme_wait waits for any context to complete its operation.

gpgme_wait can be used only in conjunction with any context that

has a pending operation initiated with one of the gpgme_op*_start functions except gpgme_op_keylist_start and gpgme_op_trustlist_start (for which you should use the corresponding gpgme_op*_next functions). If CTX is NULL, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect gpgme_wait.

In a multi-threaded environment, only one thread should ever call gpgme_wait at any time, regardless of whether CTX is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

The function returns the CTX of the context which has finished the operation. If HANG is false, and the timeout expires, NULL is returned and *status will be set to 0. If an error occurs, NULL is returned and the error is returned in *status.

File: gpgme.info, Node: Using External Event Loops, Next: Cancellation, Prev: Waiting For Completion, Up: Run Control

7.8.2 Using External Event Loops

GPGME hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrary long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if gpgme_wait is used without the HANG option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. GPGME will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading or writing. It is then the users responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, GPGME will never block. This gives the user more control over the program flow, and allows to perform other tasks when GPGME would block otherwise.

By using this advanced mechanism, GPGME can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

* Menu:

- * I/O Callback Interface:: How I/O callbacks are registered.
- * Registering I/O Callbacks:: How to use I/O callbacks for a context.
- * I/O Callback Example:: An example how to use I/O callbacks.
- * I/O Callback Example GTK+:: How to use GPGME with GTK+.
- * I/O Callback Example GDK:: How to use GPGME with GDK.
- * I/O Callback Example Qt:: How to use GPGME with Qt.

7.8.2.1 I/O Callback Interface

.....

-- Data type: `gpgme_error_t (*gpgme_io_cb_t) (void *DATA, int FD)`

The `gpgme_io_cb_t` type is the type of functions which GPGME wants to register as I/O callback handlers using the `gpgme_register_io_cb_t` functions provided by the user.

DATA and FD are provided by GPGME when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor FD.

The callback handler always returns 0, but you should consider the return value to be reserved for later use.

-- Data type: `gpgme_error_t (*gpgme_register_io_cb_t) (void *DATA, int FD, int DIR, gpgme_io_cb_t FNC, void *FNC_DATA, void **TAG)`

The `gpgme_register_io_cb_t` type is the type of functions which

can be called by GPGME to register an I/O callback function FNC for the file descriptor FD with the user. FNC_DATA should be passed as the first argument to FNC when the handler is invoked (the second argument should be FD). If DIR is 0, FNC should be called by the user when FD is ready for writing. If DIR is 1, FNC should be called when FD is ready for reading.

DATA was provided by the user when registering the `gpgme_register_io_cb_t` function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the event loop to which the file descriptor should be added.

GPGME will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with `gpgme_set_io_cbs`. It can also call this function when it is in an I/O callback handler for a file descriptor

associated to this context.

The user should return a unique handle in TAG identifying this I/O callback registration, which will be passed to the `gpgme_register_io_cb_t` function without interpretation when the file descriptor should not be monitored anymore.

-- Data type: void (*gpgme_remove_io_cb_t) (void *TAG)
The gpgme_remove_io_cb_t type is the type of functions which can be called by GPGME to remove an I/O callback handler that was registered before. TAG is the handle that was returned by the gpgme_register_io_cb_t for this I/O callback.

GPGME can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

-- Data type: enum gpgme_event_io_t
The gpgme_event_io_t type specifies the type of an event that is reported to the user by GPGME as a consequence of an I/O operation. The following events are defined:

GPGME_EVENT_START

The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled. TYPE_DATA is NULL and reserved for later use.

GPGME_EVENT_DONE

The operation is finished, the last I/O callback for this operation was removed. The accompanying TYPE_DATA points to a struct gpgme_io_event_done_data variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

GPGME_EVENT_NEXT_KEY

In a gpgme_op_keylist_start operation, the next key was received from the crypto engine. The accompanying TYPE_DATA is a gpgme_key_t variable that contains the key with one reference for the user.

-- Data type: void (*gpgme_event_io_cb_t)
(void *DATA,
gpgme_event_io_t TYPE, void *TYPE_DATA)
The gpgme_event_io_cb_t type is the type of functions which can be called by GPGME to signal an event for an operation running in a context which has I/O callback functions registered by the user.

DATA was provided by the user when registering the gpgme_event_io_cb_t function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the context in which this event has occurred.

TYPE will specify the type of event that has occurred. TYPE_DATA specifies the event further, as described in the above list of possible gpgme_event_io_t types.

GPGME can call this function in an I/O callback handler.

File: gpgme.info, Node: Registering I/O Callbacks, Next: I/O Callback Example, Prev: I/O Callback Interface, Up: Using External Event Loops

7.8.2.2 Registering I/O Callbacks

.....

-- Data type: struct gpgme_io_cbs

This structure is used to store the I/O callback interface functions described in the previous section. It has the following members:

gpgme_register_io_cb_t add

This is the function called by GPGME to register an I/O callback handler. It must be specified.

void *add_priv

This is passed as the first argument to the add function when it is called by GPGME. For example, it can be used to determine the event loop to which the file descriptor should be added.

gpgme_remove_io_cb_t remove

This is the function called by GPGME to remove an I/O callback handler. It must be specified.

gpgme_event_io_cb_t event

This is the function called by GPGME to signal an event for an operation. It must be specified, because at least the start event must be processed.

void *event_priv

This is passed as the first argument to the event function when it is called by GPGME. For example, it can be used to determine the context in which the event has occurred.

-- Function: void gpgme_set_io_cbs (gpgme_ctx_t CTX, struct gpgme_io_cbs *IO_CBS)

The function gpgme_set_io_cbs enables the I/O callback interface for the context CTX. The I/O callback functions are specified by IO_CBS.

If `IO_CBS->add` is `NULL`, the I/O callback interface is disabled for the context, and normal operation is restored.

-- Function: `void gpgme_get_io_cbs (gpgme_ctx_t CTX, struct gpgme_io_cbs *IO_CBS)`
The function `gpgme_get_io_cbs` returns the I/O callback functions set with `gpgme_set_io_cbs` in `IO_CBS`.

File: `gpgme.info`, Node: I/O Callback Example, Next: I/O Callback Example GTK+, Prev: Registering I/O Callbacks, Up: Using External Event Loops

7.8.2.3 I/O Callback Example

.....

To

actually use an external event loop, you have to implement the I/O callback functions that are used by GPGME to register and unregister file descriptors. Furthermore, you have to actually monitor these file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in GPGME is not predictable.

```
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>

/* The following structure holds the result of a crypto operation. */
struct op_result
{
    int done;
    gpgme_error_t err;
};

/* The following structure holds the
data associated with one I/O
callback. */
struct one_fd
{
```



```

int fd;
int dir;
gpgme_io_cb_t fnc;
void *fnc_data;
void *loop;
};

struct event_loop
{
    pthread_mutex_t lock;
#define MAX_FDS 32
    /* Unused slots are marked with FD being -1. */
    struct one_fd fds[MAX_FDS];
};

```

The following functions implement the I/O callback interface.

```

gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
          void **r_tag)
{
    struct event_loop *loop = data;
    struct one_fd *fds = loop->fds;
    int i;

    pthread_mutex_lock (&loop->lock);
    for (i = 0; i < MAX_FDS; i++)
    {
        if (fds[i].fd == -1)
        {
            fds[i].fd = fd;
            fds[i].dir = dir;
            fds[i].fnc = fnc;
            fds[i].fnc_data = fnc_data;
            fds[i].loop = loop;
            break;
        }
    }
    pthread_mutex_unlock (&loop->lock);
    if (i == MAX_FDS)
        return gpg_error (GPG_ERR_GENERAL);
    *r_tag = &fds[i];
    return 0;
}

void
remove_io_cb (void *tag)
{

```

```

struct one_fd *fd = tag;
struct event_loop *loop = fd->loop;

pthread_mutex_lock (&loop->lock);
fd->fd = -1;
pthread_mutex_unlock (&loop->lock);
}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
{
    struct op_result *result = data;

    /* We don't support list operations here. */
    if (type == GPGME_EVENT_DONE)
    {
        result->done = 1;
        result->err = *type_data;
    }
}

```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```

int
do_select (struct event_loop *loop)
{
    fd_set rfd;
    fd_set wfd;
    int i, n;
    int any = 0;
    struct timeval tv;
    struct one_fd *fdlist
= loop->fds;

    pthread_mutex_lock (&loop->lock);
    FD_ZERO (&rfd);
    FD_ZERO (&wfd);
    for (i = 0; i < MAX_FDS; i++)
        if (fdlist[i].fd != -1)
            FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfd);
    pthread_mutex_unlock (&loop->lock);

    tv.tv_sec = 0;
    tv.tv_usec = 1000;

    do
    {

```

```

    n = select (FD_SETSIZE, &rfd, &wfd, NULL, &tv);
}
while (n < 0 && errno == EINTR);

if (n < 0)
    return n; /* Error or timeout. */

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS && n; i++)
{
    if (fdlist[i].fd != -1)
    {
        if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfd))
        {
            assert (n);
            n--;
            any = 1;
            /* The I/O callback handler can register/remove callbacks,
               so we have to unlock the file descriptor list. */
            pthread_mutex_unlock (&loop->lock);
            (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
            pthread_mutex_lock (&loop->lock);
        }
    }
}
pthread_mutex_unlock (&loop->lock);
return any;
}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
{
    int ret;

    do
    {
        ret = do_select (loop);
    }
    while (ret >= 0 && !result->done);
}

```

The main function shows how to put it all together.

```

int
main (int argc, char *argv[])
{
    struct event_loop loop;
    struct op_result result;

```

```

gpgme_ctx_t ctx;
gpgme_error_t err;
gpgme_data_t sig, text;
int i;
pthread_mutexattr_t attr;
struct gpgme_io_cbs io_cbs =
{
    add_io_cb,
    &loop,
    remove_io_cb,
    event_io_cb,
    &result
};

init_gpgme ();

/* Initialize the loop structure. */

/* The mutex must be
recursive, since remove_io_cb (which acquires a
lock) can be called while holding a lock acquired in do_select. */
pthread_mutexattr_init (&attr);
pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
pthread_mutex_init (&loop.lock, &attr);
pthread_mutexattr_destroy (&attr);

for (i = 0; i < MAX_FDS; i++)
    loop.fds[i].fd = -1;

/* Initialize the result structure. */
result.done = 0;

err = gpgme_data_new_from_file (&sig, "signature", 1);
if (!err)
    err = gpgme_data_new_from_file (&text, "text", 1);
if (!err)
    err = gpgme_new (&ctx);
if (!err)
    {
        gpgme_set_io_cbs (ctx, &io_cbs);
        err = gpgme_op_verify_start (ctx, sig, text, NULL);
    }
if (err)
    {
        fprintf (stderr, "gpgme error: %s: %s\n",
                gpgme_strerror (err), gpgme_strerror (err));
        exit (1);
    }

```

```

    wait_for_op (&loop,
&result);
    if (!result.done)
    {
        fprintf (stderr, "select error\n");
        exit (1);
    }
    if (!result.err)
    {
        fprintf (stderr, "verification failed: %s: %s\n",
                gpgme_strsource (result.err), gpgme_strerror (result.err));
        exit (1);
    }
    /* Evaluate verify result. */
    ...
    return 0;
}

```

File: gpgme.info, Node: I/O Callback Example GTK+, Next: I/O Callback Example GDK, Prev: I/O Callback Example, Up: Using External Event Loops

7.8.2.4 I/O Callback Example GTK+

.....

The I/O callback interface can be used to integrate GPGME with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific setup.

```

#include <gtk/gtk.h>

struct my_gpgme_io_cb
{
    gpgme_io_cb_t fnc;
    void *fnc_data;
    guint input_handler_id
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
    struct my_gpgme_io_cb *iocb = data;
    (*(iocb->fnc)) (iocb->data, source);
}

```

```

}

void
my_gpgme_remove_io_cb (void *data)
{
    struct my_gpgme_io_cb *iocb = data;
    gtk_input_remove (data->input_handler_id);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
{
    struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
    iocb->fnc = fnc;
    iocb->data = fnc_data;
    iocb->input_handler_id = gtk_input_add_full (fd, dir
                                                ? GDK_INPUT_READ
                                                : GDK_INPUT_WRITE,
                                                my_gpgme_io_callback,
                                                0, iocb, NULL);

    *tag = iocb;
    return 0;
}

```

File: gpgme.info, Node: I/O Callback Example GDK, Next: I/O Callback Example Qt, Prev: I/O Callback Example GTK+, Up: Using External Event Loops

7.8.2.5 I/O Callback Example GDK

.....

The I/O callback interface can also be used to integrate GPGME with the GDK event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```

#include <gdk/gdk.h>

struct my_gpgme_io_cb
{
    gpgme_io_cb_t fnc;
    void *fnc_data;
    gint tag;
}

```

```

};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
    struct my_gpgme_io_cb *iocb = data;
    (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
    struct my_gpgme_io_cb *iocb = data;
    gdk_input_remove (data->tag);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
{
    struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
    iocb->fnc = fnc;
    iocb->data = fnc_data;
    iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
                                   my_gpgme_io_callback, iocb, NULL);
    *tag = iocb;
    return 0;
}

```

File: gpgme.info, Node: I/O Callback Example Qt, Prev: I/O Callback Example GDK, Up: Using External Event Loops

7.8.2.6 I/O Callback Example Qt

.....

The

I/O callback interface can also be used to integrate GPGME with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any Qt specific setup.

```

#include <qsocketnotifier.h>
#include <qapplication.h>

```

```

struct IOCB {
    IOCB( GpgmeIOCb f, void * d, QSocketNotifier * n )
        : func( f ), data( d ), notifier( n ) {}
    GpgmeIOCb func;
    void * data;
    QSocketNotifier * notifier;
}

class MyApp : public QApplication {

// ...

static void registerGpgmeIOCallback( void * data, int fd, int dir,
                                     GpgmeIOCb func, void * func_data,
                                     void ** tag ) {
    QSocketNotifier * n =
        new QSocketNotifier(
fd, dir ? QSocketNotifier::Read
                        : QSocketNotifier::Write );
    connect( n, SIGNAL(activated(int)),
            qApp, SLOT(slotGpgmeIOCallback(int)) );
    qApp->mIOCBs.push_back( IOCB( func, func_data, n ) );
    *tag = (void*)n;
}

static void removeGpgmeIOCallback( void * tag ) {
    if ( !tag ) return;
    QSocketNotifier * n = static_cast<QSocketNotifier*>( tag );
    for ( QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
          it != qApp->mIOCBs.end() ; ++it )
        if ( it->notifier == n ) {
            delete it->notifier;
            qApp->mIOCBs.erase( it );
            return;
        }
}

public slots:
void slotGpgmeIOCallback( int fd ) {
    for ( QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
          it != mIOCBs.end() ; ++it )
        if ( it->notifier && it->notifier->socket() == fd )
            (*(it->func))
( it->func_data, fd );
}

// ...

```



```
private:
    QValueList<IOCB> mIOCBs;
    // ...
};
```

File: gpgme.info, Node: Cancellation, Prev: Using External Event Loops, Up: Run Control

7.8.3 Cancellation

Sometimes you do not want to wait for an operation to finish. GPGME provides two different functions to achieve that. The function `gpgme_cancel` takes effect immediately. When it returns, the operation is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function `gpgme_cancel_async` can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

-- Function: `gpgme_ctx_t gpgme_cancel (gpgme_ctx_t CTX)`
SINCE: 0.4.5

The function `gpgme_cancel` attempts to cancel a pending operation in the context `CTX`. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call `gpgme_wait` during cancellation. After successful cancellation, you can call `gpgme_wait` (optionally waiting on `CTX`), and the context `CTX` will appear as if it had finished with the error code `GPG_ERR_CANCEL`.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a `GPGME_EVENT_DONE` event with the error code `GPG_ERR_CANCEL` will be signalled.

The function returns an error code if the cancellation failed (in this case the state of `CTX` is not modified).

-- Function: `gpgme_ctx_t gpgme_cancel_async (gpgme_ctx_t CTX)`
SINCE: 1.1.7

The function `gpgme_cancel_async` attempts to cancel a pending

operation

in the context CTX. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

File: gpgme.info, Node: UI Server Protocol, Next: Debugging, Prev: Contexts, Up: Top

Appendix A The GnuPG UI Server Protocol

This section specifies the protocol used between clients and a User Interface Server (UI server). This protocol helps to build a system where all cryptographic operations are done by a server and the server is responsible for all dialogs. Although GPGME has no direct support for this protocol it is believed that servers will utilize the GPGME library; thus having the specification included in this manual is an appropriate choice. This protocol should be referenced as The GnuPG UI Server Protocol.

A server needs to implement these commands:(1)

* Menu:

- * UI Server Encrypt:: Encrypt a message.
- * UI Server Sign:: Sign a message.
- * UI Server Decrypt:: Decrypt a message.
- * UI Server Verify:: Verify a message.
- * UI Server Set Input Files:: Specifying the input files to operate on.
- * UI Server Sign/Encrypt Files:: Encrypting and signing files.
- * UI Server Verify/Decrypt Files:: Decrypting and verifying files.
- * UI Server Import/Export Keys:: Managing certificates.
- * UI Server Checksum Files:: Create and verify checksums for files.
- * Miscellaneous UI Server Commands:: Commands not related to a specific operation.

----- Footnotes -----

(1) In all examples we assume that the connection has already been established; see the Assuan manual for details.

File: gpgme.info, Node: UI Server Encrypt, Next: UI Server Sign, Up:

UI Server Protocol

A.1 UI Server: Encrypt a Message

=====

Before encryption can be done the recipients must be set using the command:

-- Command: RECIPIENT STRING

Set the recipient for the encryption. `STRING` is an RFC-2822 recipient name ("mailbox" as per section 3.4). This command may or may not check the recipient for validity right away; if it does not all recipients are expected to be checked at the time of the `ENCRYPT` command. All `RECIPIENT` commands are cumulative until a successful `ENCRYPT` command or until a `RESET` command. Linefeeds are obviously not allowed in `STRING` and should be folded into spaces (which are equivalent).

To tell the server the source and destination of the data, the next two commands are to be used:

-- Command: INPUT FD=N

Set the file descriptor for the message to be encrypted to `N`. The message send to the server is binary encoded.

GpgOL is a Windows only program, thus `N` is not a libc file descriptor but a regular system handle. Given that the Assuan connection works over a socket, it is not possible to use regular inheritance to make the file descriptor available to the server. Thus `DuplicateHandle` needs to be used to duplicate a handle to the server process. This is the reason that the server needs to implement the `GETINFO pid` command. Sending this command a second time replaces the file descriptor set by the last one.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output (i.e. the encrypted message) to `N`. If the option `--binary` is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the `INPUT` command.

The setting of the recipients, the data source and destination may happen in any order, even intermixed. If this has been done the actual encryption operation is called using:

-- Command: ENCRYPT --protocol=NAME

This command reads the plaintext from the file descriptor set by the INPUT command, encrypts it and writes the ciphertext to the file descriptor set by the OUTPUT command. The server may (and should) overlap reading and writing. The recipients used for the encryption are all the recipients set so far. If any recipient is not usable the server should take appropriate measures to notify the user about the problem and may cancel the operation by returning an error code. The used file descriptors are void after this command; the recipient list is only cleared if the server returns success.

Because GpgOL uses a streaming mode of operation the server is not allowed to auto select the protocol and must obey to the mandatory PROTOCOL parameter:

OpenPGP

Use the OpenPGP protocol (RFC-2440).

CMS

Use the CMS
(PKCS#7) protocol (RFC-3852).

To support automatically selection of the protocol depending on the selected keys, the server MAY implement the command:

-- Command: PREP_ENCRYPT [--protocol=NAME] [--expect-sign]

This commands considers all recipients set so far and decides whether it is able to take input and start the actual encryption. This is kind of a dry-run ENCRYPT without requiring or using the input and output file descriptors. The server shall cache the result of any user selection to avoid asking this again when the actual ENCRYPT command is send. The --protocol option is optional; if it is not given, the server should allow the user to select the protocol to be used based on the recipients given or by any other means.

If --expect-sign is given the server should expect that the message will also be signed and use this hint to present a unified recipient and signer selection dialog if possible and desired.

A

selected signer should then be cached for the expected SIGN command (which is expected in the same session but possible on another connection).

If this command is given again before a successful ENCRYPT command, the second one takes effect.

Before sending the OK response the server shall tell the client the protocol to be used (either the one given by the argument or the one selected by the user) by means of a status line:

-- Status line: PROTOCOL NAME

Advise the client to use the protocol NAME for the ENCRYPT command. The valid protocol names are listed under the description of the ENCRYPT command. The server shall emit exactly one PROTOCOL status line.

Here is an example of a complete encryption sequence; client lines are indicated by a C:, server responses by S::

```
C: RESET
S: OK
C: RECIPIENT foo@example.net
S: OK
C: RECIPIENT bar@example.com
S: OK
C: PREP_ENCRYPT
S: S PROTOCOL OpenPGP
S: OK
C: INPUT FD=17
S: OK
C: OUTPUT FD=18
S: OK
C: ENCRYPT
S: OK
```

File: gpgme.info, Node: UI Server Sign, Next: UI Server Decrypt, Prev: UI Server Encrypt, Up: UI Server Protocol

A.2 UI Server: Sign a Message

=====

The server needs to implement opaque signing as well as detached signing. Due to the nature of OpenPGP messages it is always required to send the entire message to the server; sending just the hash is not possible. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N

Set the file descriptor for the message to be signed to N. The message send to the server is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output. The output is

either the complete signed message or in case of a detached signature just that detached signature. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

To allow the server the selection of a non-default signing key the client may optionally use the SENDER command, see *note command SENDER::.

The signing operation is then initiated by:

-- Command: SIGN --protocol=NAME [--detached]

Sign the data set with the INPUT command and write it to the sink set by OUTPUT. NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. With option --detached given, a detached signature is created; this is actually the usual way the command is used.

The client expects the server to send at least this status information before the final OK response:

-- Status line: MICALG STRING

The STRING represents the hash algorithm used to create the signature. It is used with RFC-1847 style signature messages and defined by PGP/MIME (RFC-3156) and S/MIME (RFC-3851). The GPGME library has a supporting function gpgme_hash_algo_name to return the algorithm name as a string. This string needs to be lowercased and for OpenPGP prefixed with "pgp-".

-----BEGIN PGP PRIVATE KEY BLOCK-----

```
IQOYBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAttrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BzkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJIO1s0N2c
PSht98QRzPMf2owgVvk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRjLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAEAB/wLJ0gyMjs2ffft83wM
5Lzz2yQIwV4t3bbIBAuJdHTqeN5Zmsm/oakFyjSokULK96Kv0R4ej9eoIgmFvxFk
HRkrngxTrbsNJ7I6QcKYHTPeIj318ykNL6fj0WJUcdPIENukX15jbqNyk3/4D2y
TTDySyq6jHTgvMH4K4KJUSpglvSJPntTk9RhuFGHAF+sNR9atygDYctAaERMrtSg
LCoSt/AoX5GRMIQjXT9oqQjwSQoZyF4s8HMC8wdTFIE/E0L4IVdHVP8sz2UzNtT
W/evmCA+KVruKjRH/Fhrq4hHkEamW28+j4L6uAyagONP7BONs+S5Oo2zTT9+tV2R
```

ILTZBADdLuAgF6C5Lu9jCF6DfFgaT/uafMyQNkEGNlxOHMWHTgLHe475V2eG9gA
amd4yXKyEFKU1PWnvlGuicQSGdzVcwmq61msvXgYD0FK3LP3yWzKnE4X1tzc9Vp
/uHJxKjcwCuyt1f5in919v+T8TbUxBYKC0zX/qWtX+10cTx77QQA6leqhToJ95Yc
u4UBrKMEO+y2v8Svb3LG7yI5oY8tkw0EkJ/kpZ8xTAFZYCe6fXdVVE3PHg2lrxyc
Wv/EU3QY/qA3G82mbXYeJ2jNZaTNYo4MylMrt4Mx25x4ke7JIsE8SVrQ+4CrHkqp
OjSIa7fppLrQ78uW980AtN8NNQGrlTsD/A9aoA60IgxylQ3K2uSyDCyjLknv57ym
ZSBD3/t7m0l6Q6gbdfhNGosT+Hd4y3actqEqzXZHW2VG4dKZ/wRNkxtSm9adU9vs
EHyzxjb6mKIH32zAG5TafT20hC+NK6lsyHr9UE2ZrS6ma2sLxGW2O40hqNsdD+5m
NrqeBc2l/js1PMK0EHRlc3RAZXhbbXBsZS5vcmeJAVQEEwEIAD4WIQTUFzW5Ejb9
uIIejFojAWNe7/DLBQUCWuwoSQIbAwUJA8JnAAULCQgHAgYVCgkICwIEFgIDAQIe
AQIXgAAKCRajAWNe7/DLBf9kB/wOQ/S60HGwFq07W9N01HWULyhHKOmmHL6rfZ6
4oDqLxolPSasz7WAMW1jN4qtWJ0mFzwo83V6kaBe+wF6Kqir6udFSBW9rPcFg6/V
ZXPtT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rNgkYo1JCBR0XdRJYCSX3yB4TWv/eX
nZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k70DevQeBsv+UjVXjWpNTZmPbvDnd9
95uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6UunOf9Rlp1oMzdxMool/d1MICxg2h
3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ1J8Nsv87SZeEnQOYBFrsKEKBCADj
oEBhG/QPqZHg8VyoD1xYRAWGxyDjKX/GrSs6yE+x2hk5FoQCajxKa/d4AVxOnJpd
whAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0pO7bgAiZxkA6RHxtNqhpPnPQoXvUz
kzpRgpuL+Nj4ylg7z1ITH6KQH4u5SI9vd+j/8i9Taz67pdZwuJjac8qBuJHjzAo1
bjYctFYUSG5pbmMQyNLYSzgiNkFa4DajODlt3RuqVGP316Fk+Sy2+60tC/HIX8jg
MyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyLUGKU+L8cB2g1PGGp2biBFWqZbudZ
oyRBet/0yH/zirBdQJw1ABEBAAEAB/4IN3gXOI4OuoOcsvHak4pebx61Mt0YP9cT
qZASIBqxok5x8E28pFh/tYfkYdqRCtdNYZOnxcEoUWh5j6nfwZkEnJ9P/T8GPNk7
pMKnKXmExi05b5uGHD8nU1rSbf/YkvAF0vpxd4/RDxbbtQhbUwGzusSI+pBLM0w
5TreEB+vRGBc2gOvXXOtKLNEa7M9rH2EwbAkP3jOGGwgk6adxbQdBcRqx4merqHL
YrVz73bcj8TDc0fsNjyIaZJZ++ejfBFYavsF1pvx9z7FNFf8rSXoiB3SBtaWGfhr
bwNaMzrDc7TRIqf/gaL6g//bzcWrr1YaHXZ10Bgx6UymDOIYkCpBADm0Hv46sPw
07SO8+IACcaQliOto1pndOPwTimCe058/7rf8I2a5uuJloGrnPwAX65bKDnUALp6
X3lnXRNmhnB3Uewx4i00LQmjsxhJfQiGLpMv0j58tn64s7GqQzGVV1JKcQm992RV
jFOydyjZ+K4LGWEOITG/bZrMEVNGCM+OnQQA/Haz8xN0NFS1q7tyfFc0pkx/TiCX
xGfBqB00wU2b5GMnZbY/06HENpidIzpa231VQaw5/nPTvfhlLKW1iGAkc148cX1q
IL9w2ksXuaHR3LXud2VcfVTIdXU/7h7u1dD/85+c0+7jlGObD9cXKx1M6OjpIJ1
l5/1h3C5S0TuxHkEAL/3BGihkhNfv1XxOrWu0/732usX/nE/A9C26hGu41FUf3fp
0ilonKpKZUEwWt5hWSEFCSrznNVekiO0rxvuu3RVegvzThPNU4Pf4JZtJpRVhvUQ
d9ulxJw7V9rs75uNBatTNC0kXuGoXhehw4Bn93xa67gYGd3LfrH+oT0GCDpTSHCJ
ATwEGAEIACYWIQTUFzW5Ejb9uIIejFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAK
CRAjAWNe7/DLBf0pCACPP5hBuUWngu2Hqvg+tNiujsiYzId3MffFxEk3CbXeHcJ
5F32NDJ9PYCnra4L8wSv+NZt9gIa8IFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7
Jq3e/4Iy0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02L
kr+2Cc/Qk6H+vINOHGRgnpl/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe
23nntMSDA+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t
9Mmd7bM1+UyPgbPER0iWMeyctYsuOLEUyQKMscDT
=hkUm
-----END
PGP PRIVATE KEY BLOCK-----
from __future__ import absolute_import

import cython

```

import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

if cython.compiled is True:
    cc = "Powered by Cython compiled C code."
else:
    cc = "Powered by Python."

print("""
    Number of secret keys: {0}
    Number of public keys: {1}

{2}
""").format(secnum, pubnum, cc)
This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

```

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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gpgme.info-1: 1688

gpgme.info-2: 301751

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End Tag Table

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@documentencoding UTF-8

@setfilename gpgme.info

@include defs.inc

@settitle The `GnuPG Made Easy' Reference Manual

@dircategory GNU Libraries

@direntry

* @acronym{GPGME}: (gpgme). Adding support for cryptography to your program.

@end direntry

@c Unify some of the indices.

@syncodeindex tp fn

@syncodeindex pg fn

@copying

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@quotation

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@end quotation

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@end copying

@c Macros used by the description of the UI server protocol

@macro clnt{string}

@sc{c:} \string\

@end macro

@macro srvr{string}

@sc{s:} \string\

@end macro

@c API version.

@macro since{string}

@sc{Since:} \string\

@end macro

@c

@c T I T L E P A G E

@c

@ifinfo

This file documents the @acronym{GPGME} library.

This is Edition @value{EDITION}, last updated @value{UPDATED}, of @cite{The `GnuPG Made Easy' Reference Manual}, for Version @value{VERSION}.

@c NOTE: Don't forget to update the year for the TeX version, too.

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@end ifinfo

@c We do not want that bastard short titlepage.

@c @iftex

@c @shorttitlepage The `GnuPG Made Easy' Reference Manual
@c @end iftex
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@center @titlefont{Reference Manual}
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@sp 1
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by The GnuPG Project@* c/o g10 Code GmbH@* Httenstr. 61@* 40699 Erkrath, Germany

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@end titlepage
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@summarycontents
@contents

@ifnottex
@node Top
@top Main Menu
This is Edition @value{EDITION}, last updated @value{UPDATED}, of
@cite{The `GnuPG Made Easy' Reference Manual}, for Version
@value{VERSION} of the @acronym{GPGME} library.
@end ifnottex

@menu
* Introduction:: How to use this manual.
* Preparation:: What you should do before using the library.
* Protocols and Engines:: Supported crypto protocols.
* Algorithms:: Supported algorithms.
* Error Handling:: Error numbers and their meanings.
* Exchanging Data:: Passing data to and from @acronym{GPGME}.
* Contexts:: Handling @acronym{GPGME} contexts.

Appendices

* UI Server Protocol:: The GnuPG UI Server Protocol.
* Debugging:: How to solve problems.
* Deprecated
Functions:: Documentation of deprecated functions.

- * **Library Copying::** The GNU Lesser General Public License says how you can copy and share 'GnuPG Made Easy'.
- * **Copying::** The GNU General Public License says how you can copy and share this manual.

Indices

- * **Concept Index::** Index of concepts and programs.
- * **Function and Data Index::** Index of functions, variables and data types.

@detailmenu

--- The Detailed Node Listing ---

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- * **Getting Started::** Purpose of the manual, and how to use it.
- * **Features::** Reasons to install and use @acronym{GPGME}.
- * **Overview::** Basic architecture of the @acronym{GPGME} library.

Preparation

- * **Header::** What header file you need to include.
- * **Building the Source::** Compiler options to be used.
- * **Largefile Support (LFS)::**
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- * **Using Automake::** Compiler options to be used the easy way.
- * **Using Libtool::** Avoiding compiler options entirely.
- * **Library Version Check::** Getting and verifying the library version.
- * **Signal Handling::** How @acronym{GPGME} affects signal handling.
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- * Destroying Data Buffers:: Releasing data buffers.
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*
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- * Result Management:: Managing the result of crypto operations.
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* I/O Callback Interface:: How I/O callbacks are registered.

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* I/O Callback Example:: An example how to use I/O callbacks.

* I/O Callback Example GTK+:: How to integrate @acronym{GPGME} in GTK+.

* I/O Callback Example GDK:: How to integrate @acronym{GPGME} in GDK.

* I/O Callback Example Qt:: How to integrate @acronym{GPGME} in Qt.

@end detailmenu

@end menu

@node Introduction

@chapter Introduction

`GnuPG Made Easy' (@acronym{GPGME}) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. @acronym{GPGME} provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

@acronym{GPGME} uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

@menu

* Getting Started:: Purpose of the manual, and how to use it.

* Features:: Reasons to install and use @acronym{GPGME}.

* Overview:: Basic architecture of the @acronym{GPGME} library.

@end menu

@node Getting Started

@section Getting Started

This manual documents the @acronym{GPGME} library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to @acronym{GPGME} or its users.

This manual can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those languages bindings follow the general programming model of `@acronym{GPGME}` but may provide some extra high level abstraction on top of the `@acronym{GPGME}` style API. For now please see the README files in the `@file{lang/}` directory of the source distribution.

`@node Features`

`@section Features`

`@acronym{GPGME}` has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

`@table @asis`

`@item it's free software`

Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (`@pxref{Library Copying}`).

`@item it's flexible`

`@acronym{GPGME}` provides transparent support for several cryptographic protocols by different engines. Currently, `@acronym{GPGME}` supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

`@item it's easy`

`@acronym{GPGME}` hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for `@acronym{GPGME}` has been added to a program, it is easy to add support for other crypto protocols once `@acronym{GPGME}` backends provide them.

`@item it's language friendly`

`@acronym{GPGME}`

comes with languages bindings for several common programming languages: Common Lisp, C++, Python 2, and Python 3.

@end table

@node Overview

@section Overview

@acronym{GPGME} provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, @acronym{GPGME} has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, @acronym{GPGME} can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

@node Preparation

@chapter Preparation

To use @acronym{GPGME}, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

@menu

- * Header:: What header file you need to include.
- * Building the Source:: Compiler options to be used.
- * Largefile Support (LFS):: How to use @acronym{GPGME} with LFS.
- * Using Automake:: Compiler options to be used the easy way.
- * Using Libtool:: Avoiding compiler options entirely.
- * Library Version Check:: Getting and verifying the library version.
- * Signal Handling::

How `@acronym{GPGME}` affects signal handling.

* Multi-Threading:: How `@acronym{GPGME}` can be used in an MT environment.

@end menu

@node Header

@section Header

@cindex header file

@cindex include file

All interfaces (data types and functions) of the library are defined in the header file ``gpgme.h'`. You must include this in all programs using the library, either directly or through some other header file, like this:

@example

```
#include <gpgme.h>
```

@end example

The name space of `@acronym{GPGME}` is `@code{gpgme_*}` for function names and data types and `@code{GPGME_*}` for other symbols. Symbols internal to `@acronym{GPGME}` take the form `@code{_gpgme_*}` and `@code{_GPGME_*}`.

Because `@acronym{GPGME}` makes use of the GPG Error library, using `@acronym{GPGME}` will also use the `@code{GPG_ERR_*}` name space directly, and the `@code{gpg_err*}`, `@code{gpg_str*}`, and `@code{gpgtr_*}` name space indirectly.

@node Building the Source

@section Building the Source

@cindex compiler options

@cindex

compiler flags

If you want to compile a source file including the ``gpgme.h'` header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the `@option{-I}` option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, `gpgme` ships with a small helper program `@command{gpgme-config}` that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the `@option{--cflags}` option to `@command{gpgme-config}`. The following example shows how it can be used at the command line:

```
@example
gcc -c foo.c `gpgme-config --cflags`
@end example
```

Adding the output of `@samp{gpgme-config --cflags}` to the compiler command line will ensure that the compiler can find the `@acronym{GPGME}` header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the `@option{-L}` option). For this, the option `@option{--libs}` to `@command{gpgme-config}` can be used. For convenience, this option also outputs all other options that are required to link the program with `@acronym{GPGME}` (in particular, the `@samp{-lgpgme}` option). The example shows how to link `@file{foo.o}` with the `@acronym{GPGME}` library to a program `@command{foo}`.

```
@example
gcc -o foo foo.o `gpgme-config --libs`
@end example
```

Of course you can also combine both examples to a single command by specifying both options to `@command{gpgme-config}`:

```
@example
gcc -o foo foo.c `gpgme-config --cflags --libs`
@end example
```

If you need to detect the installed language bindings you can use `list` them using:

```
@example
gpgme-config --print-lang
@end example
```

or
test for the availability using

```
@example
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
@end example
```

```
@node Largefile Support (LFS)
@section Largefile Support (LFS)
```

@cindex largefile support

@cindex LFS

@acronym{GPGME} is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type @code{off_t} is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type @code{off64_t} is provided, which is 64 bit wide. Or you can replace the existing @code{off_t} data type with its 64 bit wide counterpart. All occurrences of @code{off_t} are then automatically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for @acronym{GPGME}, because some data types it uses in its interfaces are affected by that. For example, the @code{off_t} data type is used in the @code{gpgme_data_seek} function, to match its @acronym{POSIX} counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms `@acronym{GPGME}` is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the `@file{gpgme.h}` header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms `@code{off_t}` is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (`@code{CreateFile}` et al.) for large files. Released binary versions of `@acronym{GPGME}` (`libgpgme-11.dll`) have always been build with a 32 bit `@code{off_t}`. To avoid an ABI break we stick to this convention for 32 bit Windows by using `@code{long}` there. `@acronym{GPGME}` versions for 64 bit Windows have never been released and thus we are able to use `@code{int64_t}` instead of `@code{off_t}` there. For easier migration the typedef `@code{gpgme_off_t}` has been defined. The reason we cannot use `@code{off_t}` directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for `@code{off_t}`. Some widely used toolkits make use of this hack and in turn `@acronym{GPGME}` would need to use it also. However, this would introduce an ABI break and existing software making use of `libgpgme` might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using `@code{off_t}` to use `@code{gpgme_off_t}` which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in `@acronym{GPGME}` is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro `@code{AC_SYS_LARGEFILE}`. If you do this, then you don't need to worry about anything else: It will just work. In this case you might also want to use `@code{AC_FUNC_FSEEKO}` to take advantage of some new interfaces, and `@code{AC_TYPE_OFF_T}` (just in case).

If you do not use Autoconf, you can define the preprocessor symbol `@code{_FILE_OFFSET_BITS}` to 64 `@emph{before}` including any header files, for example by specifying the option `@code{-D_FILE_OFFSET_BITS=64}` on the compiler command line. You will also want to define the preprocessor symbol `@code{LARGEFILE_SOURCE}` to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the `@acronym{GPGME}` header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (`@code{_LARGEFILE64_SOURCE}`).

```
@node Using Automake
@section Using Automake
@cindex automake
@cindex autoconf
```

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the `@command{gpgme-config}` script at all. `@acronym{GPGME}` provides an extension to Automake that does all the work for you.

```
@c A simple macro for optional variables.
@macro ovar{varname}
@r{[]@var{\varname\}@r{[]}
@end
macro
@defmac AM_PATH_GPGME (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTH (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTHREAD (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
Check whether @acronym{GPGME} (at least version @var{minimum-version}, if given) exists on the host system. If it is found, execute @var{action-if-found}, otherwise do @var{action-if-not-found}, if given.
```

Additionally, the function defines `@code{GPGME_CFLAGS}` to the flags needed for compilation of the program to find the `@file{gpgme.h}` header file, and `@code{GPGME_LIBS}` to the linker flags needed to link the program to the `@acronym{GPGME}` library. If the used helper script does not match the target type you are building for a warning is printed and the string `@code{libgcrypt}` is appended to the variable `@code{gpg_config_script_warn}`.

```
@code{AM_PATH_GPGME_PTH}
checks for the version of @acronym{GPGME}
that can be used with GNU Pth, and defines @code{GPGME_PTH_CFLAGS} and
@code{GPGME_PTH_LIBS}.
```

```
@code{AM_PATH_GPGME_PTHREAD} checks for the version of @acronym{GPGME}
that can be used with the native pthread implementation, and defines
@code{GPGME_PTHREAD_CFLAGS} and @code{GPGME_PTHREAD_LIBS}. Since
```

version 1.8.0 this is no longer required to GPGME_PTHREAD as @acronym{GPGME} itself is thread safe.

This macro searches for @command{gpgme-config} along the PATH. If you are cross-compiling, it is useful to set the environment variable @code{SYSROOT} to the top directory of your target. The macro will then first look for the helper program in the @file{bin} directory below that top directory. An absolute directory name must be used for @code{SYSROOT}. Finally, if the configure command line option @code{--with-gpgme-prefix} is used, only its value is used for the top directory below which the helper script is expected.

@end defmac

You can use the defined Autoconf variables like this in your @file{Makefile.am}:

```
@example
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
@end example
```

@node Using Libtool
@section Using Libtool
@cindex libtool

The easiest way is to just use GNU Libtool. If you use libtool, and link to @code{libgpgme.la}, @code{libgpgme-pth.la} or @code{libgpgme-pthread.la} respectively, everything will be done automatically by Libtool.

@node Library Version Check
@section Library Version Check
@cindex version check, of the library

```
@deftypefun {const char *} gpgme_check_version (@w{const char *}@var{required_version})
```

The function @code{gpgme_check_version} has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems, and for this reason alone it must be invoked early in your program, before you make use of the other functions in

@acronym{GPGME}. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If `@var{required_version}` is `@code{NULL}`, the function returns a pointer to a statically allocated string containing the version number of the library.

If `@var{required_version}` is not `@code{NULL}`, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If `@var{REQUIRED_VERSION}` is not a valid version number, or if the version requirement is not met, the function returns `@code{NULL}`.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking `@code{gpgme_new}` or `@code{gpgme_data_new}`, so that a detailed error code can be returned (historically, `@code{gpgme_check_version}` does not return a detailed error code).

`@end deftypefun`

```
@deftypefun {int} gpgme_set_global_flag @
  (@w{const char *@var{name}}, @
  @w{const char *@var{value}})
```

`@since{1.4.0}`

On some systems it is not easy to set environment variables and thus hard to use `@acronym{GPGME}`'s internal trace facility for debugging. This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses `@acronym{GPGME}` functions between a call to this function and after the return from the call to `@code{gpgme_check_version}`.

All currently supported features require that this function is called as early as possible

--- even before `@code{gpgme_check_version}`. The features are identified by the following values for `@var{name}`:

`@table @code`

`@item debug`

To enable debugging use the string ```debug``` for `@var{name}` and `@var{value}` identical to the value used with the environment variable `@code{GPGME_DEBUG}`.

`@item disable-gpgconf`

Using this feature with any `@var{value}` disables the detection of the `gpgconf` program and thus forces GPGME to fallback into the simple OpenPGP only mode. It may be used to force the use of GnuPG-1 on systems which have both GPG versions installed. Note that in general the use of `@code{gpgme_set_engine_info}` is a better way to select a specific engine version.

`@item gpgconf-name`

`@itemx gpg-name`

Set the name of the `gpgconf` respective `gpg` binary. The defaults are `@code{GNU/GnuPG/gpgconf}` and `@code{GNU/GnuPG/gpg}`. Under Unix the leading directory part is ignored. Under Windows the leading directory part is used as the default installation directory; the `@code{.exe}` suffix is added by GPGME. Use forward slashed even under Windows.

`@item require-gnupg`

Set the minimum version of the required GnuPG engine. If that version is not met, GPGME fails early instead of trying to use the existent version. The given version must be a string with major, minor, and micro number. Example: "2.1.0".

`@item w32-inst-dir`

On Windows GPGME needs to know its installation directory to find its spawn helper. This is in general no problem because a DLL has this information. Some applications however link statically to GPGME and thus GPGME can only figure out the installation directory of this application which may be wrong in certain cases. By supplying an installation directory as value to this flag, GPGME will assume that that directory is the installation directory. This flag has no effect on non-Windows platforms.

`@end table`

This function returns `@code{0}` on success. In contrast to other functions the non-zero return value on failure does not convey any error

code. For setting ``debug" the only possible error cause is an out of memory condition; which would exhibit itself later anyway. Thus the return value may be ignored.

```
@end deftypefun
```

After initializing @acronym{GPGME}, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

```
@example
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
@{
  /* Initialize the locale environment. */
  setlocale (LC_ALL, "");
  gpgme_check_version (NULL);
  gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
#ifdef LC_MESSAGES
  gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
@}
@end example
```

Note that you are highly recommended to initialize the locale settings like this. @acronym{GPGME} can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for portability to W32 systems.

```
@node Signal Handling
@section Signal Handling
@cindex signals
@cindex signal handling
```

The @acronym{GPGME} library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a @code{SIGPIPE} signal will be delivered to the application. The default action is to abort the program. To protect against this, @code{gpgme_check_version} sets the @code{SIGPIPE} signal action to @code{SIG_IGN}, which means that the signal will be ignored.

@acronym{GPGME} will only do that if the signal action for @code{SIGPIPE} is @code{SIG_DEF} at the time @code{gpgme_check_version} is called. If it is something different, @code{GPGME} will take no action.

This means that if your application does not install any signal handler for @code{SIGPIPE}, you don't need to take any precautions. If you do install a signal handler for @code{SIGPIPE}, you must be prepared to handle any @code{SIGPIPE} events that occur due to @acronym{GPGME} writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for @code{SIGPIPE}, you must make sure you do this either before @code{gpgme_check_version} is called or afterwards.

@node Multi-Threading
@section Multi-Threading
@cindex thread-safeness
@cindex multi-threading

The @acronym{GPGME} library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

@itemize @bullet
@item

The function @code{gpgme_check_version} must be called before any other function in the library, because it initializes the thread support subsystem in @acronym{GPGME}. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use @acronym{GPGME}. For this, it is sufficient to call @code{gpgme_check_version} before creating the other threads using @acronym{GPGME} @footnote{At least this is true for POSIX threads, as @code{pthread_create} is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term ``Memory Synchronization". For other thread packages other, more relaxed or more strict rules may apply.}.

@item

Any @code{gpgme_data_t} and @code{gpgme_ctx_t} object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

@item

Only one thread at any time is allowed to call @code{gpgme_wait}. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

@item

The function @code{gpgme_strerror} is not thread safe. You have to

use @code{gpgme_strerror_r} instead.

@end itemize

@node Protocols and Engines

@chapter Protocols and Engines

@cindex protocol

@cindex engine

@cindex crypto engine

@cindex backend

@cindex crypto backend

@acronym{GPGME} supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. @acronym{GPGME} uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by @acronym{GPGME}. Where an exchange of information between the application and the backend is necessary, @acronym{GPGME} provides the necessary callback function hooks and further interfaces.

@deftp {Data type} {enum gpgme_protocol_t}

@tindex gpgme_protocol_t

The @code{gpgme_protocol_t} type specifies the set of possible protocol values that are supported

by @acronym{GPGME}. The following protocols are supported:

@table @code

@item GPGME_PROTOCOL_OpenPGP

@itemx GPGME_PROTOCOL_OPENPGP

This specifies the OpenPGP protocol.

@item GPGME_PROTOCOL_CMS

This specifies the Cryptographic Message Syntax.

@item GPGME_PROTOCOL_GPGCONF

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_ASSUAN
@since{1.2.0}

This specifies the raw Assuan protocol.

@item GPGME_PROTOCOL_G13
@since{1.3.0}

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_UISERVER
Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_SPAWN
@since{1.5.0}

Special protocol for use with @code{gpgme_op_spawn}.

@item GPGME_PROTOCOL_UNKNOWN
Reserved for future extension. You may use this to indicate that the used protocol is not known to the application. Currently, @acronym{GPGME} does not accept this value in any operation, though, except for @code{gpgme_get_protocol_name}.
@end
table
@end deftp

@deftypefun {const char *} gpgme_get_protocol_name (@w{gpgme_protocol_t} @var{protocol})
The function @code{gpgme_get_protocol_name} returns a statically allocated string describing the protocol @var{protocol}, or @code{NULL} if the protocol number is not valid.
@end deftypefun

@menu
* Engine Version Check:: Verifying the engine version.
* Engine Information:: Obtaining more information about the engines.
* Engine Configuration:: Changing the engine configuration.
* OpenPGP:: Support for the OpenPGP protocol.
* Cryptographic Message Syntax:: Support for the CMS.
* Assuan:: Support for the raw Assuan protocol.
@end menu

@node Engine Version Check
@section Engine Version Check

@cindex version check, of the engines

```
@deftypedefun @w{const char *} gpgme_get_dirinfo (@w{const char *}@var{what})  
@since{1.5.0}
```

The function `gpgme_get_dirinfo` returns a statically allocated string with the value associated to `@var{what}`. The returned values are the defaults and won't change even after `gpgme_set_engine_info` has been used to configure a different engine. `NULL` is returned if no value is available. Commonly supported values for `@var{what}` are:

@table @code

@item homedir

Return the default home directory.

@item sysconfdir

Return the name of the system configuration directory

@item bindir

Return the name of the directory with GnuPG program files.

@item libdir

Return the name of the directory with GnuPG related library files.

@item libexecdir

Return the name of the directory with GnuPG helper program files.

@item datadir

Return the name of the directory with GnuPG shared data.

@item localedir

Return the name of the directory with GnuPG locale data.

@item agent-socket

Return the name of the socket to connect to the gpg-agent.

@item agent-ssh-socket

Return the name of the socket to connect to the ssh-agent component of gpg-agent.

@item

dirmngr-socket

Return the name of the socket to connect to the dirmngr.

@item uiserver-socket

Return the name of the socket to connect to the user interface server.

@item gpgconf-name

Return the file name of the engine configuration tool.

@item gpg-name

Return the file name of the OpenPGP engine.

@item gpgsm-name

Return the file name of the CMS engine.

@item g13-name

Return the name of the file container encryption engine.

@item gpg-wks-client-name

Return the name of the Web Key Service tool.

@end table

@end deftypefun

@deftypefun gpgme_error_t gpgme_engine_check_version (@w{gpgme_protocol_t @var{protocol}})

The function @code{gpgme_engine_check_version} verifies that the engine implementing the protocol @var{PROTOCOL} is installed in the expected path and meets the version requirement of @acronym{GPGME}.

This function returns the error code @code{GPG_ERR_NO_ERROR} if the engine is available and @code{GPG_ERR_INV_ENGINE} if it is not.

@end deftypefun

@node Engine

Information

@section Engine Information

@cindex engine, information about

@deftp {Data type} {gpgme_engine_info_t}

@tindex gpgme_protocol_t

The @code{gpgme_engine_info_t} type specifies a pointer to a structure describing a crypto engine. The structure contains the following elements:

@table @code

@item gpgme_engine_info_t next

This is a pointer to the next engine info structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme_protocol_t protocol

This is the protocol for which the crypto engine is used. You can convert this to a string with `gpgme_get_protocol_name` for printing.

`@item const char *file_name`

This is a string holding the file name of the executable of the crypto engine. Currently, it is never `NULL`, but using `NULL` is reserved for future use, so always check before you use it.

`@item const char *home_dir`

This is a string holding the directory name of the crypto engine's configuration directory. If it is `NULL`, then the default directory is used. See `gpgme_get_dirinfo` on how to get the default directory.

`@item const char *version`

This is a string containing the version number of the crypto engine. It might be `NULL` if the version number can not be determined, for example because the executable doesn't exist or is invalid.

`@item const char *req_version`

This is a string containing the minimum required version number of the crypto engine for `GPGME` to work correctly. This is the version number that `gpgme_engine_check_version` verifies against. Currently, it is never `NULL`, but using `NULL` is reserved for future use, so always check before you use it.

`@end table`

`@end deftp`

`@deftypefun gpgme_error_t gpgme_get_engine_info (@w{gpgme_engine_info_t *}@var{info})`

The function `gpgme_get_engine_info` returns a linked list of engine info structures in `@var{info}`. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, and a system error if the memory could not be allocated.

`@end deftypefun`

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

`@example`

`gpgme_ctx_t ctx;`

```
gpgme_error_t err;
```

```
[...]
```

```
if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
@{
    gpgme_engine_info_t info;
    err = gpgme_get_engine_info (&info);
    if (!err)
        @{
            while (info && info->protocol != gpgme_get_protocol (ctx))
                info = info->next;
            if (!info)
                fprintf (stderr, "GPGME compiled without support for protocol %s",
                    gpgme_get_protocol_name (info->protocol));
            else if (info->file_name && !info->version)
                fprintf (stderr, "Engine %s not installed properly",
                    info->file_name);
            else if (info->file_name && info->version && info->req_version)
                fprintf (stderr, "Engine %s version %s installed, "
                    "but at least version %s required", info->file_name,
                    info->version, info->req_version);
            else
                fprintf (stderr, "Unknown problem with engine for protocol %s",
                    gpgme_get_protocol_name (info->protocol));
        @}
    @}
@end example
```

```
@node Engine Configuration
@section Engine Configuration
@cindex engine, configuration of
@cindex configuration of crypto backend
```

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

```
@deftypedefun gpgme_error_t gpgme_set_engine_info (@w{gpgme_protocol_t @var{proto}}, @w{const char
*@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}
```

The function `gpgme_set_engine_info` changes the default configuration of the crypto engine implementing the protocol `@var{proto}`.

`@var{file_name}` is the file name of the executable program implementing this protocol, and `@var{home_dir}` is the directory name of the configuration directory for this crypto engine. If `@var{home_dir}` is `@code{NULL}`, the engine's default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code `@code{GPG_ERR_NO_ERROR}` if successful, or an error code on failure.

`@end deftypefun`

The functions `@code{gpgme_ctx_get_engine_info}` and `@code{gpgme_ctx_set_engine_info}` can be used to change the engine configuration per context. [@xref{Crypto Engine}](#).

`@node OpenPGP`

`@section OpenPGP`

`@cindex OpenPGP`

`@cindex GnuPG`

`@cindex protocol, GnuPG`

`@cindex engine, GnuPG`

OpenPGP is implemented by GnuPG, the [@acronym{GNU}](#) Privacy Guard.

This is the first protocol that was supported by [@acronym{GPGME}](#).

The OpenPGP protocol is specified by `@code{GPGME_PROTOCOL_OpenPGP}`.

`@node`

Cryptographic Message Syntax

`@section Cryptographic Message Syntax`

`@cindex CMS`

`@cindex cryptographic message syntax`

`@cindex GpgSM`

`@cindex protocol, CMS`

`@cindex engine, GpgSM`

`@cindex S/MIME`

`@cindex protocol, S/MIME`

[@acronym{CMS}](#) is implemented by GpgSM, the S/MIME implementation for GnuPG.

The [@acronym{CMS}](#) protocol is specified by `@code{GPGME_PROTOCOL_CMS}`.

`@node Assuan`

@section Assuan
@cindex ASSUAN
@cindex protocol, ASSUAN
@cindex engine, ASSUAN

Assuan is the RPC library used by the various @acronym{GnuPG} components. The Assuan protocol allows one to talk to arbitrary Assuan servers using @acronym{GPGME}. @xref{Using the Assuan protocol}.

The ASSUAN protocol is specified by @code{GPGME_PROTOCOL_ASSUAN}.

@node Algorithms
@chapter Algorithms
@cindex algorithms

The crypto backends support a variety of algorithms used in public key cryptography. @footnote{Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.} The following sections list the identifiers used to denote such an algorithm.

@menu
* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.
@end menu

@node Public Key Algorithms
@section Public Key Algorithms
@cindex algorithms, public key
@cindex public key algorithms

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

@deftp {Data type} {enum gpgme_pubkey_algo_t}
@tindex gpgme_pubkey_algo_t
The @code{gpgme_pubkey_algo_t} type specifies the set of all public key algorithms that are supported by @acronym{GPGME}. Possible values are:

@table @code
@item GPGME_PK_RSA
This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

@item GPGME_PK_RSA_E

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

@item GPGME_PK_RSA_S

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

@item GPGME_PK_DSA

This value indicates DSA, the Digital Signature Algorithm.

@item GPGME_PK_ELG

This value indicates ElGamal.

@item GPGME_PK_ELG_E

This value also indicates ElGamal and is used specifically in GnuPG.

@item GPGME_PK_ECC

@since{1.5.0}

This value is a generic indicator for elliptic curve algorithms.

@item GPGME_PK_ECDSA

@since{1.3.0}

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

@item GPGME_PK_ECDH

@since{1.3.0}

This value indicates ECDH, the Elliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

@item GPGME_PK_EDDSA

@since{1.7.0}

This value indicates the EdDSA algorithm.

@end table

@end deftp

@deftypedefun {const char *} gpgme_pubkey_algo_name (@w{gpgme_pubkey_algo_t @var{algo}})

The function @code{gpgme_pubkey_algo_name} returns a pointer to a statically allocated string containing a description of the public key algorithm

@var{algo}. This string can be used to output the name of the public key algorithm to the user.

If @var{algo} is not a valid public key algorithm, @code{NULL} is returned.

@end deftypefun

@deftypefun {char *} gpgme_pubkey_algo_string (@w{gpgme_subkey_t @var{key}})
@since{1.7.0}

The function @code{gpgme_pubkey_algo_string} is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. ``rsa2048" or ``ed25519"). The caller must free the result using @code{gpgme_free}. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets @code{ERRNO}.

@end deftypefun

@node Hash Algorithms

@section Hash Algorithms

@cindex algorithms, hash

@cindex algorithms, message digest

@cindex hash algorithms

@cindex message digest algorithms

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

@deftp {Data type} {enum gpgme_hash_algo_t}

@tindex gpgme_hash_algo_t

The

@code{gpgme_hash_algo_t} type specifies the set of all hash algorithms that are supported by @acronym{GPGME}. Possible values are:

@table @code

@item GPGME_MD_MD5

@item GPGME_MD_SHA1

@item GPGME_MD_RMD160

@item GPGME_MD_MD2

@item GPGME_MD_TIGER

@item GPGME_MD_HAVAL

@item GPGME_MD_SHA256

@item GPGME_MD_SHA384

@item GPGME_MD_SHA512

@item GPGME_MD_SHA224

@since{1.5.0}

@item GPGME_MD_MD4


```
@item GPGME_MD_CRC32
@item GPGME_MD_CRC32_RFC1510
@item GPGME_MD_CRC24_RFC2440
@end table
@end deftp
```

```
@deftypefun {const char *} gpgme_hash_algo_name (@w{gpgme_hash_algo_t @var{algo}})
The function gpgme_hash_algo_name returns a pointer to a
statically allocated string containing a description of the hash
algorithm @var{algo}. This string can be used to output the name of
the hash algorithm to the user.
```

```
If @var{algo} is not a valid hash algorithm, NULL is returned.
@end deftypefun
```

```
@node Error Handling
@chapter Error Handling
@cindex error handling
```

Many functions in `GPGME` can return an error if they fail.

For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

`GPGME` uses the `libgpg-error` library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no information is lost. As a consequence, `GPGME` does not use its own identifiers for error codes, but uses those provided by `libgpg-error`. They usually start with `GPG_ERR_`.

However, `GPGME` does provide aliases for the functions defined in `libgpg-error`, which might be preferred for name space consistency.

@menu
* Error Values:: The error value and what it means.
* Error Sources:: A list of important error sources.
* Error Codes:: A list of important error codes.
* Error Strings:: How to get a descriptive string from a value.
@end menu

@node Error Values
@section Error Values
@cindex error values
@cindex error codes
@cindex error sources

@deftp {Data type} {gpgme_err_code_t}
The @code{gpgme_err_code_t} type is an alias for the @code{libpgg-error}
type @code{gpg_err_code_t}. The
error code indicates the type of an
error, or the reason why an operation failed.

A list of important error codes can be found in the next section.
@end deftp

@deftp {Data type} {gpgme_err_source_t}
The @code{gpgme_err_source_t} type is an alias for the
@code{libpgg-error} type @code{gpg_err_source_t}. The error source
has not a precisely defined meaning. Sometimes it is the place where
the error happened, sometimes it is the place where an error was
encoded into an error value. Usually the error source will give an
indication to where to look for the problem. This is not always true,
but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.
@end deftp

@deftp {Data type} {gpgme_error_t}
The @code{gpgme_error_t} type is an alias for the @code{libpgg-error}
type @code{gpg_error_t}. An error value like this has always two
components, an error code and an error source. Both together form the
error value.

Thus, the error value
can not be directly compared against an error
code, but the accessor functions described below must be used.
However, it is guaranteed that only 0 is used to indicate success
(@code{GPG_ERR_NO_ERROR}), and that in this case all other parts of
the error value are set to 0, too.

Note that in `@acronym{GPGME}`, the error source is used purely for diagnostic purposes. Only the error code should be checked to test for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

`@end deftp`

```
@deftypefun {static inline gpgme_err_code_t} gpgme_err_code (@w{gpgme_error_t @var{err}})
```

The static inline function `@code{gpgme_err_code}` returns the `@code{gpgme_err_code_t}` component of the error value `@var{err}`. This function must be used to extract the error code from an error value in order to compare it with the `@code{GPG_ERR_*}` error code macros.

`@end deftypefun`

```
@deftypefun {static inline gpgme_err_source_t}
gpgme_err_source (@w{gpgme_error_t @var{err}})
```

The static inline function `@code{gpgme_err_source}` returns the `@code{gpgme_err_source_t}` component of the error value `@var{err}`. This function must be used to extract the error source from an error value in order to compare it with the `@code{GPG_ERR_SOURCE_*}` error source macros.

`@end deftypefun`

```
@deftypefun {static inline gpgme_error_t} gpgme_err_make (@w{gpgme_err_source_t @var{source}},
@w{gpgme_err_code_t @var{code}})
```

The static inline function `@code{gpgme_err_make}` returns the error value consisting of the error source `@var{source}` and the error code `@var{code}`.

This function can be used in callback functions to construct an error value to return it to the library.

`@end deftypefun`

```
@deftypefun {static inline gpgme_error_t} gpgme_error (@w{gpgme_err_code_t @var{code}})
```

The static inline function `@code{gpgme_error}` returns the error value consisting of the default error source and the error code `@var{code}`.

For `@acronym{GPGME}`

applications, the default error source is

`@code{GPG_ERR_SOURCE_USER_1}`. You can define

`@code{GPGME_ERR_SOURCE_DEFAULT}` before including `@file{gpgme.h}` to change this default.

This function can be used in callback functions to construct an error value to return it to the library.

`@end deftypefun`

The `@code{libpgp-error}` library provides error codes for all system

error numbers it knows about. If `@var{err}` is an unknown error number, the error code `@code{GPG_ERR_UNKNOWN_ERRNO}` is used. The following functions can be used to construct error values from system error numbers.

```
@deftypefun {gpgme_error_t} gpgme_err_make_from_errno (@w{gpgme_err_source_t @var{source}}, @w{int @var{err}})
```

The function `@code{gpgme_err_make_from_errno}` is like `@code{gpgme_err_make}`, but it takes a system error like `@code{errno}` instead of a `@code{gpgme_err_code_t}` error code.

```
@end deftypefun
```

```
@deftypefun {gpgme_error_t} gpgme_error_from_errno (@w{int @var{err}})
```

The function `@code{gpgme_error_from_errno}` is like `@code{gpgme_error}`, but it takes a system error like `@code{errno}` instead of a `@code{gpgme_err_code_t}` error code.

```
@end deftypefun
```

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

```
@deftypefun {gpgme_err_code_t} gpgme_err_code_from_errno (@w{int @var{err}})
```

The function `@code{gpgme_err_code_from_errno}` returns the error code for the system error `@var{err}`. If `@var{err}` is not a known system error, the function returns `@code{GPG_ERR_UNKNOWN_ERRNO}`.

```
@end deftypefun
```

```
@deftypefun {int} gpgme_err_code_to_errno (@w{gpgme_err_code_t @var{err}})
```

The function `@code{gpgme_err_code_to_errno}` returns the system error for the error code `@var{err}`. If `@var{err}` is not an error code representing a system error, or if this system error is not defined on this system, the function returns `@code{0}`.

```
@end deftypefun
```

```
@node Error Sources
```

```
@section
```

```
Error Sources
```

```
@cindex error codes, list of
```

The library `@code{libgpg-error}` defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is `@code{0}`, the whole error

value will be @code{0}. In this case the error source part is of course @code{GPG_ERR_SOURCE_UNKNOWN}.

The list of error sources that might occur in applications using @acronym{GPGME} is:

@table @code

@item GPG_ERR_SOURCE_UNKNOWN

The error source is not known. The value of this error source is @code{0}.

@item GPG_ERR_SOURCE_GPGME

The error source is @acronym{GPGME} itself. This is the default for errors that occur in the @acronym{GPGME} library.

@item GPG_ERR_SOURCE_GPG

The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

@item GPG_ERR_SOURCE_GPGSM

The error source is GPGSM, which is the crypto engine used for the CMS protocol.

@item GPG_ERR_SOURCE_GCRYPT

The error source is @code{libgcrypt}, which is used by crypto engines to perform cryptographic operations.

@item GPG_ERR_SOURCE_GPGAGENT

The error source is @command{gpg-agent}, which is used by crypto engines to perform operations with the secret key.

@item GPG_ERR_SOURCE_PINENTRY

The error source is @command{pinentry}, which is used by @command{gpg-agent} to query the passphrase to unlock a secret key.

@item GPG_ERR_SOURCE_SCD

The error source is the SmartCard Daemon, which is used by @command{gpg-agent} to delegate operations with the secret key to a SmartCard.

@item GPG_ERR_SOURCE_KEYBOX

The error source is @code{libkbx}, a library used by the crypto engines to manage local keyrings.

@item GPG_ERR_SOURCE_USER_1

@item GPG_ERR_SOURCE_USER_2

@item GPG_ERR_SOURCE_USER_3

@item GPG_ERR_SOURCE_USER_4

These error sources are not used by any GnuPG component and can be used by other software. For example, applications using

@acronym{GPGME} can use them to mark error values coming from callback handlers. Thus @code{GPG_ERR_SOURCE_USER_1} is the default for errors created with @code{gpgme_error} and @code{gpgme_error_from_errno}, unless you define @code{GPGME_ERR_SOURCE_DEFAULT} before including @file{gpgme.h}.

@end table

@node Error Codes

@section Error Codes

@cindex error codes, list of

The library @code{libgpg-error} defines many error values. Most of them are not used by @code{GPGME} directly, but might be returned by @acronym{GPGME} because it received them from the crypto engine. The below list only includes such error codes that have a specific meaning in @code{GPGME}, or which are so common that you should know about them.

@table @code

@item GPG_ERR_EOF

This value indicates the end of a list, buffer or file.

@item GPG_ERR_NO_ERROR

This value indicates success. The value of this error code is @code{0}. Also, it is guaranteed that an error value made from the error code @code{0} will be @code{0} itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

@item GPG_ERR_GENERAL

This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

@item GPG_ERR_ENOMEM

This value means that an out-of-memory condition occurred.

@item GPG_ERR_E...

System errors are mapped to GPG_ERR_FOO where FOO is the symbol for the system error.

@item GPG_ERR_INV_VALUE

This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty @code{gpgme_data_t} object was expected, but one containing data was provided, this error value is returned.

@item GPG_ERR_UNUSABLE_PUBKEY

This value means that some recipients for a message were invalid.

@item GPG_ERR_UNUSABLE_SECKEY

This value means that some signers were invalid.

@item GPG_ERR_NO_DATA

This value means that a @code{gpgme_data_t} object which was expected to have content was found empty.

@item GPG_ERR_CONFLICT

This value means that a conflict of some sort occurred.

@item GPG_ERR_NOT_IMPLEMENTED

This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

@item GPG_ERR_DECRYPT_FAILED

This value indicates that a decryption operation was unsuccessful.

@item GPG_ERR_BAD_PASSPHRASE

This value means that the user did not provide a correct passphrase when requested.

@item GPG_ERR_CANCELED

This value means that the operation was canceled.

@item GPG_ERR_INV_ENGINE

This value means that the engine that implements the desired protocol is currently not available. This can either be because the sources were configured to exclude support for this engine, or because the engine is not installed properly.

@item GPG_ERR_AMBIGUOUS_NAME

This value indicates that a user ID or other specifier did not specify a unique key.

@item GPG_ERR_WRONG_KEY_USAGE

This value indicates that a key is not used appropriately.

@item GPG_ERR_CERT_REVOKED

This value indicates that a key signature was revoked.

@item GPG_ERR_CERT_EXPIRED

This value indicates that a key signature expired.

@item GPG_ERR_NO_CRL_KNOWN

This value indicates that no certificate revocation list is known for the certificate.

@item GPG_ERR_NO_POLICY_MATCH

This value indicates that a policy issue occurred.

@item GPG_ERR_NO_SECKEY

This value indicates that no secret key for the user ID is available.

@item GPG_ERR_MISSING_CERT

This value indicates that a key could not be imported because the issuer certificate is missing.

@item GPG_ERR_BAD_CERT_CHAIN

This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

@item GPG_ERR_UNSUPPORTED_ALGORITHM

This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

@item GPG_ERR_BAD_SIGNATURE

This value means a verification failed because the signature is bad.

@item GPG_ERR_NO_PUBKEY

This value means a verification failed because the public key is not available.

@item GPG_ERR_USER_1

@item GPG_ERR_USER_2

@item ...

@item GPG_ERR_USER_16

These error codes are not used by any GnuPG component and can be freely used by other software. Applications using @acronym{GPGME} might use them to mark specific errors returned by callback handlers if no suitable error codes (including the system errors) for these errors exist already.

@end table

@node Error Strings
@section Error Strings
@cindex error values, printing of
@cindex error codes, printing of
@cindex error sources, printing of
@cindex error strings

@deftypefun {const char *} gpgme_strerror
(@w{gpgme_error_t @var{err}})
The function @code{gpgme_strerror} returns a pointer to a statically allocated string containing a description of the error code contained in the error value @var{err}. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use @code{gpgme_strerror_r} in multi-threaded programs.

@end deftypefun

@deftypefun {int} gpgme_strerror_r (@w{gpgme_error_t @var{err}}, @w{char *@var{buf}}, @w{size_t @var{buflen}})

The function @code{gpgme_strerror_r} returns the error string for @var{err} in the user-supplied buffer @var{buf} of size @var{buflen}. This function is, in contrast to @code{gpgme_strerror}, thread-safe if a thread-safe @code{strerror_r} function is provided by the system. If the function succeeds, 0 is returned and @var{buf} contains the string describing the error. If the buffer was not large enough, ERANGE is returned and @var{buf} contains as much of the beginning of the error string as fits into the buffer.

@end deftypefun

@deftypefun {const char *} gpgme_strsource (@w{gpgme_error_t @var{err}})

The function @code{gpgme_strsource} returns a pointer to a statically allocated string containing a description of the error source contained in the error value @var{err}. This string can be used to output a diagnostic message to the user.

@end deftypefun

The following example illustrates the use of @code{gpgme_strerror}:

@example
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)

```
@{
    fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
            argv[0], gpgme_strsource (err), gpgme_strerror (err));
    exit (1);
@}
@end example
```

```
@node Exchanging Data
@chapter Exchanging Data
@cindex data, exchanging
```

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by @acronym{GPGME}.

The user provides and receives the data via @code{gpgme_data_t} objects, regardless of the communication protocol between @acronym{GPGME} and the crypto engine in use.

```
@deftp {Data type} {gpgme_data_t}
The @code{gpgme_data_t} type is a handle for a container for generic data, which is used by @acronym{GPGME} to exchange data with the user.
@end deftp
```

@code{gpgme_data_t} objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

```
@deftp {Data type} {gpgme_off_t}
@since{1.4.1}
```

On POSIX platforms the @code{gpgme_off_t} type is an alias for @code{off_t}; it may be used interchangeably. On Windows platforms @code{gpgme_off_t} is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64 bit signed integer for 64 bit Windows.

```
@end deftp
```

```
@deftp {Data type} {gpgme_ssize_t}
The @code{gpgme_ssize_t} type is an alias for @code{ssize_t}. It has only been introduced to overcome portability problems pertaining to the declaration of @code{ssize_t} by different toolchains.
```

@end deftp

@menu

- * Creating Data Buffers:: Creating new data buffers.
- * Destroying Data Buffers:: Releasing data buffers.
- * Manipulating Data Buffers:: Operations on data buffers.

@end menu

@node Creating Data Buffers

@section Creating Data Buffers

@cindex data buffer, creation

Data objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

@menu

- * Memory Based Data Buffers:: Creating memory based data buffers.
- * File Based Data Buffers:: Creating file based data buffers.
- * Callback Based Data Buffers:: Creating callback based data buffers.

@end menu

@node

Memory Based Data Buffers

@subsection Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source and to its destination, which can often be avoided by using one of the other data object

@deftypefun gpgme_error_t gpgme_data_new (@w{gpgme_data_t *}@var{dh})

The function @code{gpgme_data_new} creates a new @code{gpgme_data_t} object and returns a handle for it in @var{dh}. The data object is memory based and initially empty.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, @code{GPG_ERR_INV_VALUE} if @var{dh} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available.

@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_mem (@w{gpgme_data_t *}@var{dh}), @w{const char

```
*@var{buffer}}, @w{size_t @var{size}},  
@w{int @var{copy}})
```

The function `gpgme_data_new_from_mem` creates a new `gpgme_data_t` object and fills it with `@var{size}` bytes starting from `@var{buffer}`.

If `@var{copy}` is not zero, a private copy of the data is made. If `@var{copy}` is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains valid for the whole life span of the data object.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `@var{dh}` or `@var{buffer}` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_file (@w{gpgme_data_t *@var{dh}}, @w{const char  
*@var{filename}}, @w{int @var{copy}})
```

The function `gpgme_data_new_from_file` creates a new `gpgme_data_t` object and fills it with the content of the file `@var{filename}`.

If `@var{copy}` is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for `@var{copy}` might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `@var{dh}` or `@var{filename}` is not a valid pointer, `GPG_ERR_NOT_IMPLEMENTED` if `@var{code}` is zero, and `GPG_ERR_ENOMEM` if not enough memory is available.
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_filepart (@w{gpgme_data_t *@var{dh}}, @w{const char  
*@var{filename}}, @w{FILE *@var{fp}}, @w{off_t @var{offset}}, @w{size_t @var{length}})
```

The function `gpgme_data_new_from_filepart` creates a new `gpgme_data_t` object and fills it with a part of the file specified by `@var{filename}` or `@var{fp}`.

Exactly one of `@var{filename}` and `@var{fp}` must be non-zero, the other must be zero. The argument that is not zero specifies the file from which `@var{length}` bytes are read into the data object, starting from `@var{offset}`.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `dh` and exactly one of `filename` and `fp` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

@node File Based Data Buffers

@subsection File Based Data Buffers

File based data objects operate directly on file descriptors or streams. Only a small amount of data is stored in core at any time, so the size of the data objects is not limited by `GPGME`.

@deftypefun gpgme_error_t gpgme_data_new_from_fd (@w{gpgme_data_t *`dh`}, @w{int `fd`})

The function `gpgme_data_new_from_fd` creates a new `gpgme_data_t` object and uses the file descriptor `fd` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that `GPGME` assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_stream (@w{gpgme_data_t *`dh`}, @w{FILE *`stream`})

The function `gpgme_data_new_from_stream` creates a new `gpgme_data_t` object and uses the I/O stream `stream` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that `GPGME` assumes that the stream is in blocking mode. Errors

during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_estream (@w{gpgme_data_t *@var{dh}},  
@w{gpgmt_stream_t @var{stream}})
```

The function `gpgme_data_new_from_estream` creates a new `gpgme_data_t` object and uses the `gpgmt` stream `@var{stream}` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME

assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

@node Callback Based Data Buffers

@subsection Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your application, you can implement the functions a data object provides yourself and create a data object from these callback functions.

```
@defpt {Data type} {ssize_t (*gpgme_data_read_cb_t) (@w{void *@var{handle}}, @w{void @var{*buffer}},  
@w{size_t @var{size}})}
```

@tindex gpgme_data_read_cb_t

The `gpgme_data_read_cb_t` type is the type of functions which `GPGME` calls if it wants to read data from a user-implemented data object. The function should read up to `@var{size}` bytes from the current read position into the space starting at `@var{buffer}`. The `@var{handle}` is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available.

Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, `@var{errno}` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {ssize_t (*gpgme_data_write_cb_t) (@w{void *@var{handle}}, @w{const void @var{*buffer}}, @w{size_t @var{size}})}
```

```
@tindex gpgme_data_write_cb_t
```

The `@code{gpgme_data_write_cb_t}` type is the type of functions which `@acronym{GPGME}` calls if it wants to write data to a user-implemented data object. The function should write up to `@var{size}` bytes to the current write position from the space starting at `@var{buffer}`. The `@var{handle}` is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available.

Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, `@var{errno}` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {off_t (*gpgme_data_seek_cb_t) (@w{void *@var{handle}}, @w{off_t @var{offset}}, @w{int @var{whence}})}
```

```
@tindex gpgme_data_seek_cb_t
```

The `@code{gpgme_data_seek_cb_t}` type is the type of functions which `@acronym{GPGME}` calls if it wants to change the current read/write position in a user-implemented data object, just like the `@code{lseek}` function.

The function should return the new read/write position, and -1 on error. If an error occurs, `@var{errno}` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {void (*gpgme_data_release_cb_t) (@w{void *@var{handle}})}
```

```
@tindex gpgme_data_release_cb_t
```

The `@code{gpgme_data_release_cb_t}` type is the type of functions which `@acronym{GPGME}` calls if it wants to destroy a user-implemented data object. The `@var{handle}` is provided by the user at data object creation time.

@end deftp

@deftp {Data type} {struct gpgme_data_cbs}

This structure is used to store the data callback interface functions described above. It has the following members:

@table @code

@item gpgme_data_read_cb_t read

This is the function called by @acronym{GPGME} to read data from the data object. It is only required for input data object.

@item gpgme_data_write_cb_t write

This is the function called by @acronym{GPGME} to write data to the data object. It is only required for output data object.

@item gpgme_data_seek_cb_t seek

This is the function called by @acronym{GPGME} to change the current read/write pointer in the data object (if available). It is optional.

@item gpgme_data_release_cb_t release

This is the function called by @acronym{GPGME} to release a data object. It is optional.

@end table

@end deftp

@deftypefun gpgme_error_t gpgme_data_new_from_cbs

(@w{gpgme_data_t *@var{dh}}, @w{gpgme_data_cbs_t @var{cbs}}, @w{void *@var{handle}})

The function @code{gpgme_data_new_from_cbs} creates a new @code{gpgme_data_t} object and uses the user-provided callback functions to operate on the data object.

The handle @var{handle} is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, and @code{GPG_ERR_ENOMEM} if not enough memory is available.

@end deftypefun

@node Destroying Data Buffers

@section Destroying Data Buffers

@cindex data buffer, destruction

@deftypefun void gpgme_data_release (@w{gpgme_data_t @var{dh}})

The function @code{gpgme_data_release} destroys the data object with the handle @var{dh}. It releases all associated resources that were not provided by the user in the first place.

@end deftypefun


```
@deftypefun {char *} gpgme_data_release_and_get_mem (@w{gpgme_data_t
@var{dh}}, @w{size_t *@var{length}})
```

The function `gpgme_data_release_and_get_mem` is like `gpgme_data_release`, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with `gpgme_free`. In case the user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return `NULL`. In any case, the data object `dh` is destroyed.

```
@end deftypefun
```

```
@deftypefun void gpgme_free (@w{void *@var{buffer}})
@since{1.1.1}
```

The function `gpgme_free` releases the memory returned by `gpgme_data_release_and_get_mem` and `gpgme_pubkey_algo_string`. It should be used instead of the system libraries `free` function in case different allocators are used by a program. This is often the case if `gpgme` is used under Windows as a DLL.

```
@end deftypefun
```

```
@node
```

```
Manipulating Data Buffers
```

```
@section Manipulating Data Buffers
```

```
@cindex data buffer, manipulation
```

Data buffers contain data and meta-data. The following operations can be used to manipulate both.

```
@menu
```

- * Data Buffer I/O Operations:: I/O operations on data buffers.
- * Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- * Data Buffer Convenience:: Convenience function for data buffers.

```
@end menu
```

```
@node Data Buffer I/O Operations
```

```
@subsection Data Buffer I/O Operations
```

```
@cindex data buffer, I/O operations
```

@cindex data buffer, read
@cindex data buffer, write
@cindex data buffer, seek

@deftypefun ssize_t gpgme_data_read (@w{gpgme_data_t @var{dh}}, @w{void *@var{buffer}}, @w{size_t @var{length}})

The function @code{gpgme_data_read} reads up to @var{length} bytes from the data object with the handle @var{dh} into the space starting at @var{buffer}.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets @var{errno}.

@end deftypefun

@deftypefun ssize_t gpgme_data_write (@w{gpgme_data_t @var{dh}}, @w{const void *@var{buffer}}, @w{size_t @var{size}})

The function @code{gpgme_data_write} writes up to @var{size} bytes starting from @var{buffer} into the data object with the handle @var{dh} at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, @var{errno} is set.

@end deftypefun

@deftypefun off_t gpgme_data_seek (@w{gpgme_data_t @var{dh}}, @w{off_t @var{offset}}, @w{int @var{whence}})

The function @code{gpgme_data_seek} changes the current read/write position.

The @var{whence} argument specifies how the @var{offset} should be interpreted. It must be one of the following symbolic constants:

@table @code

@item SEEK_SET

Specifies that @var{offset} is a count of characters from the beginning of the data object.

@item SEEK_CUR

Specifies that @var{offset}

is a count of characters from the current file position. This count may be positive or negative.

@item SEEK_END

Specifies that @var{offset} is a count of characters from the end of the data object. A negative count specifies a position within the

current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

@end table

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with @code{SEEK_CUR} to read the current read/write position.

If the function fails, -1 is returned and @var{errno} is set.

@end deftypefun

@node Data Buffer Meta-Data

@subsection Data Buffer Meta-Data

@cindex data buffer, meta-data

@cindex data buffer, file name

@cindex data buffer, encoding

@deftypefun {char *} gpgme_data_get_file_name

(@w{gpgme_data_t} @var{dh})

@since{1.1.0}

The function @code{gpgme_data_get_file_name} returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned.

Otherwise, @code{NULL} will be returned.

@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_file_name (@w{gpgme_data_t} @var{dh}, @w{const char} *@var{file_name})

@since{1.1.0}

The function @code{gpgme_data_set_file_name} sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code @code{GPG_ERR_INV_VALUE} if @var{dh} is not a valid pointer and @code{GPG_ERR_ENOMEM} if not enough memory is available.

@end
deftypefun

@deftp {Data type} {enum gpgme_data_encoding_t}

@tindex gpgme_data_encoding_t

The @code{gpgme_data_encoding_t} type specifies the encoding of a @code{gpgme_data_t} object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

@table @code

@item GPGME_DATA_ENCODING_NONE

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

@item GPGME_DATA_ENCODING_BINARY

This specifies that the data is encoding in binary form; i.e. there is no special encoding.

@item GPGME_DATA_ENCODING_BASE64

This specifies that the data is encoded using the Base-64 encoding scheme as used by @acronym{MIME} and other protocols.

@item

GPGME_DATA_ENCODING_ARMOR

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

@item GPGME_DATA_ENCODING_MIME

@since{1.7.0}

This specifies that the data is encoded as a MIME part.

@item GPGME_DATA_ENCODING_URL

@since{1.2.0}

The data is a list of linefeed delimited URLs. This is only useful with @code{gpgme_op_import}.

@item GPGME_DATA_ENCODING_URL0

@since{1.2.0}

The data is a list of binary zero delimited URLs. This is only useful with @code{gpgme_op_import}.

@item GPGME_DATA_ENCODING URLESC

@since{1.2.0}

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is not yet implemented.

@end table

@end deftp

@deftypefun gpgme_data_encoding_t gpgme_data_get_encoding (@w{gpgme_data_t @var{dh}})

The function @code{gpgme_data_get_encoding} returns the encoding of the data object with the handle @var{dh}. If @var{dh} is not a valid pointer (e.g. @code{NULL}) @code{GPGME_DATA_ENCODING_NONE} is

returned.

@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_encoding (@w{gpgme_data_t @var{dh}}, gpgme_data_encoding_t @var{enc})

The function @code{gpgme_data_set_encoding} changes the encoding of the data object with the handle @var{dh} to @var{enc}.

@end deftypefun

@deftypefun {gpgme_error_t} gpgme_data_set_flag @

(@w{gpgme_data_t @var{dh}}, @

@w{const char *@var{name}}, @

@w{const char *@var{value}})

@since{1.7.0}

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for @var{name}:

@table @code

@item size-hint

The value is a decimal number with the length gpgme shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the application knows the total size of the data. If this is set the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total

value for its

progress information.

@end table

This function returns @code{0} on success.

@end deftypefun

@node Data Buffer Convenience

@subsection Data Buffer Convenience Functions

@cindex data buffer, convenience

@cindex type of data

@cindex identify

@defftp {Data type} {enum gpgme_data_type_t}

@tindex gpgme_data_type_t

@since{1.4.3}

The @code{gpgme_data_type_t} type is used to return the detected type of the content of a data buffer.

@end deftp

@table @code

@item GPGME_DATA_TYPE_INVALID

This is returned by @code{gpgme_data_identify} if it was not possible to identify the data. Reasons for this might be a non-seekable stream or a memory problem. The value is 0.

@item GPGME_DATA_TYPE_UNKNOWN

The type of the data is not known.

@item GPGME_DATA_TYPE_PGP_SIGNED

The data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.

@item GPGME_DATA_TYPE_PGP_ENCRYPTED

@since{1.7.0}

The data is an OpenPGP encrypted message.

@item GPGME_DATA_TYPE_PGP_SIGNATURE

@since{1.7.0}

The

data is an OpenPGP detached signature.

@item GPGME_DATA_TYPE_PGP_OTHER

This is a generic OpenPGP message. In most cases this will be encrypted data.

@item GPGME_DATA_TYPE_PGP_KEY

This is an OpenPGP key (private or public).

@item GPGME_DATA_TYPE_CMS_SIGNED

This is a CMS signed message.

@item GPGME_DATA_TYPE_CMS_ENCRYPTED

This is a CMS encrypted (enveloped data) message.

@item GPGME_DATA_TYPE_CMS_OTHER

This is used for other CMS message types.

@item GPGME_DATA_TYPE_X509_CERT

The data is a X.509 certificate

@item GPGME_DATA_TYPE_PKCS12

The data is a PKCS#12 message. This is commonly used to exchange private keys for X.509.

@end table

@deftypefun gpgme_data_type_t gpgme_data_identify (@w{gpgme_data_t @var{dh}})
@since{1.4.3}

The function @code{gpgme_data_identify} returns the type of the data with the handle @var{dh}. If it is not possible to perform the identification, the function returns zero

(@code{GPGME_DATA_TYPE_INVALID}). Note that depending on how the data

object has been created the identification may not be possible or the data object may change its internal state (file pointer moved). For file or memory based data object, the state should not change.

@end deftypefun

@c

@c Chapter Contexts

@c

@node Contexts

@chapter Contexts

@cindex context

All cryptographic operations in @acronym{GPGME} are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

@defftp {Data type} {gpgme_ctx_t}

The @code{gpgme_ctx_t} type is a handle for a @acronym{GPGME} context, which is used to hold the configuration, status and result of cryptographic operations.

@end defftp

@menu

- * Creating Contexts:: Creating new @acronym{GPGME} contexts.
- * Destroying Contexts:: Releasing @acronym{GPGME} contexts.
- * Result Management:: Managing the result of crypto operations.
- * Context Attributes:: Setting properties of a context.
- * Key Management:: Managing keys with @acronym{GPGME}.
- * Crypto Operations:: Using a context for cryptography.
- * Miscellaneous:: Miscellaneous operations

* Run Control:: Controlling how operations are run.

@end menu

@node Creating Contexts

@section Creating Contexts

@cindex context, creation

@deftypefun gpgme_error_t gpgme_new (@w{gpgme_ctx_t *}@var{ctx})

The function @code{gpgme_new} creates a new @code{gpgme_ctx_t} object and returns a handle for it in @var{ctx}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the context was successfully created, @code{GPG_ERR_INV_VALUE} if @var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available. Also, it returns

@code{GPG_ERR_NOT_OPERATIONAL} if @code{gpgme_check_version} was not called to initialize GPGME, and @code{GPG_ERR_SELFTEST_FAILED} if a

selftest failed. Currently, the only selftest is for Windows MingW32 targets to see if @code{-mms-bitfields} was used (as required).

@end deftypefun

@node Destroying Contexts

@section Destroying Contexts

@cindex context, destruction

@deftypefun void gpgme_release (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_release} destroys the context with the handle @var{ctx} and releases all associated resources.

@end deftypefun

@node Result Management

@section Result Management

@cindex context, result of operation

The detailed result of an operation is returned in operation-specific structures such as @code{gpgme_decrypt_result_t}. The corresponding retrieval functions such as @code{gpgme_op_decrypt_result} provide static access to the results after an operation completes. Those structures shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context

and give it a lifetime beyond that of the current operation or context.


```
@deftypefun void gpgme_result_ref (@w{void *@var{result}})
@since{1.2.0}
```

The function `gpgme_result_ref` acquires an additional reference for the result `@var{result}`, which may be of any type

`gpgme_*_result_t`. As long as the user holds a reference, the result structure is guaranteed to be valid and unmodified.

```
@end deftypefun
```

```
@deftypefun void gpgme_result_unref (@w{void *@var{result}})
@since{1.2.0}
```

The function `gpgme_result_unref` releases a reference for the result `@var{result}`. If this was the last reference, the result structure will be destroyed and all resources associated to it will be released.

```
@end deftypefun
```

Note that a context may hold its own references to result structures, typically until the context is destroyed or the next operation is started. In fact, these references are accessed through the `gpgme_op_*_result` functions.

```
@node Context Attributes
```

```
@section
```

Context Attributes

```
@cindex context, attributes
```

```
@menu
```

- * Protocol Selection:: Selecting the protocol used by a context.
- * Crypto Engine:: Configuring the crypto engine.
- * Setting the Sender:: How to tell the engine the sender.
- * ASCII Armor:: Requesting `ASCII` armored output.
- * Text Mode:: Choosing canonical text mode.
- * Offline Mode:: Choosing offline mode.
- * Pinentry Mode:: Choosing the pinentry mode.
- * Included Certificates:: Including a number of certificates.
- * Key Listing Mode:: Selecting key listing mode.
- * Passphrase Callback:: Getting the passphrase from the user.
- * Progress Meter Callback:: Being informed about the progress.
- * Status Message Callback:: Status messages received from `gpg`.
- * Context Flags:: Additional flags for a context.
- * Locale:: Setting the locale of a context.
- *

Additional Logs:: Additional logs of a context.

```
@end menu
```

@node Protocol Selection
@subsection Protocol Selection
@cindex context, selecting protocol
@cindex protocol, selecting

```
@deftypefun gpgme_error_t gpgme_set_protocol (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t @var{proto}})
```

The function `gpgme_set_protocol` sets the protocol used within the context `@var{ctx}` to `@var{proto}`. All crypto operations will be performed by the crypto engine configured for that protocol.
[@xref{Protocols and Engines}](#).

Setting the protocol with `gpgme_set_protocol` does intentionally not check if the crypto engine for that protocol is available and installed correctly. [@xref{Engine Version Check}](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the protocol could be set successfully, and `GPG_ERR_INV_VALUE` if `@var{protocol}` is not a valid protocol.
@end deftypefun

```
@deftypefun gpgme_protocol_t gpgme_get_protocol (@w{gpgme_ctx_t @var{ctx}})
```

The function `gpgme_get_protocol` retrieves the protocol currently use with the context `@var{ctx}`.
@end deftypefun

@node Crypto Engine
@subsection Crypto Engine
@cindex context, configuring engine
@cindex engine, configuration per context

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context.
[@xref{Engine Information}](#). The default can also be changed globally.
[@xref{Engine Configuration}](#).

```
@deftypefun gpgme_engine_info_t gpgme_ctx_get_engine_info (@w{gpgme_ctx_t @var{ctx}})  
@since{1.1.0}
```

The function `gpgme_ctx_get_engine_info` returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context `@var{ctx}`.

The result is valid until the next invocation of `gpgme_ctx_set_engine_info` for this particular context.

This function can not fail.
@end deftypefun

```
@deftypefun
gpgme_error_t gpgme_ctx_set_engine_info (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t
@var{proto}}, @w{const char *@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}
```

The function `gpgme_ctx_set_engine_info` changes the configuration of the crypto engine implementing the protocol `@var{proto}` for the context `@var{ctx}`.

`@var{file_name}` is the file name of the executable program implementing this protocol, and `@var{home_dir}` is the directory name of the configuration directory for this crypto engine. If `@var{home_dir}` is `NULL`, the engine's default will be used.

Currently this function must be used before starting the first crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context `@var{ctx}`.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.
@end deftypefun

```
@node Setting the Sender
@subsection How to tell
the engine the sender.
@cindex context, sender
@cindex sender
@cindex From:
```

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. `GPGME` provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not supported.

```
@deftypefun gpgme_error_t gpgme_set_sender @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{int @var{address}})
```

@since{1.8.0}

The function `gpgme_set_sender` specifies the sender address for use in sign and verify operations. `address` is expected to be the `addr-spec` part of an address but may also be a complete mailbox address, in which case this function extracts the `addr-spec` from it. Using `NULL` for `address` clears the sender address.

The function returns 0 on success or an error code on failure. The most likely failure is that no valid `addr-spec` was found in `address`.

@end deftypefun

```
@deftypefun @w{const char *} gpgme_get_sender @
  (@w{gpgme_ctx_t} @var{ctx})
```

@since{1.8.0}

The function `gpgme_get_sender` returns the current sender address from the context, or `NULL` if none was set. The returned value is valid as long as the `ctx` is valid and `gpgme_set_sender` has not been called again.

@end deftypefun

@c FIXME: Unfortunately, using `acronym` here breaks `texi2dvi`.

@node ASCII Armor

@subsection `ASCII` Armor

@cindex context, armor mode

@cindex `ASCII` armor

@cindex armor mode

```
@deftypefun void gpgme_set_armor (@w{gpgme_ctx_t} @var{ctx}, @w{int} @var{yes})
```

The function `gpgme_set_armor` specifies if the output should be `ASCII` armored. By default, output is not `ASCII` armored.

`ASCII` armored output is disabled if `yes` is zero, and enabled otherwise.

@end deftypefun

```
@deftypefun int gpgme_get_armor (@w{gpgme_ctx_t}
```

@var{ctx}))

The function @code{gpgme_get_armor} returns 1 if the output is @acronym{ASCII} armored, and @code{0} if it is not, or if @var{ctx} is not a valid pointer.

@end deftypefun

@node Text Mode

@subsection Text Mode

@cindex context, text mode

@cindex text mode

@cindex canonical text mode

@deftypefun void gpgme_set_textmode (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})

The function @code{gpgme_set_textmode} specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if @var{yes} is zero, and enabled otherwise.

@end deftypefun

@deftypefun int gpgme_get_textmode (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_get_textmode} returns 1 if canonical text mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a valid pointer.

@end deftypefun

@node Offline Mode

@subsection Offline Mode

@cindex context, offline mode

@cindex offline mode

@deftypefun void gpgme_set_offline (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})

@since{1.6.0}

The function @code{gpgme_set_offline} specifies if offline mode should be used. Offline mode is disabled if @var{yes} is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode `GPGME_KEYLIST_MODE_VALIDATE`.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

@end dectypedefun

```
@dectypedefun int gpgme_get_offline (@w{gpgme_ctx_t @var{ctx}})
@since{1.6.0}
```

The function `gpgme_get_offline` returns 1 if offline mode is enabled, and `0` if it is not, or if `@var{ctx}` is not a valid pointer.

@end dectypedefun

@node Pinentry Mode

@subsection Pinentry Mode

@cindex context, pinentry mode

@cindex pinentry mode

```
@dectypedefun gpgme_error_t gpgme_set_pinentry_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_pinentry_mode_t @var{mode}})
```

@since{1.4.0}

The function `gpgme_set_pinentry_mode` specifies the pinentry mode to be used.

For GnuPG ≥ 2.1 this option is required to be set to

`GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback mechanism in GPGME

through `gpgme_set_passphrase_cb`.

@end dectypedefun

```
@dectypedefun gpgme_pinentry_mode_t gpgme_get_pinentry_mode (@w{gpgme_ctx_t @var{ctx}})
```

@since{1.4.0}

The function @code{gpgme_get_pinentry_mode} returns the mode set for the context.

@end deftp

@deftp {Data type} {enum gpgme_pinentry_mode_t}

@tindex gpgme_pinentry_mode_t

@since{1.4.0}

The @code{gpgme_minentry_mode_t} type specifies the set of possible pinentry modes that are supported by @acronym{GPGME} if GnuPG >= 2.1 is used.

The following modes are supported:

@table @code

@item GPGME_PINENTRY_MODE_DEFAULT

@since{1.4.0}

Use the default of the agent, which is ask.

@item GPGME_PINENTRY_MODE_ASK

@since{1.4.0}

Force the use of the Pinentry.

@item GPGME_PINENTRY_MODE_CANCEL

@since{1.4.0}

Emulate use of Pinentry's cancel button.

@item GPGME_PINENTRY_MODE_ERROR

@since{1.4.0}

Return a Pinentry error @code{No Pinentry}.

@item GPGME_PINENTRY_MODE_LOOPBACK

@since{1.4.0}

Redirect Pinentry queries to the caller.

This enables

the use of @code{gpgme_set_passphrase_cb} because pinentry queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires @code{allow-loopback-pinentry} to be enabled in the @file{gpg-agent.conf} or an agent started with that option.

@end table

@end deftp

@node Included Certificates
@subsection Included Certificates
@cindex certificates, included

```
@deftypefun void gpgme_set_include_certs (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{nr_of_certs}})
```

The function @code{gpgme_set_include_certs} specifies how many certificates should be included in an S/MIME signed message. By default, only the sender's certificate is included. The possible values of @var{nr_of_certs} are:

```
@table @code  
@item GPGME_INCLUDE_CERTS_DEFAULT  
@since{1.0.3}
```

Fall back to the default of the crypto backend. This is the default for GPGME.

```
@item -2
```

Include all certificates except the root certificate.

```
@item -1
```

Include all certificates.

```
@item 0
```

Include no certificates.

```
@item 1
```

Include the sender's certificate only.

```
@item n
```

Include the first n certificates of the certificates path, starting from the sender's certificate. The number @code{n} must be positive.

```
@end table
```

Values of @var{nr_of_certs} smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by all other engines.

```
@end deftypefun
```

```
@deftypefun int gpgme_get_include_certs (@w{gpgme_ctx_t @var{ctx}})
```

The function @code{gpgme_get_include_certs} returns the number of certificates to include into an S/MIME signed message.

```
@end deftypefun
```

@node Key Listing Mode
@subsection Key Listing Mode
@cindex key listing mode
@cindex key listing, mode of


```
@deftypedefun gpgme_error_t gpgme_set_keylist_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_keylist_mode_t @var{mode}})
```

The function `gpgme_set_keylist_mode` changes the default behaviour of the key listing functions. The value in `@var{mode}` is a bitwise-or combination of one or multiple of the following bit values:

`@table @code`

`@item GPGME_KEYLIST_MODE_LOCAL`

The

`@code{GPGME_KEYLIST_MODE_LOCAL}` symbol specifies that the local keyring should be searched for keys in the keylisting operation. This is the default.

Using only this option results in a `@code{--list-keys}`.

`@item GPGME_KEYLIST_MODE_EXTERN`

The `@code{GPGME_KEYLIST_MODE_EXTERN}` symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with `@code{GPGME_KEYLIST_MODE_LOCAL}`. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a `@code{--search-keys}` for

`@code{GPGME_PROTOCOL_OpenPGP}` and something similar to `@code{--list-external-keys}` for `@code{GPGME_PROTOCOL_CMS}`.

`@item GPGME_KEYLIST_MODE_LOCATE`

This is a shortcut for the combination of

`@code{GPGME_KEYLIST_MODE_LOCAL}` and `@code{GPGME_KEYLIST_MODE_EXTERN}`, which results in a `@code{--locate-keys}` for `@code{GPGME_PROTOCOL_OpenPGP}`.

`@item`

`GPGME_KEYLIST_MODE_SIGS`

The `@code{GPGME_KEYLIST_MODE_SIGS}` symbol specifies that the key signatures should be included in the listed keys.

`@item GPGME_KEYLIST_MODE_SIG_NOTATIONS`

`@since{1.1.1}`

The `@code{GPGME_KEYLIST_MODE_SIG_NOTATIONS}` symbol specifies that the signature notations on key signatures should be included in the listed keys. This only works if `@code{GPGME_KEYLIST_MODE_SIGS}` is also enabled.

`@item GPGME_KEYLIST_MODE_WITH_TOFU`

`@since{1.7.0}`

The `GPGME_KEYLIST_MODE_WITH_TOFU` symbol specifies that information pertaining to the TOFU trust model should be included in the listed keys.

`GPGME_KEYLIST_MODE_WITH_KEYGRIP`
@since{1.14.0}

The `GPGME_KEYLIST_MODE_WITH_KEYRIP` symbol specifies that the keygrip is always included in the listing. The default depends on the version of the backend and the used protocol.

`GPGME_KEYLIST_MODE_WITH_SECRET`
@since{1.5.1}

The `GPGME_KEYLIST_MODE_WITH_SECRET` returns information about the presence of a corresponding secret key in a public key listing. A public key listing with this mode is slower than a standard listing but can be used instead of a second run to list the secret keys. This is only supported for GnuPG versions ≥ 2.1 . Note that using this option also makes sure that the keygrip is available in the output.

`GPGME_KEYLIST_MODE_EPHEMERAL`
@since{1.2.0}

The `GPGME_KEYLIST_MODE_EPHEMERAL` symbol specifies that keys flagged as ephemeral are included in the listing.

`GPGME_KEYLIST_MODE_VALIDATE`
@since{0.4.5}

The `GPGME_KEYLIST_MODE_VALIDATE` symbol specifies that the backend should do key or certificate validation and not just get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

@end table

At least one of `GPGME_KEYLIST_MODE_LOCAL` and `GPGME_KEYLIST_MODE_EXTERN` must be specified. For future binary compatibility,

you should get the current mode with `gpgme_get_keylist_mode` and modify it by setting or clearing the appropriate bits, and then using that calculated value in the `gpgme_set_keylisting_mode` operation. This will leave all other bits in the mode value intact (in particular those that are not used in the current version of the library).

The function returns the error code `{GPG_ERR_NO_ERROR}` if the mode could be set correctly, and `{GPG_ERR_INV_VALUE}` if `{ctx}` is not a valid pointer or `{mode}` is not a valid mode.

@end deffun

@deffun gpgme_keylist_mode_t gpgme_get_keylist_mode (@w{gpgme_ctx_t @var{ctx}})

The function `{gpgme_get_keylist_mode}` returns the current key listing mode of the context `{ctx}`. This value can then be modified and used in a subsequent `{gpgme_set_keylist_mode}` operation to only affect the desired bits (and leave all others intact).

The function returns 0 if `{ctx}` is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

@end deffun

@node Passphrase Callback
@subsection Passphrase Callback
@cindex callback, passphrase
@cindex passphrase callback

@deftp {Data type} {gpgme_error_t (*gpgme_passphrase_cb_t)(void *@var{hook}, const char *@var{uid_hint}, const char *@var{passphrase_info}, @w{int @var{prev_was_bad}}, @w{int @var{fd}})}

@tindex gpgme_passphrase_cb_t

The `{gpgme_passphrase_cb_t}` type is the type of functions usable as passphrase callback function.

The argument `{uid_hint}` might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), `{uid_hint}` will be `{NULL}`.

The argument `{passphrase_info}`, if not `{NULL}`, will give further information about the context in which the passphrase is required. This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then `{prev_was_bad}` is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor `{fd}`. The function `{gpgme_io_writen}` should be used for the write operation. Note that if the user returns

0 to indicate success, the user must at least write a newline character before returning from the callback.

If an error occurs, return the corresponding `gpgme_error_t` value. You can use the error code `GPG_ERR_CANCELED` to abort the operation. Otherwise, return `0`.

Note: The `passphrase_cb` only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See `gpgme_set_pinentry_mode` for more details on 2.1.x usage.

`@end deftp`

```
@deftypefun void gpgme_set_passphrase_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t @var{passfunc}}, @w{void *@var{hook_value}})
```

The function `gpgme_set_passphrase_cb` sets the function that is used

when a passphrase needs to be provided by the user to `@var{passfunc}`. The function `@var{passfunc}` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `@var{hook_value}`. By default, no passphrase callback function is set.

Not all crypto engines require this callback to retrieve the passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not even support an external passphrase callback at all, in this case the error code `GPG_ERR_NOT_SUPPORTED` is returned.

For GnuPG \geq 2.1 the pinentry mode has to be set to `GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback. See `gpgme_set_pinentry_mode`.

The user can disable the use of a passphrase callback function by calling `gpgme_set_passphrase_cb` with `@var{passfunc}` being `NULL`.

`@end deftypefun`

```
@deftypefun void gpgme_get_passphrase_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t *@var{passfunc}}, @w{void **@var{hook_value}})
```

The function `gpgme_get_passphrase_cb` returns the function that is used when a passphrase needs to be provided by the user in `@var{*passfunc}`, and the first argument for this function in `@var{*hook_value}`. If no passphrase callback is set, or `@var{ctx}` is not a valid pointer, `NULL` is returned in both variables.

`@var{passfunc}` or `@var{hook_value}` can be `NULL`. In this case,

the corresponding value will not be returned.

@end deftypefun

@node Progress Meter Callback

@subsection Progress Meter Callback

@cindex callback, progress meter

@cindex progress meter callback

```
@deftp {Data type} {void (*gpgme_progress_cb_t)(void *@var{hook}, const char *@var{what}, int @var{type},
int @var{current}, int @var{total})}
```

```
@tindex gpgme_progress_cb_t
```

The @code{gpgme_progress_cb_t} type is the type of functions usable as progress callback function.

The arguments are

specific to the crypto engine. More information

about the progress information returned from the GnuPG engine can be found in the GnuPG source code in the file @file{doc/DETAILS} in the section PROGRESS.

@end deftp

```
@deftypefun void gpgme_set_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t
@var{progfunc}}, @w{void *@var{hook_value}})
```

The function @code{gpgme_set_progress_cb} sets the function that is used when progress information about a cryptographic operation is available. The function @var{progfunc} needs to be implemented by the user, and whenever it is called, it is called with its first argument being @var{hook_value}. By default, no progress callback function is set.

Setting a callback function allows an interactive program to display progress information about a long operation to the user.

The user can disable the use of a progress callback function by calling @code{gpgme_set_progress_cb} with @var{progfunc} being @code{NULL}.

@end deftypefun

```
@deftypefun void
```

```
gpgme_get_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t *@var{progfunc}},
@w{void **@var{hook_value}})
```

The function @code{gpgme_get_progress_cb} returns the function that is used to inform the user about the progress made in @var{*progfunc}, and the first argument for this function in @var{*hook_value}. If no progress callback is set, or @var{ctx} is not a valid pointer, @code{NULL} is returned in both variables.

@var{progfunc} or @var{hook_value} can be @code{NULL}. In this case, the corresponding value will not be returned.

@end deftypefun

@node Status Message Callback

@subsection Status Message Callback

@cindex callback, status message

@cindex status message callback

```
@deftp {Data type} {gpgme_error_t (*gpgme_status_cb_t)(void *@var{hook}, const char *@var{keyword}, const char *@var{args})}
```

@tindex gpgme_status_cb_t

The @code{gpgme_status_cb_t} type is the type of function usable as a status message callback function.

The argument @var{keyword} is the name

of the status message while the

@var{args} argument contains any arguments for the status message.

If an error occurs, return the corresponding @code{gpgme_error_t} value. Otherwise, return @code{0}.

@end deftp

```
@deftypefun void gpgme_set_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t @var{statusfunc}}, @w{void *@var{hook_value}})
```

@since{1.6.0}

The function @code{gpgme_set_status_cb} sets the function that is used when a status message is received from gpg to @var{statusfunc}. The function @var{statusfunc} needs to be implemented by the user, and whenever it is called, it is called with its first argument being @var{hook_value}. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling

@code{gpgme_set_status_cb} with @var{statusfunc} being @code{NULL}.

@end deftypefun

```
@deftypefun void gpgme_get_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t *@var{statusfunc}}, @w{void **@var{hook_value}})
```

@since{1.6.0}

The

function @code{gpgme_get_status_cb} returns the function that is used to process status messages from gpg in @var{*statusfunc}, and the first argument for this function in @var{*hook_value}. If no status message callback is set, or @var{ctx} is not a valid pointer, @code{NULL} is returned in both variables.

@end deffun

@node Context Flags

@subsection Context Flags

@cindex flags, of a context

```
@deffun {gpgme_error_t} gpgme_set_ctx_flag @
    (@w{gpgme_ctx_t @var{ctx}}, @
    @w{const char *@var{name}}, @
    @w{const char *@var{value}})
```

@since{1.7.0}

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for @var{name}:

@table @code

@item "redraw"

This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a Pinentry.

A Curses based application may use this information to redraw the screen; for example:

@example

```
err = gpgme_op_keylist_start (ctx, "foo@@example.org", 0);
while (!err)
    @ {
        err = gpgme_op_keylist_next (ctx, &key);
        if (err)
            break;
        show_key (key);
        gpgme_key_release (key);
    }
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
    redraw_screen ();
gpgme_release (ctx);
@end example
```

@item "full-status"

Using a @var{value} of "1" the status callback set by gpgme_set_status_cb returns all status lines with the exception of PROGRESS lines. With the default of "0" the status callback is only called in certain situations.

@item "raw-description"

Setting the `@var{value}` to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the `@code{description}` field of the `@code{gpgme_tofu_info_t}` object.

@item "export-session-key"

Using a `@var{value}` of "1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for `@var{value}`, session keys are not exported.

@item "override-session-key"

The string given in `@var{value}` is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via `ps(1)`.

@item "auto-key-retrieve"

Setting the `@var{value}` to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can see which keys you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

@item "auto-key-import"

Setting the `@var{value}` to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

@item "include-key-block"

Setting the `@var{value}` to "1" forces the GPG backend to embed the signing key as well as an encryption subkey into the the signature.

@item "request-origin"

The string given in `@var{value}` is passed to the GnuPG engines to request restrictions based on the origin of the request. Valid values are documented in the GnuPG manual and the `gpg man` page under the option `@option{--request-origin}`. Requires at least GnuPG 2.2.6 to have an effect.

@item "no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and

decryption. This cache is based on the message specific salt value.
Requires at least GnuPG 2.2.7 to have an effect.

@item "ignore-mdc-error"

This flag passes

the option @option{--ignore-mdc-error} to gpg. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag

@code{legacy_cipher_nomdc} set. For failsafe reasons this flag is reset after each operation.

@item "auto-key-locate"

The string given in @var{value} is passed to gpg. This can be used to change the behavior of a @code{GPGME_KEYLIST_MODE_LOCATE} keylisting. Valid values are documented in the GnuPG manual and the gpg man page under the option @option{--auto-key-locate}.

Requires at least GnuPG 2.1.18.

Note: Keys retrieved through @code{auto-key-locate} are automatically imported in the keyring.

@item trust-model

@since{1.11.2}

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default. If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail. Example: "tofu+pgp".

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future operations. A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

@item "extended-edit"

This flag passes the option @option{--expert} to gpg key edit. This can be used to get additional callbacks in @code{gpgme_op_edit}.

@end table

This function returns @code{0} on success.

@end deftypefun

```
@deftypefun {const char *} gpgme_get_ctx_flag @
  (@w{gpgme_ctx_t @var{ctx}}, @
  @w{const char *@var{name}})
```

@since{1.8.0}

The value of flags settable by @code{gpgme_set_ctx_flag} can be retrieved by this function. If @var{name} is unknown the function returns @code{NULL}. For boolean flags an empty string is returned for False and the string "1" is returned for True; either `atoi(3)` or a test for an empty string can be used to get the boolean value.

@end deftypefun

@node Locale

@subsection Locale

@cindex locale, default

@cindex locale, of a context

A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

```
@deftypefun gpgme_error_t gpgme_set_locale (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{category}},
  @w{const char *@var{value}})
@since{0.4.3}
```

The function @code{gpgme_set_locale} sets the locale of the context @var{ctx}, or the default locale if @var{ctx} is a null pointer.

The locale settings that should be changed are specified by @var{category}. Supported categories are @code{LC_CTYPE}, @code{LC_MESSAGES}, and @code{LC_ALL}, which is a wildcard you can use if you want to change all the categories at once.

The value to be used for the locale setting is @var{value}, which will be copied to @acronym{GPGME}'s internal data structures. @var{value} can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default value at startup.

The function returns an error if not enough memory is available.

@end deftypefun

@node Additional Logs

@subsection Additional Logs

@cindex auditlog, of the engine

@cindex auditlog

Additional logs can be associated with a context. These logs are engine specific and can be obtained with @code{gpgme_op_getauditlog}.

```
@deftypefun gpgme_error_t gpgme_op_getauditlog @
  (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}},
  @
  @w{unsigned int @var{flags}})
@since{1.1.1}
```

The function @code{gpgme_op_getauditlog} is used to obtain additional logs as specified by @var{flags} into the @var{output} data. If

The function returns the error code @code{GPG_ERR_NO_ERROR} if a log could be queried from the engine, and @code{GPG_ERR_NOT_IMPLEMENTED} if the log specified in @var{flags} is not available for this engine. If no log is available @code{GPG_ERR_NO_DATA} is returned.

The value in @var{flags} is a bitwise-or combination of one or multiple of the following bit values:

```
@table @code
@item GPGME_AUDITLOG_DIAG
@since{1.11.2}
```

Obtain diagnostic output which would be written to @code{stderr} in interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and @code{GPG_ERR_NO_DATA} will be returned.

Implemented for: @code{GPGME_PROTOCOL_OpenPGP}

@item

GPGME_AUDITLOG_DEFAULT

@since{1.11.2}

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the @code{GETAUDITLOG} command. For @code{GPGME_PROTOCOL_CMS} this provides additional information about the X509 certificate chain.

Implemented for: @code{GPGME_PROTOCOL_CMS}

@item GPGME_AUDITLOG_HTML

@since{1.1.1}

Same as @code{GPGME_AUDITLOG_DEFAULT} but in HTML.

Implemented for: @code{GPGME_PROTOCOL_CMS}

@end table

@end dectyfefun

```
@dectyfefun gpgme_error_t gpgme_op_getauditlog_start @
    (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}}, @
    @w{unsigned int @var{flags}})
```

@since{1.1.1}

This is the asynchronous variant of @code{gpgme_op_getauditlog}.

@end dectyfefun

@node Key Management

@section Key Management

@cindex key management

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

@menu

- * Key objects:: Description of the key structures.
- * Listing Keys:: Browsing the list of available keys.
- * Information About Keys:: Requesting detailed information about keys.
- * Manipulating Keys:: Operations on keys.
- * Generating Keys:: Creating new key pairs.
- * Signing Keys:: Adding key signatures to public keys.
- * Exporting Keys:: Retrieving key data from the key ring.
- * Importing Keys:: Adding keys to the key ring.
- * Deleting Keys:: Removing keys from the key ring.

* Changing Passphrases:: Change the passphrase of a key.
* Changing TOFU Data:: Changing data pertaining to TOFU.
* Advanced Key Editing:: Advanced key edit operation.
@end menu

@node Key objects

@subsection Key objects

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

@deftp {Data type} gpgme_key_t

The @code{gpgme_key_t} type is a pointer to a key object. It has the following members:

@table @code

@item gpgme_keylist_mode_t keylist_mode

@since{0.9.0}

The keylist mode that was active when the key was retrieved.

@item unsigned int revoked : 1

This is true if the key is revoked.

@item unsigned int expired : 1

This is true if the key is expired.

@item unsigned int disabled : 1

This is true if the key is disabled.

@item unsigned int invalid : 1

This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

@item unsigned int can_encrypt : 1

This is true if the key (ie one of its subkeys) can be used for encryption.

@item unsigned int can_sign

: 1

This is true if the key (ie one of its subkeys) can be used to create data signatures.

@item unsigned int can_certify : 1

This is true if the key (ie one of its subkeys) can be used to create key certificates.

@item unsigned int can_authenticate : 1

@since{0.4.5}

This is true if the key (ie one of its subkeys) can be used for authentication.

@item unsigned int is_qualified : 1

@since{1.1.0}

This is true if the key can be used for qualified signatures according to local government regulations.

@item unsigned int secret : 1

This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if @code{GPGME_KEYLIST_MODE_WITH_SECRET} is active.

@item unsigned int origin : 5

@since{1.8.0}

Reserved for the origin of this key.

@item gpgme_protocol_t protocol

This is the protocol supported by this key.

@item char *issuer_serial

If

@code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the issuer serial.

@item char *issuer_name

If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the issuer name.

@item char *chain_id

If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the chain ID, which can be used to built the certificate chain.

@item gpgme_validity_t owner_trust

If @code{protocol} is @code{GPGME_PROTOCOL_OpenPGP}, then this is the owner trust.

@item gpgme_subkey_t subkeys

This is a linked list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

@item gpgme_user_id_t uids

This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

@item char *fpr

@since{1.7.0}

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

@item unsigned long last_update

@since{1.8.0}

Reserved for the time of the last update of this key.

@end table

@end deftp

@deftp {Data type} gpgme_subkey_t

@since{1.5.0}

The @code{gpgme_subkey_t} type is a pointer to a subkey structure. Subkeys are one component of a @code{gpgme_key_t} object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One @code{gpgme_key_t} can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

@table @code

@item gpgme_subkey_t next

This is a pointer to the next subkey structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1

This is true if the subkey is revoked.

@item unsigned int expired : 1

This is true if the subkey is expired.

@item unsigned int disabled : 1

This is true if the subkey
is disabled.

@item unsigned int invalid : 1

This is true if the subkey is invalid.

@item unsigned int can_encrypt : 1

This is true if the subkey can be used for encryption.

@item unsigned int can_sign : 1

This is true if the subkey can be used to create data signatures.

@item unsigned int can_certify : 1

This is true if the subkey can be used to create key certificates.

@item unsigned int can_authenticate : 1

@since{0.4.5}

This is true if the subkey can be used for authentication.

@item unsigned int is_qualified : 1

@since{1.1.0}

This is true if the subkey can be used for qualified signatures
according to local government regulations.

@item unsigned int is_de_vs : 1

@since{1.8.0}

This is true if the subkey complies with the rules for classified
information in Germany at the restricted level (VS-NfD). This are
currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a
Brainpool curve.

@item unsigned int secret : 1

This is true if the subkey is a secret key. Note that
it will be
false if the key is actually a stub key; i.e. a secret key operation
is currently not possible (offline-key). This is only set if a
listing of secret keys has been requested or if
@code{GPGME_KEYLIST_MODE_WITH_SECRET} is active.

@item gpgme_pubkey_algo_t pubkey_algo

This is the public key algorithm supported by this subkey.

@item unsigned int length

This is the length of the subkey (in bits).

@item char *keyid

This is the key ID of the subkey in hexadecimal digits.

@item char *fpr

This is the fingerprint of the subkey in hexadecimal digits, if available.

@item char *keygrip

@since{1.7.0}

The keygrip of the subkey in hex digit form or @code{NULL} if not available.

@item long int timestamp

This is the creation timestamp of the subkey. This is -1 if the timestamp is invalid, and 0 if it is not available.

@item long int expires

This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

@item unsigned int is_cardkey : 1

@since{1.2.0}

True if

the secret key is stored on a smart card.

@item char *card_number

@since{1.2.0}

The serial number of a smart card holding this key or @code{NULL}.

@item char *curve

For ECC algorithms the name of the curve.

@end table

@end deftp

@deftp {Data type} gpgme_user_id_t

A user ID is a component of a @code{gpgme_key_t} object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

@table @code

@item gpgme_user_id_t next

This is a pointer to the next user ID structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1

This is true if the user ID is revoked.

@item unsigned int invalid : 1

This is true if the user ID is invalid.

@item gpgme_validity_t validity

This specifies the validity of the user ID.

@item char *uid

This is the user ID string.

@item char *name

This is the name component of @code{uid}, if available.

@item char *comment

This is the comment component of @code{uid}, if available.

@item char *email

This is the email component of @code{uid}, if available.

@item char *address;

The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the @code{email} part of this structure but might be slightly different. If no mail address is available @code{NULL} is stored.

@item gpgme_tofu_info_t tofu

@since{1.7.0}

If not @code{NULL} information from the TOFU database pertaining to this user id.

@item gpgme_key_sig_t signatures

This is a linked list with the signatures on this user ID.

@item unsigned int origin : 5

@since{1.8.0}

Reserved for the origin of this user ID.

@item unsigned long last_update

@since{1.8.0}

Reserved for the time of the last update of this user ID.

@item char *uidhash;

A string used by gpg to identify a user ID. This string can be used at certain prompts of @code{gpgme_op_edit} to select a user ID. Users must be prepared to see a @code{NULL} value here. The format of the value is not specified and may depend on the GPGME or GnuPG version.

@end table

@end deftp

@deftp {Data type} gpgme_tofu_info_t

@since{1.7.0}

The @code{gpgme_tofu_info_t} type is a pointer to a tofu info structure. Tofu info structures are one component of a @code{gpgme_user_id_t} object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

@table @code

@item gpgme_key_sig_t next

This is a pointer to the next tofu info structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int validity : 3

This is the TOFU validity. It can have the following values:

@table @code

@item 0

The value @code{0} indicates a conflict.

@item 1

The value @code{1} indicates a key without history.

@item 2

The value @code{2} indicates a key with too little history.

@item 3

The value @code{3} indicates a key with enough history for basic trust.

@item 4

The value @code{4} indicates a key

with a lot of history.

@end table

@item unsigned int policy : 4

This is the TOFU policy, see @code{gpgme_tofu_policy_t}.

@item unsigned short signcount

This is the number of signatures seen for this binding (or

@code{USHRT_MAX} if there are more than that).

@item unsigned short encrcount

This is the number of encryptions done with this binding (or

@code{USHRT_MAX} if there are more than that).

@item unsigned long signfirst

Number of seconds since Epoch when the first signature was seen with this binding.

@item unsigned long signlast

Number of seconds since Epoch when the last signature was seen with this binding.

@item unsigned long encrfirst

Number of seconds since Epoch when the first encryption was done with this binding.

@item unsigned long enclast

Number of seconds since Epoch when the last encryption was done with this binding.

@item char *description

A human-readable string summarizing the TOFU data (or NULL).

@end table

@end deftp

@deftp {Data type} gpgme_key_sig_t

The

@code{gpgme_key_sig_t} type is a pointer to a key signature structure.

Key signatures are one component of a @code{gpgme_key_t} object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the @code{GPGME_KEYLIST_MODE_SIGS} mode enabled, because it can be expensive to retrieve all signatures of a

key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the `@code{GPGME_KEYLIST_MODE_SIG_NOTATIONS}` mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

`@table @code`

`@item gpgme_key_sig_t next`

This is a pointer to the next key signature structure in the linked list, or `@code{NULL}` if this is the last element.

`@item unsigned int revoked : 1`

This is true if the key signature is a revocation signature.

`@item unsigned int expired : 1`

This is true if the key signature is expired.

`@item unsigned int invalid : 1`

This is true if the key signature is invalid.

`@item unsigned int exportable : 1`

This is true if the key signature is exportable.

`@item gpgme_pubkey_algo_t pubkey_algo`

This is the public key algorithm used to create the signature.

`@item char *keyid`

This is the key ID of the key (in hexadecimal digits) used to create the signature.

`@item long int timestamp`

This is the creation timestamp of the key signature. This is -1 if the timestamp is invalid, and 0 if it is not available.

`@item long int expires`

This is the expiration timestamp of the key signature, or 0 if the key signature does not expire.

`@item gpgme_error_t status`

This is the status of the signature and has the same meaning as the member of the same name in a `@code{gpgme_signature_t}` object.

`@item unsigned int sig_class`

This specifies the signature class of the key signature. The meaning

is specific to the crypto engine.

@item char *uid

This is the main user ID of the key used to create the signature.

@item char *name

This is the name component of @code{uid}, if available.

@item char *comment

This is the comment component of @code{uid}, if available.

@item char *email

This is the email component of @code{uid}, if available.

@item gpgme_sig_notation_t notations

This is a linked list with the notation data and policy URLs.

@end table

@end deftp

@node Listing Keys

@subsection Listing Keys

@cindex listing keys

@cindex key listing

@cindex key listing, start

@cindex key ring, list

@cindex key ring, search

@deftypefun gpgme_error_t gpgme_op_keylist_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}}, @w{int @var{secret_only}})

The function @code{gpgme_op_keylist_start} initiates a key listing operation inside the context @var{ctx}. It sets everything up so that subsequent invocations of @code{gpgme_op_keylist_next} return the keys in the list.

If @var{pattern} is @code{NULL}, all available keys are returned.

Otherwise,

@var{pattern} contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `@var{secret_only}` is not `@code{0}`, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and `@code{gpgme_op_keylist_next}` returns `@code{GPG_ERR_EOF}`), or `@code{gpgme_op_keylist_end}` is called to finish the operation.

The function returns the error code `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.
`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_keylist_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}}[], @w{int @var{secret_only}}, @w{int @var{reserved}})
```

The function `@code{gpgme_op_keylist_ext_start}` initiates an extended key listing operation inside the context `@var{ctx}`. It sets everything up so that subsequent invocations of `@code{gpgme_op_keylist_next}` return the keys in the list.

If `@var{pattern}` or `@var{*pattern}` is `@code{NULL}`, all available keys are returned. Otherwise, `@var{pattern}` is a `@code{NULL}` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `@var{secret_only}` is not `@code{0}`, the list is restricted to secret keys only.

The value of `@var{reserved}` must be `@code{0}`.

The context will be busy until either all keys are received (and `@code{gpgme_op_keylist_next}` returns `@code{GPG_ERR_EOF}`), or `@code{gpgme_op_keylist_end}` is called to finish the operation.

The function returns the error code `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.
`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_keylist_from_data_start @
(@w{gpgme_ctx_t @var{ctx}}, @
```

```
@w{gpgme_data_t @var{data}}, @  
@w{int @var{reserved}})
```

```
@since{1.8.0}
```

The function `gpgme_op_keylist_from_data_start` initiates a key listing operation inside the context `ctx`. In contrast to the other key listing operation the keys are read from the supplied `data` and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys from `data`.

The value of `reserved` must be `0`.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation. While the context is busy `data` may not be released.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_keylist_next (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t  
*@var{r_key}})
```

The function `gpgme_op_keylist_next` returns the next key in the list created by a previous `gpgme_op_keylist_start` operation in the context `ctx`. The key will have one reference for the user. [@xref{Manipulating Keys}](#).

This is the only way to get at `gpgme_key_t` objects in [GPGME](#).

If the last key in the list has already been returned, `gpgme_op_keylist_next` returns `GPG_ERR_EOF`.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` or `r_key` is not a valid pointer, and `GPG_ERR_ENOMEM` if there is not enough memory for the operation.

```
@end deftypefun
```



```
@deftypefun gpgme_error_t gpgme_op_keylist_end (@w{gpgme_ctx_t @var{ctx}})
```

The function `gpgme_op_keylist_end` ends a pending key list operation in the context `ctx`.

After the operation completed successfully, the result of the key listing operation can be retrieved with `gpgme_op_keylist_result`.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

```
@end deftypefun
```

The following example illustrates how all keys containing a certain string (`g10code`) can be listed with their key ID and the name and email address of the main user ID:

```
@example
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
@{
    err = gpgme_op_keylist_start (ctx, "g10code", 0);
    while (!err)
    @{
        err = gpgme_op_keylist_next (ctx, &key);
        if (err)
            break;
        printf ("%s:", key->subkeys->keyid);
        if (key->uids && key->uids->name)
            printf (" %s", key->uids->name);
        if (key->uids && key->uids->email)
            printf (" <%s>", key->uids->email);
        putchar ('\n');
        gpgme_key_release (key);
    @}
    gpgme_release (ctx);
@}

if (gpg_err_code (err) != GPG_ERR_EOF)
@{
    fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
    exit (1);
@}
```

@end example

@defntp {Data type} {gpgme_keylist_result_t}

This is a pointer to a structure used to store the result of a

@code{gpgme_op_keylist_*}

operation. After successfully ending a key

listing operation, you can retrieve the pointer to the result with

@code{gpgme_op_keylist_result}. The structure contains the following member:

@table @code

@item unsigned int truncated : 1

This is true if the crypto backend had to truncate the result, and less than the desired keys could be listed.

@end table

@end defntp

@defntypfun gpgme_keylist_result_t gpgme_op_keylist_result (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_keylist_result} returns a

@code{gpgme_keylist_result_t} pointer to a structure holding the

result of a @code{gpgme_op_keylist_*} operation. The pointer is only valid if the last operation on the context was a key listing

operation, and if this operation finished successfully. The returned

pointer is only valid until the next operation is started on the context.

@end defntypfun

In a simple program, for which a blocking operation is acceptable, the following function can be used to retrieve a single key.

@defntypfun gpgme_error_t gpgme_get_key (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{fpr}}, @w{gpgme_key_t *@var{r_key}}, @w{int @var{secret}})

The function @code{gpgme_get_key} gets the key with the fingerprint

(or key ID) @var{fpr} from the crypto backend and return it in

@var{r_key}. If @var{secret} is true, get the secret key. The

currently active keylist mode is used to retrieve the key. The key will have one reference for the user.

If the key is not found in the keyring, @code{gpgme_get_key} returns the error code @code{GPG_ERR_EOF} and *@var{r_key} will be set to @code{NULL}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if @var{ctx} or @var{r_key} is not a valid pointer or @var{fpr} is not a fingerprint or key ID, @code{GPG_ERR_AMBIGUOUS_NAME} if the key ID was not a unique specifier for a key, and @code{GPG_ERR_ENOMEM} if at some time during the operation there was not enough memory available.

@end deftypefun

@node Information About Keys

@subsection

Information About Keys

@cindex key, information about

@cindex key, attributes

@cindex attributes, of a key

Please see the beginning of this section for more information about

@code{gpgme_key_t} objects.

@defpt {Data type} gpgme_validity_t

The @code{gpgme_validity_t} type is used to specify the validity of a user ID in a key. The following validities are defined:

@table @code

@item GPGME_VALIDITY_UNKNOWN

The user ID is of unknown validity. The string representation of this validity is `?`.

@item GPGME_VALIDITY_UNDEFINED

The validity of the user ID is undefined. The string representation of this validity is `q`.

@item GPGME_VALIDITY_NEVER

The user ID is never valid. The string representation of this validity is `n`.

@item GPGME_VALIDITY_MARGINAL

The user ID is marginally valid. The string representation of this validity is `m`.

@item GPGME_VALIDITY_FULL

The user ID is fully valid. The string representation of this validity is `f`.

@item GPGME_VALIDITY_ULTIMATE

The

user ID is ultimately valid. The string representation of this validity is `u`.

@end table

@end deftp

@node Manipulating Keys
@subsection Manipulating Keys
@cindex key, manipulation

```
@deftypefun void gpgme_key_ref (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_ref} acquires an additional reference for
the key @var{key}.
@end deftypefun
```

```
@deftypefun void gpgme_key_unref (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_unref} releases a reference for the key
@var{key}. If this was the last reference, the key will be destroyed
and all resources associated to it will be released.
@end deftypefun
```

```
@c
@c gpgme_op_setexpire
@c
@deftypefun gpgme_error_t gpgme_op_setexpire @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{unsigned long @var{expires}}, @
   @w{const char *@var{subfprs}}, @
   @w{unsigned int @var{reserved}});
```

@since{1.14.1}

The function @code{gpgme_op_setexpire} sets the expiration time of the key @var{key} or of the specified subkeys. This function requires at least version 2.1.22 of GnuPG.

@var{key} specifies the key to operate on.

@var{expires} specifies the expiration time in seconds from now. To be similar to other usages where expiration times are provided in unsigned long this is similar to the key creation date and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time. Note that this parameter takes an unsigned long value and not a @code{time_t} to avoid problems on systems which use a signed 32 bit @code{time_t}. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

@var{subfprs} selects the subkey(s) for which the expiration time should be set. If @var{subfprs} is set to @code{NULL}, then the

expiration time of the primary key is set. If `@var{subfprs}` is an asterisk (`@code{*}`), then the expiration times of all non-revoked and not yet expired subkeys are set.

To select more than one subkey put all subkey fingerprints into one string separated by linefeeds characters (`@code{\n}`).

`@var{reserved}` is reserved for later use and must be `@code{0}`.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_setexpire_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{unsigned long @var{expires}}, @
   @w{const char *@var{subfprs}}, @
   @w{unsigned int @var{flags}});
```

`@since{1.14.1}`

The function `@code{gpgme_op_setexpire_start}` initiates a `@code{gpgme_op_setexpire}` operation; see there for details. It must be completed by calling `@code{gpgme_wait}` on the context. [@xref{Waiting For Completion}](#).

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_revuid_start @
  (@w{gpgme_ctx_t @var{ctx}}, @
   @w{gpgme_key_t @var{key}}, @
   @w{const char *@var{userid}}, @
   @w{unsigned int @var{flags}});
```

`@since{1.14.1}`

The function `@code{gpgme_op_setexpire_start}` initiates a `@code{gpgme_op_setexpire}` operation; see there for details. It must be completed by calling `@code{gpgme_wait}` on the context. [@xref{Waiting For Completion}](#).

`@end deftypefun`

`@node Generating Keys`

`@subsection Generating Keys`

@cindex key, creation

@cindex key ring, add

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the `gpgme_op_genkey` function can be used. Existing code which wants to update to the new functions or new code which shall supports older GnuPG versions may try the new functions first and provide a fallback to the old function if the error code `GPG_ERR_NOT_SUPPORTED` is received.

@c

@c gpgme_op_createkey

@c

@deftypefun gpgme_error_t gpgme_op_createkey @

```
(@w{gpgme_ctx_t @var{ctx}}, @  
 @w{const char *@var{userid}}, @  
 @w{const char *@var{algo}}, @  
 @w{unsigned long @var{reserved}}, @  
 @w{unsigned long @var{expires}}, @  
 @w{gpgme_key_t @var{extrakey}},  
 @  
 @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function `gpgme_op_createkey` generates a new key for the protocol active in the context `@var{ctx}`. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

`@var{userid}` is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`@var{algo}` specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see the GnuPG manual. If `@var{algo}` is `NULL` or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine;

however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via `@var{flags}`, triggers the creation of a

primary key plus a secondary key (subkey).

`@var{reserved}` must be set to zero.

`@var{expires}` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag

`@code{GPGME_CREATE_NOEXPIRE}` to create keys that do not expire. Note that this parameter takes an unsigned long value and not a `@code{time_t}` to avoid problems on systems which use a signed 32 bit `@code{time_t}`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`@var{extrakey}` is currently not used and must be set to `@code{NULL}`. A future version of GPGME may use this parameter to create X.509 keys.

`@var{flags}` can be set to the bit-wise OR of the following flags:

```
@table @code
@item GPGME_CREATE_SIGN
@itemx GPGME_CREATE_ENCR
@itemx GPGME_CREATE_CERT
@itemx GPGME_CREATE_AUTH
@since{1.7.0}
```

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags:

```signing"`, ``encryption"`, ``certification"`, or ``authentication".`

The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

```
@item GPGME_CREATE_NOPASSWD
@since{1.7.0}
```

Request generation of the key without password protection.

```
@item GPGME_CREATE_SELFSIGNED
@since{1.7.0}
```

For an X.509 key do not create a CSR but a self-signed certificate. This has not yet been implemented.

```
@item GPGME_CREATE_NOSTORE
@since{1.7.0}
```

Do not store the created key in the local key database.

This has not yet been implemented.

@item GPGME\_CREATE\_WANTPUB

@itemx GPGME\_CREATE\_WANTSEC

@since{1.7.0}

Return

the public or secret key as part of the result structure.

This has not yet been implemented.

@item GPGME\_CREATE\_FORCE

@since{1.7.0}

The engine does not allow the creation of a key with a user ID already existing in the local key database. This flag can be used to override this check.

@item GPGME\_CREATE\_NOEXPIRE

@since{1.9.0}

Request generation of keys that do not expire.

@end table

After the operation completed successfully, information about the created key can be retrieved with @code{gpgme\_op\_genkey\_result}.

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_createkey\_start @

(@w{gpgme\_ctx\_t @var{ctx}}, @

@w{const char \*@var{userid}}, @

@w{const char \*@var{algo}}, @

@w{unsigned long @var{reserved}}, @

@w{unsigned long @var{expires}}, @

@w{gpgme\_key\_t @var{extrakey}}, @

@w{unsigned int

@var{flags}});

@since{1.7.0}



The function `gpgme_op_createkey_start` initiates a `gpgme_op_createkey` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

`@end deftypefun`

`@c`

`@c gpgme_op_createsubkey`

`@c`

`@deftypefun gpgme_error_t gpgme_op_createsubkey @`

```
(@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{algo}}, @
 @w{unsigned long @var{reserved}}, @
 @w{unsigned long @var{expires}}, @
 @w{unsigned int @var{flags}});
```

`@since{1.7.0}`

The function `gpgme_op_createsubkey` creates and adds a new subkey to the primary OpenPGP key given by `KEY`. The only allowed protocol in `ctx` is `GPGME_PROTOCOL_OPENPGP`. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.

`key` specifies the key to operate on.

`algo` specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If `algo` is `NULL` or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

`reserved` must be set to zero.

`expires` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag `GPGME_CREATE_NOEXPIRE` to create keys that do not expire. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode

dates up to the year  
2106.

@var{flags} takes the same values as described above for  
@code{gpgme\_op\_createkey}.

After the operation completed successfully, information about the  
created key can be retrieved with @code{gpgme\_op\_genkey\_result}.

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if  
the engine does not support the command, or a bunch of other error  
codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_createsubkey_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{algo}}, @
 @w{unsigned long @var{reserved}}, @
 @w{unsigned long @var{expires}}, @
 @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme\_op\_createsubkey\_start} initiates a  
@code{gpgme\_op\_createsubkey} operation; see there for details. It must  
be completed by calling @code{gpgme\_wait} on the context.  
@xref{Waiting For Completion}.

@end deftypefun

@c

@c gpgme\_op\_adduid

@c

```
@deftypefun gpgme_error_t
gpgme_op_adduid @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme\_op\_adduid} adds a new user ID to the OpenPGP  
key given by @var{KEY}. Adding additional user IDs after key creation

is a feature of the OpenPGP protocol and thus the protocol for the context `@var{ctx}` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`@var{key}` specifies the key to operate on.

`@var{userid}` is the user ID to add to the key. A user ID is commonly the mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`@var{flags}` are currently not used and must be set to zero.

The function returns zero on success, `@code{GPG_ERR_NOT_SUPPORTED}` if the engine does not support the command, or a bunch of other error codes.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_adduid_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});
```

`@since{1.7.0}`

The function `@code{gpgme_op_adduid_start}` initiates a `@code{gpgme_op_adduid}` operation; see there for details. It must be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

`@end deftypefun`

`@c`

`@c gpgme_op_revuid`

`@c`

```
@deftypefun gpgme_error_t gpgme_op_revuid @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});
```

`@since{1.7.0}`

The function `gpgme_op_revuid` revokes a user ID from the OpenPGP key given by `KEY`. Revoking user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `ctx` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`key` specifies the key to operate on.

`userid` is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. This is a required parameter.

`flags` are currently not used and must be set to zero.

Note that the engine won't allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

`end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_revuid_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}},
 @
 @w{unsigned int @var{flags}});
```

`since{1.7.0}`

The function `gpgme_op_revuid_start` initiates a `gpgme_op_revuid` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

`end deftypefun`

`c`

`c gpgme_op_set_uid_flag`

`c`

```
@deftypefun gpgme_error_t gpgme_op_set_ui_flag @
```

```
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{const char *@var{userid}}, @
@w{cons char * @var{name}}, @
@w{cons char * @var{value}});
```

@since{1.8.0}

The function @code{gpgme\_op\_set\_uid\_flag} is used to set flags on a user ID from the OpenPGP key given by @var{KEY}. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context @var{ctx} must be set to OpenPGP.

@var{key} specifies the key to operate on. This parameters is required.

@var{userid} is the user ID of the key to be manipulated. This user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the @code{uid} field from the user ID object (@code{gpgme\_user\_id\_t}) is to be used. This is a required parameter.

@var{name} names the flag which is to be changed. The only currently supported flag is:

@table @code

@item primary

This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. @var{value} must be given as NULL. For technical reasons this functions bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

@end table

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_set\_uid\_flag\_start @

```
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{const char *@var{userid}}, @
@w{cons char * @var{name}},
@
@w{cons char * @var{value}});
```

@since{1.8.0}

The function `gpgme_op_set_uid_flag_start` initiates a `gpgme_op_set_uid_flag` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

@end deftypefun

@c

@c gpgme\_op\_genkey

@c

@deftypefun gpgme\_error\_t gpgme\_op\_genkey @

(@w{gpgme\_ctx\_t @var{ctx}}, @

@w{const char \*@var{parms}}, @

@w{gpgme\_data\_t @var{public}}, @

@w{gpgme\_data\_t @var{secret}})

The function `gpgme_op_genkey` generates a new key pair in the context `@var{ctx}`. The meaning of `@var{public}` and `@var{secret}` depends on the crypto backend.

GPG does not support `@var{public}` and `@var{secret}`, they should be `NULL`. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with `gpgme_op_genkey_result`.

GpgSM requires `@var{public}` to be a writable data object. GpgSM will generate

a secret key (which will be stored by `gpg-agent`), and return a certificate request in `@var{public}`, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument `@var{parms}` specifies parameters for the key in a string that looks something like XML. The details about the format of `@var{parms}` are specific to the crypto engine used by `@var{ctx}`. The first line of the parameters must be `<GnupgKeyParams format="internal">` and the last line must be `</GnupgKeyParams>`. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters `<`, `>`, or `&`.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

@example

```

<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real:
 Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
@end example

```

Here is an example for GpgSM as the crypto engine (all parameters of OpenPGP key generation are documented in the GPGSM manual):

```

@example
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@@foo.bar
</GnupgKeyParms>
@end example

```

Strings should be given in UTF-8 encoding. The only format supported for now is ``internal''. The content of the `{GnupgKeyParms}` container is passed verbatim to the crypto backend. Control statements are not allowed.

After the operation completed successfully, the result can be retrieved with `{gpgme_op_genkey_result}`.

The function returns the error code `{GPG_ERR_NO_ERROR}` if the operation could be started successfully, `{GPG_ERR_INV_VALUE}` if `{parms}` is not a well-formed string (e.g. does not have the expected tag-like headers and footers), `{GPG_ERR_NOT_SUPPORTED}` if `{public}` or `{secret}` is not valid, and `{GPG_ERR_GENERAL}` if no key was created by the backend.

```

@end deftypefun

```

```

@deftypefun gpgme_error_t gpgme_op_genkey_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{parms}}, @w{gpgme_data_t @var{public}}, @w{gpgme_data_t @var{secret}})

```

The function `{gpgme_op_genkey_start}` initiates a `{gpgme_op_genkey}` operation. It can be completed by calling `{gpgme_wait}` on the context. [@xref{Waiting For Completion}](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `@var{parms}` is not a valid XML string, and `GPG_ERR_NOT_SUPPORTED` if `@var{public}` or `@var{secret}` is not `NULL`.  
@end deftypefun

```
@c
@c gpgme_op_genkey_result
@c
@deftp {Data type} {gpgme_genkey_result_t}
```

This is a pointer to a structure used to store the result of a `gpgme_op_genkey` operation. After successfully generating a key, you can retrieve the pointer to the result with `gpgme_op_genkey_result`. The structure contains the following members:

```
@table @code
@item unsigned int primary : 1
This flag is set to 1 if a primary key was created and to 0 if not.
```

```
@item unsigned int sub : 1
This flag is set to 1 if a subkey was created and to 0 if not.
```

```
@item unsigned int uid : 1
This flag is set to 1 if a user ID was created and to 0 if not.
```

```
@item char *fpr
This is the fingerprint of the key that was created. If both a primary and a subkey were generated, the fingerprint of the primary key will be returned. If the crypto engine does not provide the fingerprint, fpr will be a null pointer.
```

```
@item gpgme_data_t pubkey
@since{1.7.0}
```

This will eventually be used to return the public key. It is currently not used.

```
@item gpgme_data_t seckey
@since{1.7.0}
```

This will eventually be used to return the secret key. It is currently not used.



@end table

@end deftp

@deftypefun

```
gpgme_genkey_result_t gpgme_op_genkey_result (@w{gpgme_ctx_t @var{ctx}})
```

The function `gpgme_op_genkey_result` returns a `gpgme_genkey_result_t` pointer to a structure holding the result of a `gpgme_op_genkey` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_genkey` or `gpgme_op_genkey_start` operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@c

@c SIGNING KEYS

@c

@node Signing Keys

@subsection Signing Keys

@cindex key, signing

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the `gpgme_op_interact` function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

@c

@c gpgme\_op\_keysign

@c

@deftypefun

```
gpgme_error_t gpgme_op_keysign @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned long @var{expires}}, @
 @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function `gpgme_op_keysign` adds a new key signature to the public key `KEY`. This function requires at least version 2.1.12 of

GnuPG.

`@var{CTX}` is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, `@code{gpgme_signers_add}` can be used.

`@xref{Selecting Signers}`.

`@var{key}` specifies the key to operate on.

`@var{userid}` selects the user ID or user IDs to be signed. If `@var{userid}` is set to `@code{NULL}` all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `@code{uid}` field from the user ID object (`@code{gpgme_user_id_t}`) is to be used. To select more than one user ID put them all into one string separated by linefeed characters (`@code{\n}`) and set the flag `@code{GPGME_KEYSIGN_LFSEP}`.

`@var{expires}` specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag `@code{GPGME_KEYSIGN_NOEXPIRE}` is used. Note that this parameter takes an unsigned long value and not a `@code{time_t}` to avoid problems on systems which use a signed 32 bit `@code{time_t}`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`@var{flags}` can be set to the bit-wise OR of the following flags:

```
@table @code
@item GPGME_KEYSIGN_LOCAL
@since{1.7.0}
```

Instead of creating an exportable key signature, create a key signature which is marked as non-exportable.

```
@item GPGME_KEYSIGN_LFSEP
@since{1.7.0}
```

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that `@var{userid}` may contain several linefeed separated user IDs.

```
@item GPGME_KEYSIGN_NOEXPIRE
```

Force the creation of a key signature without an expiration date. This overrides `@var{expire}` and any local configuration of the engine.

`@end table`

The function returns zero on success, `@code{GPG_ERR_NOT_SUPPORTED}` if the engine does not support the command, or a bunch of other error codes.

`@end dectypedefun`

```
@dectypedefun gpgme_error_t gpgme_op_keysign_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned long @var{expires}}, @
 @w{unsigned int @var{flags}});
```

`@since{1.7.0}`

The function `@code{gpgme_op_keysign_start}` initiates a `@code{gpgme_op_keysign}` operation; see there for details. It must be completed by calling `@code{gpgme_wait}` on the context. [@xref{Waiting For Completion}](#).

`@end dectypedefun`

`@c`

`@c gpgme_op_revsign`

`@c`

```
@dectypedefun gpgme_error_t gpgme_op_revsign @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{gpgme_key_t @var{signing_key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});
```

`@since{1.14.1}`

The function `@code{gpgme_op_revsign}` revokes key signatures of the public key `@var{key}` made with the key `@var{signing_key}`. This function requires at least version 2.2.24 of GnuPG.

`@var{key}` specifies the key to operate on.

@var{signing\_key} specifies the key whose signatures shall be revoked.

@var{userid} selects the user ID or user IDs whose signatures shall be revoked. If @var{userid} is set to @code{NULL} the signatures on all user IDs are revoked. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the @code{uid} field from the user ID object (@code{gpgme\_user\_id\_t}) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (@code{\n}) and set the flag @code{GPGME\_REVSIG\_LFSEP}.

@var{flags} can be set to the bit-wise OR of the following flags:

```
@table @code
@item GPGME_REVSIG_LFSEP
@since{1.14.1}
```

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that @var{userid} may contain several linefeed separated user IDs.

```
@end table
```

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

```
@end dectypedefun
```

```
@dectypedefun gpgme_error_t gpgme_op_revsig_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{gpgme_key_t @var{signing_key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});
```

```
@since{1.14.1}
```

The function @code{gpgme\_op\_revsig\_start} initiates a @code{gpgme\_op\_revsig} operation; see there for details. It must be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

```
@end dectypedefun
```

@c  
@c EXPORTING KEYS  
@c  
@node Exporting Keys  
@subsection Exporting Keys  
@cindex key, export  
@cindex key ring, export from

Exporting keys means the same as running `@command{gpg}` with the command `@option{--export}`. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

@table @code

@item GPGME\_EXPORT\_MODE\_EXTERN

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the `@var{keydata}` argument of the export function is set to `@code{NULL}`.

@item GPGME\_EXPORT\_MODE\_MINIMAL

@since{1.3.1}

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

@item GPGME\_EXPORT\_MODE\_SSH

@since{1.4.0}

If this bit is set, the latest authentication key of the requested OpenPGP key is exported in the OpenSSH public key format. This accepts just a single key; to force the export of a specific subkey a fingerprint pattern with an appended exclamation mark may be used.

@item GPGME\_EXPORT\_MODE\_SECRET

@since{1.6.0}

Instead of exporting the public key, the secret key is exported. This may not be combined with `@code{GPGME_EXPORT_MODE_EXTERN}`. For X.509 the export format is PKCS#8.

@item GPGME\_EXPORT\_MODE\_RAW

@since{1.6.0}

If this flag is used with @code{GPGME\_EXPORT\_MODE\_SECRET} for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

@item GPGME\_EXPORT\_MODE\_PKCS12

@since{1.6.0}

If this flag is used with @code{GPGME\_EXPORT\_MODE\_SECRET} for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

@item GPGME\_EXPORT\_MODE\_NOUID

@since{1.12.0 - experimental}

Do not export user ids. Works only with certain gpg version.

@end table

@deftypefun gpgme\_error\_t gpgme\_op\_export (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{pattern}}, @w{gpgme\_export\_mode\_t @var{mode}}, @w{gpgme\_data\_t @var{keydata}})

The function @code{gpgme\_op\_export} extracts public keys and returns them in the data buffer @var{keydata}. The output format of the key data returned is determined by the @acronym{ASCII} armor attribute set for the context @var{ctx}, or, if that is not set, by the encoding specified for @var{keydata}.

If @var{pattern} is @code{NULL}, all available keys are returned. Otherwise, @var{pattern} contains an engine specific expression that is used to limit the list to all keys matching the pattern.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation completed successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{keydata} is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_export\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{pattern}}, @w{gpgme\_export\_mode\_t @var{mode}}, @w{gpgme\_data\_t @var{keydata}})

The function @code{gpgme\_op\_export\_start} initiates a @code{gpgme\_op\_export} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `@var{keydata}` is not a valid empty data buffer.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_export_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
```

The function `@code{gpgme_op_export}` extracts public keys and returns them in the data buffer `@var{keydata}`. The output format of the key data returned is determined by the `@acronym{ASCII}` armor attribute set for the context `@var{ctx}`, or, if that is not set, by the encoding specified for `@var{keydata}`.

If `@var{pattern}` or `@var{*pattern}` is `@code{NULL}`, all available keys are returned. Otherwise, `@var{pattern}` is a `@code{NULL}` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim.

`@var{mode}` is usually 0; other values are described above.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{keydata}` is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_export_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t
@var{keydata}})
```

The function `@code{gpgme_op_export_ext_start}` initiates a `@code{gpgme_op_export_ext}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, and `@code{GPG_ERR_INV_VALUE}` if `@var{keydata}` is not a valid empty data buffer.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_export_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t keys[]},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}
```

The function `@code{gpgme_op_export_keys}` extracts public keys and returns them in the data buffer `@var{keydata}`. The output format of the key data returned is determined by the `@acronym{ASCII}` armor attribute set

for the context `@var{ctx}`, or, if that is not set, by the encoding specified for `@var{keydata}`.

The keys to export are taken from the `@code{NULL}` terminated array `@var{keys}`. Only keys of the currently selected protocol of `@var{ctx}` which do have a fingerprint set are considered for export. Other keys specified by the `@var{keys}` are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

`@var{mode}` is usually 0; other values are described above.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{keydata}` is not a valid empty data buffer, `@code{GPG_ERR_NO_DATA}` if no useful keys are in `@var{keys}` and passes through any errors that are reported by the crypto engine support routines.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_export_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{keys}}[], @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}
```

The function `@code{gpgme_op_export_keys_start}` initiates a `@code{gpgme_op_export_ext}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. [@xref{Waiting For Completion}](#).

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, and `@code{GPG_ERR_INV_VALUE}` if `@var{keydata}` is not a valid empty data buffer, `@code{GPG_ERR_NO_DATA}` if no useful keys are in `@var{keys}` and passes through any errors that are reported by the crypto engine support routines.

`@end deftypefun`

`@node Importing Keys`

`@subsection Importing Keys`

`@cindex key, import`

`@cindex key ring, import to`

Importing keys means the same as running `@command{gpg}` with the command `@option{--import}`.

```
@deftypefun gpgme_error_t gpgme_op_import (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{keydata}})
```

The function `@code{gpgme_op_import}` adds the keys in the data buffer



@var{keydata} to the key ring of the crypto engine used by @var{ctx}.  
The format of @var{keydata} can be @acronym{ASCII} armored, for example,  
but the details are specific to the crypto engine.

After the operation completed successfully, the result  
can be  
retrieved with @code{gpgme\_op\_import\_result}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the  
import was completed successfully, @code{GPG\_ERR\_INV\_VALUE} if  
@var{keydata} if @var{ctx} or @var{keydata} is not a valid pointer,  
and @code{GPG\_ERR\_NO\_DATA} if @var{keydata} is an empty data buffer.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_import_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}})
```

The function @code{gpgme\_op\_import\_start} initiates a  
@code{gpgme\_op\_import} operation. It can be completed by calling  
@code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the  
import could be started successfully, @code{GPG\_ERR\_INV\_VALUE} if  
@var{ctx} or @var{keydata} is not a valid pointer, and  
@code{GPG\_ERR\_NO\_DATA} if @var{keydata} is an empty data buffer.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_import_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
*@var{keys}})
@since{1.2.0}
```

The  
function @code{gpgme\_op\_import\_keys} adds the keys described by  
the @code{NULL} terminated array @var{keys} to the key ring of the  
crypto engine used by @var{ctx}. It is used to actually import and  
make keys permanent which have been retrieved from an external source  
(i.e. using @code{GPGME\_KEYLIST\_MODE\_EXTERN}) earlier. The external  
keylisting must have been made with the same context configuration (in  
particular the same home directory). @footnote{Thus it is a  
replacement for the usual workaround of exporting and then importing a  
key to make an X.509 key permanent.} Note that for OpenPGP this may  
require another access to the keyserver over the network.

Only keys of the currently selected protocol of @var{ctx} are  
considered for import. Other keys specified by the @var{keys} are  
ignored. As of now all considered keys must have been retrieved using  
the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully,

the result can be retrieved with `gpgme_op_import_result`.

To move keys from one home directory to another, export and import the keydata using `gpgme_op_export` and `gpgme_op_import`.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for export.

`@end dectypedefun`

```
@deftypedef gpgme_error_t gpgme_op_import_keys_start (@w{gpgme_ctx_t} ctx, @w{gpgme_key_t} *keys)
@since{1.2.0}
```

The function `gpgme_op_import_keys_start` initiates a `gpgme_op_import_keys` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `keydata` if `ctx` or `keydata` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for export.

`@end dectypedefun`

```
@deftp {Data type} {gpgme_import_status_t}
```

This is a pointer to a structure used to store a part of the result of a `gpgme_op_import` operation. For each considered key one status is added that contains information about the result of the import. The structure contains the following members:

```
@table @code
```

```
@item gpgme_import_status_t next
```

This is a pointer to the next status structure in the linked list, or `NULL` if this is the last element.

```
@item char *fpr
```

This is the fingerprint of the key that was considered.

```
@item gpgme_error_t result
```

If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is `GPG_ERR_NO_ERROR`.

@item unsigned int status

This is a bit-wise OR of the following flags that give more information about what part of the key was imported. If the key was already known, this might be 0.

@table @code

@item GPGME\_IMPORT\_NEW

The key was new.

@item GPGME\_IMPORT\_UID

The key contained new user IDs.

@item GPGME\_IMPORT\_SIG

The key contained new signatures.

@item GPGME\_IMPORT\_SUBKEY

The key contained new sub keys.

@item GPGME\_IMPORT\_SECRET

The key contained a secret key.

@end table

@end table

@end deftp

@deftp {Data type} {gpgme\_import\_result\_t}

This is a pointer to a structure used to store the result of a @code{gpgme\_op\_import} operation. After a successful import operation, you can retrieve the pointer to the result with @code{gpgme\_op\_import\_result}. The structure contains the following members:

@table @code

@item int considered

The total number of considered keys.

@item int no\_user\_id

The number of keys without user ID.

@item int imported

The total number of imported keys.

@item int imported\_rsa

The number of imported RSA keys.

@item int unchanged

The number of unchanged keys.

@item

int new\_user\_ids

The number of new user IDs.

@item int new\_sub\_keys

The number of new sub keys.

@item int new\_signatures

The number of new signatures.

@item int new\_revocations

The number of new revocations.

@item int secret\_read

The total number of secret keys read.

@item int secret\_imported

The number of imported secret keys.

@item int secret\_unchanged

The number of unchanged secret keys.

@item int not\_imported

The number of keys not imported.

@item gpgme\_import\_status\_t imports

A list of `gpgme_import_status_t` objects which contain more information about the keys for which an import was attempted.

@item int skipped\_v3\_keys

For security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP 2.x) and ignores them on import. This counter provides the number of such skipped v3 keys.

@end table

@end deftp

@deftypefun gpgme\_import\_result\_t gpgme\_op\_import\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function `gpgme_op_import_result` returns a

`gpgme_import_result_t`

pointer to a structure holding the result

of a `gpgme_op_import` operation. The pointer is only valid if

the last operation on the context was a `gpgme_op_import` or

`gpgme_op_import_start` operation, and if this operation finished

successfully. The returned pointer is only valid until the next

operation is started on the context.

@end deftypefun

@node Deleting Keys

@subsection Deleting Keys

@cindex key, delete

@cindex key ring, delete from

```
@deftypefun gpgme_error_t gpgme_op_delete_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}
```

The function `gpgme_op_delete_ext` deletes the key `@var{key}` from the key ring of the crypto engine used by `@var{ctx}`.

`@var{flags}` can be set to the bit-wise OR of the following flags:

@table @code

@item GPGME\_DELETE\_ALLOW\_SECRET

@since{1.9.1}

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

@item

GPGME\_DELETE\_FORCE

@since{1.9.1}

If set, the user is not asked to confirm the deletion.

@end table

The function returns the error code `GPG_ERR_NO_ERROR` if the key was deleted successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}` or `@var{key}` is not a valid pointer, `GPG_ERR_NO_PUBKEY` if `@var{key}` could not be found in the keyring, `GPG_ERR_AMBIGUOUS_NAME` if the key was not specified unambiguously, and `GPG_ERR_CONFLICT` if the secret key for `@var{key}` is available, but `@var{allow_secret}` is zero.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_delete_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}
```

The function `gpgme_op_delete_ext_start` initiates a `gpgme_op_delete` operation. It can be completed by calling `gpgme_wait` on the context. @xref{Waiting For Completion}.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully,

```
and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun
```

The following functions allow only to use one particular flag.

```
@deftypefun gpgme_error_t gpgme_op_delete (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{int @var{allow_secret}})
```

Similar to @code{gpgme\_op\_delete\_ext}, but only the flag  
@code{GPGME\_DELETE\_ALLOW\_SECRET} can be provided.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_delete_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{int @var{allow_secret}})
```

Similar to @code{gpgme\_op\_delete\_ext\_start}, but only the flag  
@code{GPGME\_DELETE\_ALLOW\_SECRET} can be provided.  
@end deftypefun

```
@node Changing Passphrases
```

```
@subsection Changing Passphrases
```

```
@cindex passphrase, change
```

```
@deftypefun gpgme_error_t gpgme_op_passwd @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}})
```

```
@since{1.3.0}
```

The function @code{gpgme\_op\_passwd} changes the passphrase of the private key associated with @var{key}. The only allowed value for @var{flags} is @code{0}. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old @code{gpg} engines (before version 2.0.15) do not support this command and will silently ignore it.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_passwd_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}})
```

```
@since{1.3.0}
```

The function `gpgme_op_passwd_start` initiates a `gpgme_op_passwd` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns `0` if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

```
@c
@c CHANGING TOFU DATA
@c
@node Changing TOFU Data
@subsection Changing TOFU Data
@cindex validity, TOFU
```

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

```
@deftp {Data type} {enum gpgme_tofu_policy_t}
@since{1.7.0}
```

```
@tindex gpgme_tofu_policy_t
The gpgme_tofu_policy_t type specifies the set of possible policy values that are supported by GPGME:
```

```
@table @code
@item GPGME_TOFU_POLICY_AUTO
Set the policy to auto.
@item GPGME_TOFU_POLICY_GOOD
Set the policy to good.
@item GPGME_TOFU_POLICY_BAD
Set the policy to bad.
@item GPGME_TOFU_POLICY_ASK
Set the policy to ask.
@item GPGME_TOFU_POLICY_UNKNOWN
Set the policy to unknown.
@end table
```

```
@end deftp
```

To change the policy for a key the following functions can be used:

```
@deftypefun gpgme_error_t
gpgme_op_tofu_policy @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const gpgme_key_t @var{key}}, @
 @w{gpgme_tofu_policy_t @var{policy}})
```

```
@since{1.7.0}
```

The function `gpgme_op_tofu_policy` changes the TOFU policy of `@var{key}`. The valid values for `@var{policy}` are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_tofu_policy_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const gpgme_key_t @var{key}}, @
 @w{gpgme_tofu_policy_t @var{policy}})
```

```
@since{1.7.0}
```

The function `gpgme_op_tofu_policy_start` initiates a `gpgme_op_tofu_policy` operation. It can be completed by calling `gpgme_wait` on the context. [@xref{Waiting For Completion}](#).

The function returns `0` if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

```
@end deftypefun
```

```
@node Advanced Key Editing
```

```
@subsection Advanced Key Editing
```

```
@cindex key, edit
```

```
@defun {Data type} {gpgme_error_t (*gpgme_interact_cb_t) @
 (@w{void *@var{handle}}, @
 @w{const char *@var{status}}, @
 @w{const char *@var{args}}, @
 @w{int @var{fd}})}
```



@since{1.7.0}

@tindex gpgme\_interact\_cb\_t

The @code{gpgme\_interact\_cb\_t} type is the type of functions which @acronym{GPGME} calls if it a key interact operation is on-going. The status keyword @var{status} and the argument line @var{args} are passed through by @acronym{GPGME} from the crypto engine. An empty string represents EOF. The file descriptor @var{fd} is -1 for normal status messages. If @var{status} indicates a command rather than a status message, the response to the command should be written to @var{fd}. The @var{handle} is provided by the user at start of operation.

The function should return @code{GPG\_ERR\_FALSE} if it did not handle the status code, @code{0} for success, or any other error value.

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_interact (@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}}, @
@w{gpgme_interact_cb_t @var{fnc}}, @
@w{void *@var{handle}}, @
@w{gpgme_data_t @var{out}})
```

@since{1.7.0}

The function @code{gpgme\_op\_interact} processes the key @var{KEY} interactively, using the interact callback function @var{FNC} with the handle @var{HANDLE}. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by @acronym{GPGME}.

@var{flags} modifies the behaviour of the function; the only defined bit value is:

```
@table @code
@item GPGME_INTERACT_CARD
@since{1.7.0}
```

This is used for smartcard based keys and uses gpgs @code{--card-edit} command.

@end table

The function returns @code{0} if the edit operation completes successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} or @var{key} is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_interact_start (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{unsigned int @var{flags}}, @
 @w{gpgme_interact_cb_t @var{fnc}}, @
 @w{void *@var{handle}}, @
 @w{gpgme_data_t @var{out}})
```

@since{1.7.0}

The function @code{gpgme\_op\_interact\_start} initiates a @code{gpgme\_op\_interact} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} or @var{key} is not a valid pointer.

@end deftypefun

@node Crypto Operations

@section Crypto Operations

@cindex cryptographic operation

Sometimes, the result of a crypto operation returns a list of invalid keys encountered in processing the request. The following structure is used to hold information about such a key.

```
@defftp {Data type} {gpgme_invalid_key_t}
```

This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter. The structure contains the following members:

@table @code

@item gpgme\_invalid\_key\_t next

This is a pointer to the next invalid key structure in the linked list, or @code{NULL} if this is the last element.

@item char \*fpr

The fingerprint or key ID of the invalid key encountered.

@item gpgme\_error\_t reason

An error code describing the reason why the key was found invalid.

@end table

@end deftp

@menu

\* Decrypt::                 Decrypting a ciphertext.

\* Verify::

    Verifying a signature.

\* Decrypt and Verify::     Decrypting a signed ciphertext.

\* Sign::                    Creating a signature.

\* Encrypt::                 Encrypting a plaintext.

@end menu

@node Decrypt

@subsection Decrypt

@cindex decryption

@cindex cryptographic operation, decryption

@deftypefun gpgme\_error\_t gpgme\_op\_decrypt (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_data\_t @var{cipher}}, @w{gpgme\_data\_t @var{plain}})

The function @code{gpgme\_op\_decrypt} decrypts the ciphertext in the data object @var{cipher} and stores it into the data object @var{plain}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the ciphertext could be decrypted successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx}, @var{cipher} or @var{plain} is not a valid pointer, @code{GPG\_ERR\_NO\_DATA} if @var{cipher} does not contain any data to decrypt, @code{GPG\_ERR\_DECRYPT\_FAILED} if @var{cipher} is not a valid cipher text, @code{GPG\_ERR\_BAD\_PASSPHRASE} if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_decrypt\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_data\_t @var{cipher}}, @w{gpgme\_data\_t @var{plain}})

The function @code{gpgme\_op\_decrypt\_start} initiates a @code{gpgme\_op\_decrypt} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation could be started successfully, and @code{GPG\_ERR\_INV\_VALUE}

if @var{cipher} or @var{plain} is not a valid pointer.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_decrypt_ext (@
 @w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_decrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{cipher}}, @
 @w{gpgme_data_t @var{plain}})
```

@since{1.8.0}

The function @code{gpgme\_op\_decrypt\_ext} is the same as  
@code{gpgme\_op\_decrypt}  
but has an additional argument  
@var{flags}. If @var{flags} is 0 both function behave identically.

The value in @var{flags} is a bitwise-or combination of one or  
multiple of the following bit values:

```
@table @code
@item GPGME_DECRYPT_VERIFY
@since{1.8.0}
```

The @code{GPGME\_DECRYPT\_VERIFY} symbol specifies that this function  
shall exactly act as @code{gpgme\_op\_decrypt\_verify}.

```
@item GPGME_DECRYPT_UNWRAP
@since{1.8.0}
```

The @code{GPGME\_DECRYPT\_UNWRAP} symbol specifies that the output shall  
be an OpenPGP message with only the encryption layer removed. This  
requires GnuPG 2.1.12 and works only for OpenPGP. This is the  
counterpart to @code{GPGME\_ENCRYPT\_WRAP}.

@end table

The function returns the error codes as described for  
@code{gpgme\_op\_decrypt}.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_decrypt_ext_start (@
 @w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_decrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{cipher}}, @

 @w{gpgme_data_t @var{plain}})
```

@since{1.8.0}

The function `gpgme_op_decrypt_ext_start` initiates a `gpgme_op_decrypt_ext` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `cipher` or `plain` is not a valid pointer.

@end deftypefun

@deftp {Data type} {gpgme\_recipient\_t}

@since{1.1.0}

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a `gpgme_op_decrypt` operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

@table @code

@item gpgme\_recipient\_t next

This is a pointer to the next recipient structure in the linked list, or `NULL` if this is the last element.

@item gpgme\_pubkey\_algo\_t

The public key algorithm used in the encryption.

@item char \*keyid

This is the key ID of the key (in hexadecimal digits) used as recipient.

@item gpgme\_error\_t status

This is an error number with the error code `GPG_ERR_NO_SECKEY` if the secret key for this recipient is not available, and 0 otherwise.

@end table

@end deftp

@deftp {Data type} {gpgme\_decrypt\_result\_t}

This is a pointer to a structure used to store the result of a `gpgme_op_decrypt` operation. After successfully decrypting data, you can retrieve the pointer to the result with

`gpgme_op_decrypt_result`. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a structure on its own. The structure contains the

following members:

@table @code

@item char \*unsupported\_algorithm

If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

@item unsigned int wrong\_key\_usage

: 1

@since{0.9.0}

This is true if the key was not used according to its policy.

@item unsigned int legacy\_cipher\_nomdc : 1

@since{1.11.2}

The message was made by a legacy algorithm without any integrity protection. This might be an old but legitimate message.

@item unsigned int is\_mime : 1;

@since{1.11.0}

The message claims that the content is a MIME object.

@item unsigned int is\_de\_vs : 1;

@since{1.10.0}

The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

@item gpgme\_recipient\_t recipients

@since{1.1.0}

This is a linked list of recipients to which this message was encrypted.

@item char \*file\_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

@item char \*session\_key

@since{1.8.0}

A textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session

keys (see @code{gpgme\_set\_ctx\_flag,

"export-session-key"}), and a session key was available for the most recent decryption operation. Otherwise, this is a null pointer.

You must not try to access this member of the struct unless

@code{gpgme\_set\_ctx\_flag (ctx, "export-session-key")} returns success

or @code{gpgme\_get\_ctx\_flag (ctx, "export-session-key")} returns true

(non-empty string).

@item char \*symkey\_algo  
@since{1.11.0}

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

@end table  
@end deftp

@deftypefun gpgme\_decrypt\_result\_t gpgme\_op\_decrypt\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_decrypt\_result} returns a @code{gpgme\_decrypt\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_decrypt} operation. The pointer is only valid if the last operation on the context was a @code{gpgme\_op\_decrypt} or @code{gpgme\_op\_decrypt\_start} operation.

If the operation failed this might be a @code{NULL} pointer. The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@node Verify

@subsection Verify

@cindex verification

@cindex signature, verification

@cindex cryptographic operation, verification

@cindex cryptographic operation, signature check

@cindex signature notation data

@cindex notation data

@deftypefun gpgme\_error\_t gpgme\_op\_verify (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_data\_t @var{sig}}, @w{gpgme\_data\_t @var{signed\_text}}, @w{gpgme\_data\_t @var{plain}})

The function @code{gpgme\_op\_verify} verifies that the signature in the data object @var{sig} is a valid signature. If @var{sig} is a detached signature, then the signed text should be provided in @var{signed\_text} and @var{plain} should be a null pointer. Otherwise, if @var{sig} is a normal (or cleartext) signature, @var{signed\_text} should be a null pointer and @var{plain} should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with @code{gpgme\_op\_verify\_result}.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be completed successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{sig}` or `@var{plain}` is not a valid pointer, `GPG_ERR_NO_DATA` if `@var{sig}` does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
```

The function `gpgme_op_verify_start` initiates a `gpgme_op_verify` operation. It can be completed by calling `gpgme_wait` on the context. [@xref{Waiting For Completion}](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{sig}` or `@var{plain}` is not a valid pointer, and `GPG_ERR_NO_DATA` if `@var{sig}` or `@var{plain}` does not contain any data to verify.

`@end deftypefun`

```
@deftp {Data type} {gpgme_sig_notation_t}
```

This is a pointer to a structure used to store a part of the result of a `gpgme_op_verify` operation. The structure contains the following members:

```
@table @code
```

```
@item gpgme_sig_notation_t next
```

This is a pointer to the next new signature notation structure in the linked list, or `NULL` if this is the last element.

```
@item char *name
```

The name of the notation field. If this is `NULL`, then the member `value` will contain a policy URL.

```
@item int name_len
```

The length of the `name` field. For strings the length is counted without the trailing binary zero.

```
@item char *value
```

The value of the notation field. If `name` is `NULL`, then this is a policy URL.

```
@item int value_len
```

The length of the `value`



field. For strings the length is counted without the trailing binary zero.

@item gpgme\_sig\_notation\_flags\_t flags

The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used as an argument to the function @code{gpgme\_sig\_notation\_add}. The value @code{flags} is a bitwise-or combination of one or multiple of the following bit values:

@table @code

@item GPGME\_SIG\_NOTATION\_HUMAN\_READABLE

@since{1.1.0}

The @code{GPGME\_SIG\_NOTATION\_HUMAN\_READABLE} symbol specifies that the notation data is in human readable form

@item GPGME\_SIG\_NOTATION\_CRITICAL

@since{1.1.0}

The @code{GPGME\_SIG\_NOTATION\_CRITICAL} symbol specifies that the notation data is critical.

@end table

@item unsigned int human\_readable : 1

This is true if the @code{GPGME\_SIG\_NOTATION\_HUMAN\_READABLE} flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

@item unsigned int critical : 1

This is true if the

@code{GPGME\_SIG\_NOTATION\_CRITICAL} flag is set and false otherwise. This flag is valid for notation data and policy URLs.

@end table

@end deftp

@deftp {Data type} {gpgme\_signature\_t}

This is a pointer to a structure used to store a part of the result of a @code{gpgme\_op\_verify} operation. The structure contains the following members:

@table @code

@item gpgme\_signature\_t next

This is a pointer to the next new signature structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme\_sigsum\_t summary

This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for GPGME\_SIGSUM\_VALID like this:

@example

```
if ((sig.summary & GPGME_SIGSUM_VALID))
```

```
@{
```

```
..do stuff if valid..
```

```
@}
```

```
else
```

```
@{
```

```
..do stuff if not fully valid..
```

```
@}
```

@end example

The defined bits are:

@table @code

@item GPGME\_SIGSUM\_VALID

The signature is fully valid.

@item GPGME\_SIGSUM\_GREEN

The signature is good but one might want to display some extra information. Check the other bits.

@item GPGME\_SIGSUM\_RED

The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

@item GPGME\_SIGSUM\_KEY\_REVOKED

The key or at least one certificate has been revoked.

@item GPGME\_SIGSUM\_KEY\_EXPIRED

The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

@item GPGME\_SIGSUM\_SIG\_EXPIRED

The signature has expired.

@item GPGME\_SIGSUM\_KEY\_MISSING

Can't verify due to a missing key or certificate.

@item GPGME\_SIGSUM\_CRL\_MISSING

The CRL (or an equivalent mechanism) is not available.

@item GPGME\_SIGSUM\_CRL\_TOO\_OLD

Available CRL is too old.

@item GPGME\_SIGSUM\_BAD\_POLICY

A policy requirement was not met.

@item GPGME\_SIGSUM\_SYS\_ERROR

A system error occurred.

@item GPGME\_SIGSUM\_TOFU\_CONFLICT

A TOFU conflict was detected.

@end table

@item char \*fpr

This is the fingerprint or key ID of the signature.

@item gpgme\_error\_t status

This is the status of the signature. In particular, the following status codes are of interest:

@table @code

@item GPG\_ERR\_NO\_ERROR

This status indicates that the signature could be verified or that there is no signature. For the combined result this status means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check the @code{summary} field for that.

For example a @code{gpgme\_op\_decrypt\_verify} returns a verification result with GPG\_ERR\_NO\_ERROR for encrypted but unsigned data.

@item GPG\_ERR\_SIG\_EXPIRED

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

@item GPG\_ERR\_KEY\_EXPIRED

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

@item GPG\_ERR\_CERT\_REVOKED

This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result

this status means that all signatures are valid and all keys are revoked.

@item GPG\_ERR\_BAD\_SIGNATURE

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPG\_ERR\_NO\_PUBKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPG\_ERR\_GENERAL

This status indicates that there was some other error which prevented the signature verification.

@end table

@item gpgme\_sig\_notation\_t notations

This is a linked list with the notation data and policy URLs.

@item unsigned long timestamp

The creation timestamp of this signature.

@item unsigned long exp\_timestamp

The expiration timestamp of this signature, or 0 if the signature does not expire.

@item unsigned int wrong\_key\_usage : 1

This is true if the key was not used according to its policy.

@item unsigned int pka\_trust : 2

This is set to the trust information gained by means of the PKA system.

Values are:

@table @code

@item 0

No PKA information available or verification not possible.

@item 1

PKA verification failed.

@item 2

PKA verification succeeded.

@item 3

Reserved for future use.

@end table

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

@item unsigned int chain\_model : 1

@since{1.1.6}

This is true if the validity of the signature has been checked using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

@item gpgme\_validity\_t validity

The validity of the signature.

@item gpgme\_error\_t validity\_reason

If a signature is not valid, this provides a reason why.

@item gpgme\_pubkey\_algo\_t

The public key algorithm used to create this signature.

@item gpgme\_hash\_algo\_t

The hash algorithm used to create this signature.

@item char \*pka\_address

The mailbox from the PKA information or @code{NULL}.

@item gpgme\_key\_t key

@since{1.7.0}

An object describing the key used to create the signature. This key object may be incomplete in that it only conveys information available directly with a signature. It may also be @code{NULL} if such information is not readily available.

@end table

@end deftp

@deftp {Data type} {gpgme\_verify\_result\_t}

This is a pointer to a structure used to store the result of a @code{gpgme\_op\_verify} operation. After verifying a signature, you can retrieve the pointer to the result with @code{gpgme\_op\_verify\_result}. If the operation failed this might be a @code{NULL} pointer. The structure contains the following member:

@table @code

@item gpgme\_signature\_t signatures

A linked list with information about all signatures for which a verification was attempted.

@item char \*file\_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

@item unsigned int is\_mime : 1;

@since{1.11.0}

The message claims that the content is a MIME object. Warning: This flag is not covered by the signature.

@end table

@end deftp

@deftypefun

gpgme\_verify\_result\_t gpgme\_op\_verify\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_verify\_result} returns a @code{gpgme\_verify\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_verify} operation. The pointer is only valid if the last operation on the context was a @code{gpgme\_op\_verify}, @code{gpgme\_op\_verify\_start}, @code{gpgme\_op\_decrypt\_verify} or @code{gpgme\_op\_decrypt\_verify\_start} operation, and if this operation finished successfully (for @code{gpgme\_op\_decrypt\_verify} and @code{gpgme\_op\_decrypt\_verify\_start}, the error code @code{GPG\_ERR\_NO\_DATA} counts as successful in this context). The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@node Decrypt and Verify

@subsection Decrypt and Verify

@cindex decryption and verification

@cindex verification and decryption

@cindex signature check

@cindex cryptographic operation, decryption and verification

@deftypefun gpgme\_error\_t gpgme\_op\_decrypt\_verify

(@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_data\_t @var{cipher}}, @w{gpgme\_data\_t @var{plain}})

The function @code{gpgme\_op\_decrypt\_verify} decrypts the ciphertext in the data object @var{cipher} and stores it into the data object @var{plain}. If @var{cipher} contains signatures, they will be verified.

After the operation completed, @code{gpgme\_op\_decrypt\_result} and

`gpgme_op_verify_result` can be used to retrieve more information about the signatures.

If the error code `GPG_ERR_NO_DATA` is returned, `cipher` does not contain any data to decrypt. However, it might still be signed. The information about detected signatures is available with `gpgme_op_verify_result` in this case.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be decrypted successfully, `GPG_ERR_INV_VALUE` if `ctx`, `cipher` or `plain` is not a valid pointer, `GPG_ERR_NO_DATA` if `cipher` does not contain any data to decrypt,

`GPG_ERR_DECRYPT_FAILED` if `cipher` is not a valid cipher text, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

`end dectyfefun`

```
@dectyfefun gpgme_error_t gpgme_op_decrypt_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The function `gpgme_op_decrypt_verify_start` initiates a `gpgme_op_decrypt_verify` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `ctx`, `cipher`, `plain` or `r_stat` is not a valid pointer, and `GPG_ERR_NO_DATA` if `cipher` does not contain any data to decrypt.

`end dectyfefun`

When processing mails it is sometimes useful to extract the actual mail

address (the `addr-spec`) from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

```
@dectyfefun @w{char *} gpgme_addrspec_from_uid (@w{const char *@var{uid}})
```

`since{1.7.1}`

Return the mail address (called `addr-spec` in RFC-5322) from the string `uid` which is assumed to be a user id (called `address` in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must free the result using `gpgme_free`. Returns `NULL` if no valid

address was found (in which case `ERRNO` is set to `EINVAL`) or for other errors.

`@end deftypefun`

`@node Sign`

`@subsection Sign`

`@cindex signature, creation`

`@cindex sign`

`@cindex cryptographic operation, signing`

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

`@menu`

\* `Selecting Signers::`           How to choose the keys to sign with.

\* `Creating a Signature::`       How to create a signature.

\* `Signature Notation Data::`   How to add notation data to a signature.

`@end menu`

`@node Selecting Signers`

`@subsubsection Selecting Signers`

`@cindex signature, selecting signers`

`@cindex signers, selecting`

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list. If no signer has been set into the context a default key is used for signing.

`@deftypefun void gpgme_signers_clear (@w{gpgme_ctx_t @var{ctx}})`

The function `gpgme_signers_clear` releases a reference for each key on the signers list and removes the list of signers from the context `@var{ctx}`.

Every context starts with an empty list.

`@end deftypefun`

`@deftypefun gpgme_error_t gpgme_signers_add (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}})`

The function

`gpgme_signers_add` adds the key `@var{key}` to the list of signers in the context `@var{ctx}`.



Calling this function acquires an additional reference for the key.

@end deftypefun

```
@deftypefun @w{unsigned int} gpgme_signers_count (@w{const gpgme_ctx_t @var{ctx}})
```

@since{1.4.3}

The function @code{gpgme\_signers\_count} returns the number of signer keys in the context @var{ctx}.

@end deftypefun

```
@deftypefun gpgme_key_t gpgme_signers_enum (@w{const gpgme_ctx_t @var{ctx}}, @w{int @var{seq}})
```

The function @code{gpgme\_signers\_enum} returns the @var{seq}th key in the list of signers in the context @var{ctx}. An additional reference is acquired for the user.

If @var{seq} is out of range, @code{NULL} is returned.

@end deftypefun

@node Creating a Signature

@subsubsection Creating a Signature

```
@deftp {Data type} {enum gpgme_sig_mode_t}
```

```
@tindex gpgme_sig_mode_t
```

The @code{gpgme\_sig\_mode\_t} type is used to specify the desired type of a signature. The following modes are available:

@table @code

@item

GPGME\_SIG\_MODE\_NORMAL

A normal signature is made, the output includes the plaintext and the signature.

@item GPGME\_SIG\_MODE\_DETACH

A detached signature is made.

@item GPGME\_SIG\_MODE\_CLEAR

A clear text signature is made. The @acronym{ASCII} armor and text mode settings of the context are ignored.

@end table

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{plain}},
@w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
```

The function @code{gpgme\_op\_sign} creates a signature for the text in the data object @var{plain} and returns it in the data object

@var{sig}. The type of the signature created is determined by the

@acronym{ASCII} armor (or, if that is not set, by the encoding specified for @var{sig}), the text mode attributes set for the context @var{ctx} and the requested signature mode @var{mode}.

After the operation completed successfully, the result can be retrieved with @code{gpgme\_op\_sign\_result}.

If an S/MIME

signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with @code{gpgme\_set\_include\_certs}. @xref{Included Certificates}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the signature could be created successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx}, @var{plain} or @var{sig} is not a valid pointer, @code{GPG\_ERR\_NO\_DATA} if the signature could not be created, @code{GPG\_ERR\_BAD\_PASSPHRASE} if the passphrase for the secret key could not be retrieved, @code{GPG\_ERR\_UNUSABLE\_SECKEY} if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_sign\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_data\_t @var{plain}}, @w{gpgme\_data\_t @var{sig}}, @w{gpgme\_sig\_mode\_t @var{mode}})

The function @code{gpgme\_op\_sign\_start} initiates a @code{gpgme\_op\_sign} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation could be started successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{ctx}, @var{plain} or @var{sig} is not a valid pointer.

@end deftypefun

@deftp {Data type} {gpgme\_new\_signature\_t}

This is a pointer to a structure used to store a part of the result of a @code{gpgme\_op\_sign} operation. The structure contains the following members:

@table @code

@item gpgme\_new\_signature\_t next

This is a pointer to the next new signature structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme\_sig\_mode\_t type

The type of this signature.

@item gpgme\_pubkey\_algo\_t pubkey\_algo

The public key algorithm used to create this signature.

@item gpgme\_hash\_algo\_t hash\_algo

The hash algorithm used to create this signature.

@item unsigned int sig\_class

The signature class of this signature.

@item long int timestamp

The creation timestamp of this signature.

@item

char \*fpr

The fingerprint of the key which was used to create this signature.

@end table

@end deftp

@deftp {Data type} {gpgme\_sign\_result\_t}

This is a pointer to a structure used to store the result of a

@code{gpgme\_op\_sign} operation. After successfully generating a signature, you can retrieve the pointer to the result with

@code{gpgme\_op\_sign\_result}. The structure contains the following members:

@table @code

@item gpgme\_invalid\_key\_t invalid\_signers

A linked list with information about all invalid keys for which a signature could not be created.

@item gpgme\_new\_signature\_t signatures

A linked list with information about all signatures created.

@end table

@end deftp

@deftypedefun gpgme\_sign\_result\_t gpgme\_op\_sign\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_sign\_result} returns a

@code{gpgme\_sign\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_sign} operation. The pointer is only valid if the last operation on the context was

a @code{gpgme\_op\_sign},

@code{gpgme\_op\_sign\_start}, @code{gpgme\_op\_encrypt\_sign} or

@code{gpgme\_op\_encrypt\_sign\_start} operation. If that operation failed, the function might return a @code{NULL} pointer. The returned pointer is only valid until the next operation is started on the context.

@end deftypedefun

@node Signature Notation Data  
@subsection Signature Notation Data  
@cindex notation data  
@cindex signature notation data  
@cindex policy URL

Using the following functions, you can attach arbitrary notation data to a signature. This information is then available to the user when the signature is verified.

```
@deftypefun void gpgme_sig_notation_clear (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}
```

The function @code{gpgme\_sig\_notation\_clear} removes the notation data from the context @var{ctx}. Subsequent signing operations from this context will not include any notation data.

Every context starts with an empty notation data list.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_sig_notation_add
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{name}}, @w{const char *@var{value}},
@w{gpgme_sig_notation_flags_t @var{flags}})
@since{1.1.0}
```

The function @code{gpgme\_sig\_notation\_add} adds the notation data with the name @var{name} and the value @var{value} to the context @var{ctx}.

Subsequent signing operations will include this notation data, as well as any other notation data that was added since the creation of the context or the last @code{gpgme\_sig\_notation\_clear} operation.

The arguments @var{name} and @var{value} must be @code{NUL}-terminated strings in human-readable form. The flag @code{GPGME\_SIG\_NOTATION\_HUMAN\_READABLE} is implied (non-human-readable notation data is currently not supported). The strings must be in UTF-8 encoding.

If @var{name} is @code{NULL}, then @var{value} should be a policy URL.

The function @code{gpgme\_sig\_notation\_add} returns the error code @code{GPG\_ERR\_NO\_ERROR} if the notation data could be added successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} is not a valid pointer, or if @var{name}, @var{value} and @var{flags} are an invalid combination. The function also passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_sig_notation_t gpgme_sig_notation_get (@w{const gpgme_ctx_t @var{ctx}})
@since{1.1.0}
```

The function @code{gpgme\_sig\_notation\_get} returns the linked list of notation data structures that are contained in the context @var{ctx}.

If @var{ctx} is not a valid pointer, or there is no notation data added for this context, @code{NULL} is returned.

@end deftypefun

@node Encrypt

@subsection Encrypt

@cindex encryption

@cindex cryptographic operation, encryption

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then passed to the encryption operation.

@menu

\* Encrypting a Plaintext::     How to encrypt a plaintext.

@end menu

@node Encrypting a

Plaintext

@subsubsection Encrypting a Plaintext

```
@deftypefun gpgme_error_t gpgme_op_encrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t
@var{cipher}})
```

The function @code{gpgme\_op\_encrypt} encrypts the plaintext in the data object @var{plain} for the recipients @var{recp} and stores the ciphertext in the data object @var{cipher}. The type of the ciphertext created is determined by the @acronym{ASCII} armor (or, if that is not set, by the encoding specified for @var{cipher}) and the text mode attributes set for the context @var{ctx}.

@var{recp} must be a @code{NULL}-terminated array of keys. The user must keep references for all keys during the whole duration of the call (but see @code{gpgme\_op\_encrypt\_start} for the requirements with the asynchronous variant).

The value in @var{flags} is a bitwise-or combination of one or multiple of the following bit values:

@table @code

@item GPGME\_ENCRYPT\_ALWAYS\_TRUST

The

@code{GPGME\_ENCRYPT\_ALWAYS\_TRUST} symbol specifies that all the recipients in @var{recp} should be trusted, even if the keys do not have a high enough validity in the keyring. This flag should be used with care; in general it is not a good idea to use any untrusted keys.

@item GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO

@since{1.2.0}

The @code{GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO} symbol specifies that no default or hidden default recipients as configured in the crypto backend should be included. This can be useful for managing different user profiles.

@item GPGME\_ENCRYPT\_NO\_COMPRESS

@since{1.5.0}

The @code{GPGME\_ENCRYPT\_NO\_COMPRESS} symbol specifies that the plaintext shall not be compressed before it is encrypted. This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

@item GPGME\_ENCRYPT\_PREPARE

@itemx GPGME\_ENCRYPT\_EXPECT\_SIGN

The @code{GPGME\_ENCRYPT\_PREPARE} symbol is used with the UI Server protocol to prepare an encryption

(i.e. sending the

@code{PREP\_ENCRYPT} command). With the

@code{GPGME\_ENCRYPT\_EXPECT\_SIGN} symbol the UI Server is advised to also expect a sign command.

@item GPGME\_ENCRYPT\_SYMMETRIC

@since{1.7.0}

The @code{GPGME\_ENCRYPT\_SYMMETRIC} symbol specifies that the output should be additionally encrypted symmetrically even if recipients are provided. This feature is only supported for the OpenPGP crypto engine.

@item GPGME\_ENCRYPT\_THROW\_KEYIDS

@since{1.8.0}

The @code{GPGME\_ENCRYPT\_THROW\_KEYIDS} symbols requests that the identifiers for the decryption keys are not included in the ciphertext.

On the receiving side, the use of this flag may slow down the

decryption process because all available secret keys must be tried.  
This flag is only honored for OpenPGP encryption.

@item GPGME\_ENCRYPT\_WRAP  
@since{1.8.0}

The @code{GPGME\_ENCRYPT\_WRAP} symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to @code{GPGME\_DECRYPT\_UNWRAP}.

@item GPGME\_ENCRYPT\_WANT\_ADDRESS  
@since{1.11.0}

The @code{GPGME\_ENCRYPT\_WANT\_ADDRESS} symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code @code{GPG\_ERR\_INV\_USER\_ID} is returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the @var{recpstring} argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

@end table

If @code{GPG\_ERR\_UNUSABLE\_PUBKEY} is returned, some recipients in @var{recp} are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in @var{cipher} (if this happens depends on the crypto engine). More information about the invalid recipients is available with @code{gpgme\_op\_encrypt\_result}.

If @var{recp} is @code{NULL}, symmetric rather than public key encryption is performed.

Symmetrically encrypted cipher text can be deciphered with @code{gpgme\_op\_decrypt}. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption is currently only supported for the OpenPGP crypto backend.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the ciphertext could be created successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx}, @var{recp}, @var{plain} or @var{cipher} is not a valid pointer, @code{GPG\_ERR\_UNUSABLE\_PUBKEY} if @var{recp} contains some invalid recipients, @code{GPG\_ERR\_BAD\_PASSPHRASE} if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

@end deftpdefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t
@var{cipher}})
```

The function `gpgme_op_encrypt_start` initiates a `gpgme_op_encrypt` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even if the operation is not yet finished.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{rset}`, `@var{plain}` or `@var{cipher}` is not a valid pointer, and `GPG_ERR_UNUSABLE_PUBKEY` if `@var{rset}` does not contain any valid recipients.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_encrypt_ext @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

```
@since{1.11.0}
```

This is an extended version of `gpgme_op_encrypt` with `@var{recpstring}` as additional parameter. If `@var{recp}` is NULL and `@var{recpstring}` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `@var{recp}` the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is remove from each line in `@var{recpstring}`. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

```
@table @code
@item --hidden
@itemx --no-hidden
```

These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested



the gpg option `@option{-R}` (or `@option{-F}` in file mode) is used instead of `@option{-r}` (`@option{-f}` in file mode).

`@item --file`

`@itemx`

`--no-file`

These keywords toggle between regular and file mode for all following key specification. In file mode the option `@option{-f}` or `@option{-F}` is passed to gpg. At least GnuPG version 2.1.14 is required to handle these options. The `@code{GPGME_ENCRYPT_WANT_ADDRESS}` flag is ignored in file mode.

`@item --`

This keyword disables all keyword detection up to the end of the string. All keywords are treated as verbatim arguments.

`@end table`

To create a `@var{recpstring}` it is often useful to employ a `strconcat` style function. For example this function creates a string to encrypt to two keys:

`@example`

```
char *
xbuild_recstring (const char *key1, const char *key2)
@{
char *result = gpgrt_strconcat ("--\n", key1, "\n", key2, NULL);
if (!result)
 @ { perror ("strconcat failed"); exit (2); @ }
return result;
@ }
@end example
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used `strconcat` function is available in `Libgpg-error 1.28` and later; `Libgpg-error` (aka `Gpgrt`) is a dependency of `GPGME`. The number of arguments to `@code{gpgrt_strconcat}` is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

`@example`

```
char *
xbuild_long_recstring (void)
@{
 gpgrt_stream_t memfp;
```

```

const char *s;
void *result;

memfp = gpgrt_fopenmem (0, "w+b");
if (!memfp)
 @ { perror ("fopenmem failed"); exit (2); @ }
gpgrt_fputs ("--", memfp);
while ((s = get_next_keyspec ()))
 @ {
 gpgrt_fputc ('\n', memfp);
 gpgrt_fputs (s, memfp);
 @ }
gpgrt_fputc (0, memfp);
if (gpgrt_ferror (memfp))
 @ { perror ("writing to memstream failed"); exit (2); @ }
if (gpgrt_fclose_snatch (memfp, &result, NULL))
 @ { perror ("fclose_snatch failed"); exit (2); @ }
return result;
@ }
@end example

```

In this example `get_next_keyspec` is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to `command{gpg}` which has as a platform specific length limitation.

`@end deftypefun`

```

@deftypefun gpgme_error_t gpgme_op_encrypt_ext_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{recp}[]}, @
 @w{const char *@var{recpstring}}, @
 @w{gpgme_encrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

```

`@since{1.11.0}`

This is an extended version of `gpgme_op_encrypt_start` with `@var{recpstring}` as additional parameter. If `@var{recp}` is NULL and `@var{recpstring}` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `@var{recp}` the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

@end deftypefun

@deftp {Data type} {gpgme\_encrypt\_result\_t}

This is a pointer to a structure used to store the result of a

@code{gpgme\_op\_encrypt} operation. After successfully encrypting

data, you can retrieve the pointer to the result with

@code{gpgme\_op\_encrypt\_result}. The structure contains the following members:

@table @code

@item gpgme\_invalid\_key\_t invalid\_recipients

A linked list with information about all invalid keys for which the data could not be encrypted.

@end table

@end deftp

@deftypefun gpgme\_encrypt\_result\_t gpgme\_op\_encrypt\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_encrypt\_result} returns a

@code{gpgme\_encrypt\_result\_t} pointer to a structure holding the

result of a @code{gpgme\_op\_encrypt} operation. The pointer is only valid if the last operation on the context was a

@code{gpgme\_op\_encrypt}, @code{gpgme\_op\_encrypt\_start},

@code{gpgme\_op\_sign} or

@code{gpgme\_op\_sign\_start} operation. If this

operation failed, this might be a @code{NULL} pointer. The returned

pointer is only valid until the next operation is started on the

context.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_encrypt\_sign (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_key\_t @var{recp}}[], @w{gpgme\_encrypt\_flags\_t @var{flags}}, @w{gpgme\_data\_t @var{plain}}, @w{gpgme\_data\_t @var{cipher}})

The function @code{gpgme\_op\_encrypt\_sign} does a combined encrypt and

sign operation. It is used like @code{gpgme\_op\_encrypt}, but the

ciphertext also contains signatures for the signers listed in

@var{ctx}.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_encrypt\_sign\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_key\_t @var{recp}}[], @w{gpgme\_encrypt\_flags\_t @var{flags}}, @w{gpgme\_data\_t @var{plain}}, @w{gpgme\_data\_t @var{cipher}})

The function @code{gpgme\_op\_encrypt\_sign\_start}

initiates a `gpgme_op_encrypt_sign` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `ctx`, `rset`, `plain` or `cipher` is not a valid pointer.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{recp}}[], @
 @w{const char *@var{recpstring}}, @
 @w{gpgme_encrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

`@since{1.11.0}`

This is an extended version of `gpgme_op_encrypt_sign` with `recpstring` as additional parameter. If `recp` is NULL and `recpstring` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `recp`

the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{recp}}[], @
 @w{const char *@var{recpstring}}, @
 @w{gpgme_encrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

`@since{1.11.0}`

This is an extended version of `gpgme_op_encrypt_sign_start` with `recpstring` as additional parameter. If `recp` is NULL and `recpstring` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `recp` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

@end deftypefun

@node Miscellaneous

@section Miscellaneous

operations

Here are some support functions which are sometimes useful.

@menu

\* Running other Programs:: Running other Programs

\* Using the Assuan protocol:: Using the Assuan protocol

\* Checking for updates:: How to check for software updates

@end menu

@node Running other Programs

@subsection Running other Programs

GPGME features an internal subsystem to run the actual backend engines. Along with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

@deftypefun gpgme\_error\_t gpgme\_op\_spawn @

(@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{file}}, @  
@w{const char \*@var{argv}[]}, @w{gpgme\_data\_t @var{datain}}, @  
@w{gpgme\_data\_t @var{dataout}}, @w{gpgme\_data\_t @var{dataerr}}, @  
@w{unsigned int @var{flags}})

@since{1.5.0}

The

function @code{gpgme\_op\_spawn} runs the program @var{file} with the arguments taken from the NULL terminated array @var{argv}. If no arguments are required @var{argv} may be given as @code{NULL}. In the latter case or if @code{argv[0]} is the empty string, GPGME uses the basename of @var{file} for @code{argv[0]}. The file descriptors @code{stdin}, @code{stdout}, and @code{stderr} are connected to the data objects @var{datain}, @var{dataout}, and @var{dataerr}. If NULL is passed for one of these data objects the corresponding file descriptor is connected to @file{/dev/null}.

The value in @var{flags} is a bitwise-or combination of one or multiple of the following bit values:

```
@table @code
@item GPGME_SPAWN_DETACHED
@since{1.5.0}
```

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

```
@item GPGME_SPAWN_ALLOW_SET_FG
@since{1.5.0}
```

Under Windows  
this flag allows the called program to put itself into  
the foreground.

```
@end table
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_spawn_start @
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
 @w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
 @w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
 @w{unsigned int @var{flags}})
```

```
@since{1.5.0}
```

This is the asynchronous variant of @code{gpgme\_op\_spawn}.

```
@end deftypefun
```

```
@node Using the Assuan protocol
@subsection Using the Assuan protocol
```

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using @code{gpgme\_ctx\_set\_engine\_info}, passing the location of the servers socket as @var{file\_name} argument, and an empty string as @var{home\_dir} argument.

The Assuan protocol functions use three kinds of callbacks to transfer data:

```
@deftp {Data type}
{gpgme_error_t (*gpgme_assuan_data_cb_t) @
 (@w{void *@var{opaque}}, @w{const void *@var{data}}, @
 @w{size_t @var{datalen}})}
```

```
@since{1.2.0}
```

This callback receives any data sent by the server. `@var{opaque}` is the pointer passed to `@code{gpgme_op_assuan_transact_start}`, `@var{data}` of length `@var{datalen}` refers to the data sent.

```
@end deftp
```

```
@deftp {Data type} {gpgme_error_t (*gpgme_assuan_inquire_cb_t) @
 (@w{void *@var{opaque}}, @w{const char *@var{name}}, @
 @w{const char *@var{args}}, @w{gpgme_data_t *@var{r_data}})}
```

```
@since{1.2.0}
```

This callback is used to provide additional data to the Assuan server. `@var{opaque}` is the pointer passed to `@code{gpgme_op_assuan_transact_start}`, `@var{name}` and `@var{args}` specify what kind of data the server requested, and `@var{r_data}` is used to return the actual data.

Note: Returning data is currently not implemented in `@acronym{GPGME}`.

```
@end deftp
```

```
@deftp {Data type} {gpgme_error_t (*gpgme_assuan_status_cb_t) @
 (@w{void *@var{opaque}}, @w{const char *@var{status}}, @
 @w{const char *@var{args}})}
```

```
@since{1.2.0}
```

This callback receives any status lines sent by the server. `@var{opaque}` is the pointer passed to `@code{gpgme_op_assuan_transact_start}`, `@var{status}` and `@var{args}` denote the status update sent.

```
@end deftp
```

```
@deftypefun gpgme_error_t gpgme_op_assuan_transact_start @
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
 @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
 @w{void * @var{data_cb_value}}, @
 @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
 @w{void * @var{inquire_cb_value}}, @
 @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
 @w{void * @var{status_cb_value}})
```

```
@since{1.2.0}
```

Send the Assuan `@var{command}` and return results via the callbacks. Any callback may be `@code{NULL}`. The result of the operation may be retrieved using `@code{gpgme_wait_ext}`.

Asynchronous variant.

@end deftypefun

@deftypefun

```
gpgme_error_t gpgme_op_assuan_transact_ext @
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
 @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
 @w{void * @var{data_cb_value}}, @
 @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
 @w{void * @var{inquire_cb_value}}, @
 @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
 @w{void * @var{status_cb_value}}, @
 @w{gpgme_error_t *@var{op_err}})
```

Send the Assuan @var{command} and return results via the callbacks.

The result of the operation is returned in @var{op\_err}.

Synchronous variant.

@end deftypefun

@node Checking for updates

@subsection How to check for software updates

The GnuPG Project operates a server to query the current versions of software packages related to GnuPG. GPGME can be used to access this online database and check whether a new version of a software package is available.

```
@deftp {Data type} {gpgme_query_swdb_result_t}
@since{1.8.0}
```

This

is a pointer to a structure used to store the result of a @code{gpgme\_op\_query\_swdb} operation. After success full call to that function, you can retrieve the pointer to the result with @code{gpgme\_op\_query\_swdb\_result}. The structure contains the following member:

@table @code

@item name

This is the name of the package.

@item iversion

The currently installed version or an empty string. This value is either a copy of the argument given to @code{gpgme\_op\_query\_swdb} or the version of the installed software as figured out by GPGME or GnuPG.



@item created

This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

@item retrieved

This gives the date the file was downloaded.

@item warning

If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could not be figured out, the

@code{update} flag may not reflect a required update status.

@item update

If this flag is set an update of the software is available.

@item urgent

If this flag is set an available update is important.

@item noinfo

If this flag is set, no valid information could be retrieved.

@item unknown

If this flag is set the given @code{name} is not known.

@item toold

If this flag is set the available information is not fresh enough.

@item error

If this flag is set some other error has occurred.

@item version

The version string of the latest released version.

@item reldate

The release date of the latest released version.

@end table

@end deftp

@deftypefun gpgme\_error\_t gpgme\_op\_query\_swdb @

```
(@w{gpgme_ctx_t @var{ctx}}, @
 @w{const char *@var{name}}, @
 @w{const char *@var{iversion}}, @
 @w{gpgme_data_t @var{reserved}})
```

@since{1.8.0}

Query the software version database for software package @var{name} and check against the installed version given by @var{iversion}. If @var{iversion} is given as @code{NULL} a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If @code{NULL} is used for @var{name} the current gpgme version is checked. @var{reserved} must be set to 0.

@end deftypefun

@deftypefun gpgme\_query\_swdb\_result\_t gpgme\_op\_query\_swdb\_result @  
(@w{gpgme\_ctx\_t @var{ctx}})

@since{1.8.0}

The function @code{gpgme\_op\_query\_swdb\_result} returns a @code{gpgme\_query\_swdb\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_query\_swdb} operation. The pointer is only valid if the last operation on the context was a successful call to @code{gpgme\_op\_query\_swdb}. If that call failed, the result might be a @code{NULL} pointer. The returned pointer is only valid until the next operation is started on the context @var{ctx}.

@end deftypefun

@noindent

Here is an example on how to check whether GnuPG is current:

@example

```
#include
<gpgme.h>
```

```
int
```

```
main (void)
```

```
@{
```

```
gpg_error_t err;
```

```
gpgme_ctx_t ctx;
```

```
gpgme_query_swdb_result_t result;
```

```
gpgme_check_version (NULL);
```

```
err = gpgme_new (&ctx);
```

```
if (err)
```

```
 fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
```

```
else
```

```
 @{
```

```
 gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);
```

```

err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
if (err)
 fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
else
 @{
 result = gpgme_op_query_swdb_result (ctx);
 if (!result)
 fprintf (stderr, "error querying swdb\n");
 if (!result->warning && !result->update)
 printf ("GnuPG version %s is current\n",
 result->iversion);
 else if (!result->warning && result->update)
 printf ("GnuPG version %s can be updated to %s\n",
 result->iversion, result->version);
 else
 fprintf (stderr, "error finding the
update status\n");
 @}
 gpgme_release (ctx);
 @}
return 0;
 @}
@end example

```

@node Run Control

@section Run Control

@cindex run control

@cindex cryptographic operation, running

@acronym{GPGME} supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when @acronym{GPGME} runs. This ensures that @acronym{GPGME} only runs when necessary and also prevents it from blocking for a long time.

@menu

\* **Waiting For Completion::**      Waiting until an operation is completed.

\* **Using External Event Loops::**    Advanced control over what happens when.

\* **Cancellation::**                How to end pending operations prematurely.

@end menu

@node Waiting For Completion

@subsection Waiting For Completion  
@cindex cryptographic operation, wait for  
@cindex wait for completion

@deftypefun

```
gpgme_ctx_t gpgme_wait (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_error_t *@var{status}}, @w{int
@var{hang}})
```

The function `gpgme_wait` continues the pending operation within the context `@var{ctx}`. In particular, it ensures the data exchange between `GPGME` and the crypto backend and watches over the run time status of the backend process.

If `@var{hang}` is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in `@var{status}` if `gpgme_wait` does not return `NULL`.

The `@var{ctx}` argument can be `NULL`. In that case, `gpgme_wait` waits for any context to complete its operation.

`gpgme_wait` can be used only in conjunction with any context that has a pending operation initiated with one of the `gpgme_op_*_start` functions except `gpgme_op_keylist_start` and `gpgme_op_trustlist_start` (for which you should use the corresponding `gpgme_op_*_next` functions). If `@var{ctx}` is `NULL`, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect `gpgme_wait`.

In a multi-threaded environment, only one thread should ever call `gpgme_wait` at any time, regardless of whether `@var{ctx}` is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

The function returns the `@var{ctx}` of the context which has finished the operation. If `@var{hang}` is false, and the timeout expires, `NULL` is returned and `*status` will be set to 0. If an error occurs, `NULL` is returned and the error is returned in `*status`.

@end deftypefun

@node Using External Event Loops

@subsection Using External Event

Loops

@cindex event loop, external

@acronym{GPGME} hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrarily long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if @code{gpgme\_wait} is used without the @var{hang} option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. @acronym{GPGME} will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading or writing. It is then the user's responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, @acronym{GPGME} will never block. This gives the user more control over the program flow, and allows to perform other tasks when @acronym{GPGME} would block otherwise.

By using this advanced mechanism, @acronym{GPGME} can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

@menu

- \* I/O Callback Interface:: How I/O callbacks are registered.
- \* Registering I/O Callbacks:: How to use I/O callbacks for a context.
- \* I/O Callback Example:: An example how to use I/O callbacks.
- \* I/O Callback Example GTK+:: How to use @acronym{GPGME} with GTK+.
- \* I/O Callback Example GDK:: How to use @acronym{GPGME} with GDK.
- \* I/O Callback Example Qt:: How to use @acronym{GPGME} with Qt.

@end menu

@node I/O Callback Interface

@subsubsection I/O Callback Interface

```
@deftp {Data type} {gpgme_error_t
(*gpgme_io_cb_t) (@w{void *}@var{data}), @w{int @var{fd}})}
@tindex gpgme_io_cb_t
```

The @code{gpgme\_io\_cb\_t} type is the type of functions which @acronym{GPGME} wants to register as I/O callback handlers using the

`gpgme_register_io_cb_t` functions provided by the user.

`data` and `fd` are provided by `GPGME` when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor `fd`.

The callback handler always returns `0`, but you should consider the return value to be reserved for later use.

`deftp`

```
@deftp {Data type} {gpgme_error_t (*gpgme_register_io_cb_t) (@w{void *data}, @w{int fd},
@w{int dir}, @w{gpgme_io_cb_t fnc}, @w{void *fnc_data}, @w{void **tag})}
@tindex gpgme_register_io_cb_t
```

The `gpgme_register_io_cb_t` type is the type of functions which can be called by `GPGME` to register an I/O callback function

`fnc` for the file descriptor `fd` with the user.

`fnc_data` should be passed as the first argument to `fnc` when the handler is invoked (the second argument should be `fd`).

If `dir` is 0, `fnc` should be called by the user when `fd` is ready for writing. If `dir` is 1, `fnc` should be called when `fd` is ready for reading.

`data` was provided by the user when registering the `gpgme_register_io_cb_t` function with `GPGME` and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the event loop to which the file descriptor should be added.

`GPGME` will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with `gpgme_set_io_cbs`. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The user should return a unique handle in `tag` identifying this I/O callback registration, which will be passed to the `gpgme_register_io_cb_t` function without interpretation when the file descriptor should not be monitored anymore.

`deftp`

```
@deftp {Data type} {void (*gpgme_remove_io_cb_t) (@w{void *tag})}
```

The `gpgme_remove_io_cb_t` type is the type of functions which can be called by `GPGME` to remove an I/O callback handler that was registered before. `tag` is the handle that was returned by the `gpgme_register_io_cb_t` for this I/O callback.

@acronym{GPGME} can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

@end deftp

@deftp {Data type} {enum gpgme\_event\_io\_t}

@tindex gpgme\_event\_io\_t

The @code{gpgme\_event\_io\_t} type specifies the type of an event that is reported to the user by @acronym{GPGME} as a consequence of an I/O operation.

The following events are defined:

@table @code

@item GPGME\_EVENT\_START

The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled.

@var{type\_data} is @code{NULL} and reserved for later use.

@item GPGME\_EVENT\_DONE

The operation is finished, the last I/O callback for this operation was removed. The accompanying @var{type\_data} points to a @code{struct gpgme\_io\_event\_done\_data} variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

@item GPGME\_EVENT\_NEXT\_KEY

In a @code{gpgme\_op\_keylist\_start} operation, the next key was received from the crypto engine. The accompanying @var{type\_data} is a @code{gpgme\_key\_t} variable that contains the key with one reference for the user.

@end table

@end deftp

@deftp {Data type} {void (\*gpgme\_event\_io\_cb\_t) (@w{void \*}@var{data}), @w{gpgme\_event\_io\_t @var{type}}, @w{void \*}@var{type\_data}}}

The @code{gpgme\_event\_io\_cb\_t} type is the type of functions which can be called by @acronym{GPGME} to signal an event for an operation running in a context which has I/O callback functions registered by the user.

@var{data} was provided by the user when registering the

@code{gpgme\_event\_io\_cb\_t} function with @acronym{GPGME} and will always be passed as the first argument when registering a callback function.

For example, the user can use this to determine the context in which this event has occurred.

@var{type} will specify the type of event that has occurred.  
@var{type\_data} specifies the event further, as described in the above list of possible @code{gpgme\_event\_io\_t} types.

@acronym{GPGME} can call this function in an I/O callback handler.  
@end deftp

@node Registering I/O Callbacks  
@subsubsection Registering I/O Callbacks

@deftp {Data type} {struct gpgme\_io\_cbs}  
@tindex gpgme\_event\_io\_t

This structure is used to store the I/O callback interface functions described in the previous section. It has the following members:

@table @code  
@item gpgme\_register\_io\_cb\_t add  
This is the function called by @acronym{GPGME} to register an I/O callback handler. It must be specified.

@item void \*add\_priv  
This is passed as the first argument to the @code{add} function when it is called by @acronym{GPGME}. For example, it can be used to determine the event loop to which the file descriptor should be added.

@item gpgme\_remove\_io\_cb\_t remove  
This is the function called by @acronym{GPGME} to remove an I/O callback handler. It must be specified.

@item gpgme\_event\_io\_cb\_t event  
This is the function called by @acronym{GPGME} to signal an event for an operation. It must be specified, because at least the start event must be processed.

@item void \*event\_priv  
This is passed as the first argument to the @code{event} function when it is called by @acronym{GPGME}. For example, it can be used to determine  
the context in which the event has occurred.

@end table  
@end deftp

@deftypedef void gpgme\_set\_io\_cbs (@w{gpgme\_ctx\_t @var{ctx}}, @w{struct gpgme\_io\_cbs \*@var{io\_cbs}})

The function @code{gpgme\_set\_io\_cbs} enables the I/O callback interface for the context @var{ctx}. The I/O callback functions are specified by @var{io\_cbs}.



If `@var{io_cbs}->@code{add}` is `@code{NULL}`, the I/O callback interface is disabled for the context, and normal operation is restored.

```
@end deftypefun
```

```
@deftypefun void gpgme_get_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
```

The function `@code{gpgme_get_io_cbs}` returns the I/O callback functions set with `@code{gpgme_set_io_cbs}` in `@var{io_cbs}`.

```
@end deftypefun
```

```
@node I/O Callback Example
```

```
@subsubsection I/O Callback Example
```

To actually use an external event loop, you have to implement the I/O callback functions that are used by `@acronym{GPGME}` to register and unregister file descriptors. Furthermore, you have to actually monitor these

file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in `@acronym{GPGME}` is not predictable.

```
@example
```

```
#include <assert.h>
```

```
#include <errno.h>
```

```
#include <stdlib.h>
```

```
#include <pthread.h>
```

```
#include <sys/types.h>
```

```
#include <gpgme.h>
```

```
/* The following structure holds the result of a crypto operation. */
```

```
struct op_result
```

```
@{
```

```
int done;
```

```
gpgme_error_t err;
```

```
@};
```

```
/* The following structure holds the data associated with one I/O callback. */
```

```
struct one_fd
```

```
@{
```

```
int fd;
```

```

int dir;
gpgme_io_cb_t fnc;
void *fnc_data;
void *loop;
@ };

struct event_loop
@ {
pthread_mutex_t lock;
#define MAX_FDS 32
/* Unused slots are marked with FD being
-1. */
struct one_fd fds[MAX_FDS];
@ };
@end example

```

The following functions implement the I/O callback interface.

```

@example
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
 void **r_tag)
@ {
struct event_loop *loop = data;
struct one_fd *fds = loop->fds;
int i;

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS; i++)
 @ {
 if (fds[i].fd == -1)
 @ {
 fds[i].fd = fd;
 fds[i].dir = dir;
 fds[i].fnc = fnc;
 fds[i].fnc_data = fnc_data;
 fds[i].loop = loop;
 break;
 @ }
 @ }
pthread_mutex_unlock (&loop->lock);
if (i == MAX_FDS)
 return gpg_error (GPG_ERR_GENERAL);
*r_tag = &fds[i];
return 0;
@ }

void

```

```

remove_io_cb (void *tag)
@{
 struct one_fd *fd = tag;
 struct event_loop *loop = fd->loop;

 pthread_mutex_lock (&loop->lock);
 fd->fd = -1;
 pthread_mutex_unlock (&loop->lock);
@}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
@{
 struct op_result *result = data;

 /* We
 don't support list operations here. */
 if (type == GPGME_EVENT_DONE)
 @{
 result->done = 1;
 result->err = *type_data;
 @}
@}
@end example

```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```

@example
int
do_select (struct event_loop *loop)
@{
 fd_set rfd;
 fd_set wfd;
 int i, n;
 int any = 0;
 struct timeval tv;
 struct one_fd *fdlist = loop->fds;

 pthread_mutex_lock (&loop->lock);
 FD_ZERO (&rfd);
 FD_ZERO (&wfd);
 for (i = 0; i < MAX_FDS; i++)
 if (fdlist[i].fd != -1)
 FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfd);
 pthread_mutex_unlock (&loop->lock);

 tv.tv_sec = 0;

```

```

tv.tv_usec = 1000;

do
 @{
 n = select (FD_SETSIZE, &rfd, &wfd, NULL, &tv);
 @}
while (n < 0 && errno == EINTR);

if (n < 0)
 return n; /* Error or timeout. */

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS && n; i++)
 @{
 if (fdlist[i].fd
 != -1)
 @{
 if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfd))
 @{
 assert (n);
 n--;
 any = 1;
 /* The I/O callback handler can register/remove callbacks,
 so we have to unlock the file descriptor list. */
 pthread_mutex_unlock (&loop->lock);
 (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
 pthread_mutex_lock (&loop->lock);
 @}
 @}
 @}
 @}
pthread_mutex_unlock (&loop->lock);
return any;
@}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
@{
 int ret;

 do
 @{
 ret = do_select (loop);
 @}
 while (ret >= 0 && !result->done);
@}
@end example

```

The main function shows how to put it all together.

```

@example
int
main (int argc, char *argv[])
@{
 struct event_loop loop;
 struct op_result result;
 gpgme_ctx_t ctx;
 gpgme_error_t err;
 gpgme_data_t sig, text;
 int i;
 pthread_mutexattr_t attr;
 struct gpgme_io_cbs io_cbs =
 @{
 add_io_cb,
 &loop,
 remove_io_cb,
 event_io_cb,
 &result
 @};

 init_gpgme ();

 /* Initialize the loop structure. */

 /* The mutex must be recursive, since remove_io_cb (which acquires a
 lock) can be called while holding a lock acquired in do_select. */
 pthread_mutexattr_init (&attr);
 pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
 pthread_mutex_init (&loop.lock, &attr);
 pthread_mutexattr_destroy (&attr);

 for (i = 0; i < MAX_FDS; i++)
 loop.fds[i].fd = -1;

 /* Initialize the result structure. */
 result.done = 0;

 err = gpgme_data_new_from_file (&sig, "signature", 1);
 if (!err)
 err = gpgme_data_new_from_file (&text, "text", 1);
 if (!err)
 err = gpgme_new (&ctx);
 if (!err)
 @{
 gpgme_set_io_cbs (ctx, &io_cbs);
 err = gpgme_op_verify_start (ctx, sig, text, NULL);
 @}

```

```

if (err)
 @ {
 fprintf (stderr, "gpgme error: %s: %s\n",
 gpgme_strerror (err), gpgme_strerror (err));
 exit (1);

 @ }

wait_for_op (&loop, &result);
if (!result.done)
 @ {
 fprintf (stderr, "select error\n");
 exit (1);
 @ }
if (!result.err)
 @ {
 fprintf (stderr, "verification failed: %s: %s\n",
 gpgme_strerror (result.err), gpgme_strerror (result.err));
 exit (1);
 @ }
/* Evaluate verify result. */
@dots { }
return 0;
@ }
@end example

```

```

@node I/O Callback Example GTK+
@subsection I/O Callback Example GTK+
@cindex GTK+, using @acronym{GPGME} with

```

The I/O callback interface can be used to integrate @acronym{GPGME} with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific setup.

```

@example
#include <gtk/gtk.h>

struct my_gpgme_io_cb
@ {
 gpgme_io_cb_t fnc;
 void *fnc_data;
 guint input_handler_id
@ };

```

```

void
my_gpgme_io_cb
(gpoiner data, gint source, GdkInputCondition condition)
@{
struct my_gpgme_io_cb *iocb = data;
(*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
struct my_gpgme_io_cb *iocb = data;
gtk_input_remove (data->input_handler_id);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
void *fnc_data, void **tag)
@{
struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
iocb->fnc = fnc;
iocb->data = fnc_data;
iocb->input_handler_id = gtk_input_add_full (fd, dir
? GDK_INPUT_READ
: GDK_INPUT_WRITE,
my_gpgme_io_callback,
0, iocb, NULL);

*tag = iocb;
return 0;
@}
@end example

```

```

@node I/O Callback Example GDK
@subsection I/O Callback Example
GDK
@cindex GDK, using @acronym{GPGME} with

```

The I/O callback interface can also be used to integrate @acronym{GPGME} with the GDK event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```
@example
```

```

#include <gdk/gdk.h>

struct my_gpgme_io_cb
@{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 gint tag;
@};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
@{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
 struct my_gpgme_io_cb *iocb = data;
 gdk_input_remove (data->tag);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
 void *fnc_data, void **tag)
@{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
 my_gpgme_io_callback, iocb, NULL);
 *tag = iocb;
 return 0;
@}
@end example

```

```

@node I/O Callback Example Qt
@subsection I/O Callback Example Qt
@cindex Qt, using @acronym{GPGME} with

```

The I/O callback interface can also be used to integrate @acronym{GPGME} with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is



missing because it does not require any Qt specific setup.

@example

```
#include <qsocketnotifier.h>
```

```
#include <qapplication.h>
```

```
struct IOCB @{
```

```
 IOCB(GpgmeIOCb f, void * d, QSocketNotifier * n)
```

```
 : func(
```

```
 f), data(d), notifier(n) @ { @ }
```

```
 GpgmeIOCb func;
```

```
 void * data;
```

```
 QSocketNotifier * notifier;
```

```
@ }
```

```
class MyApp : public QApplication @ {
```

```
 // ...
```

```
 static void registerGpgmeIOCallback(void * data, int fd, int dir,
```

```
 GpgmeIOCb func, void * func_data,
```

```
 void ** tag) @ {
```

```
 QSocketNotifier * n =
```

```
 new QSocketNotifier(fd, dir ? QSocketNotifier::Read
```

```
 : QSocketNotifier::Write);
```

```
 connect(n, SIGNAL(activated(int)),
```

```
 qApp, SLOT(slotGpgmeIOCallback(int)));
```

```
 qApp->mIOCBs.push_back(IOCB(func, func_data, n));
```

```
 tag = (void)n;
```

```
@ }
```

```
 static void removeGpgmeIOCallback(void * tag) @ {
```

```
 if (!tag) return;
```

```
 QSocketNotifier * n = static_cast<QSocketNotifier*>(tag);
```

```
 for (QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
```

```
 it != qApp->mIOCBs.end() ; ++it)
```

```
 if (it->notifier == n) @ {
```

```
 delete it->notifier;
```

```
 qApp->mIOCBs.erase(
```

```
 it);
```

```
 return;
```

```
 @ }
```

```
@ }
```

```
public slots:
```

```
 void slotGpgmeIOCallback(int fd) @ {
```

```
 for (QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
```

```
 it != mIOCBs.end() ; ++it)
```

```

 if (it->notifier && it->notifier->socket() == fd)
 (*(it->func)) (it->func_data, fd);
 @ }

// ...

private:
 QList<IOCB> mIOCBs;
 // ...
 @ };
@end example

```

```

@node Cancellation
@subsection Cancellation
@cindex cryptographic operation, aborting
@cindex cryptographic operation, cancelling
@cindex aborting operations
@cindex cancelling operations

```

Sometimes you do not want to wait for an operation to finish.

`@acronym{GPGME}` provides two different functions to achieve that. The function `@code{gpgme_cancel}` takes effect immediately. When it returns, the operation is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function `@code{gpgme_cancel_async}` can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

```

@deftypefun gpgme_ctx_t gpgme_cancel (@w{gpgme_ctx_t @var{ctx}})
@since{0.4.5}

```

The function `@code{gpgme_cancel}` attempts to cancel a pending operation in the context `@var{ctx}`. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call `@code{gpgme_wait}` during cancellation. After successful cancellation, you can call `@code{gpgme_wait}` (optionally waiting on `@var{ctx}`), and the context `@var{ctx}` will appear as if it had finished with the error code `@code{GPG_ERR_CANCEL}`.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a `@code{GPGME_EVENT_DONE}`

event

with the error code `@code{GPG_ERR_CANCEL}` will be signalled.

The function returns an error code if the cancellation failed (in this case the state of `@var{ctx}` is not modified).

`@end deftypefun`

`@deftypefun gpgme_ctx_t gpgme_cancel_async (@w{gpgme_ctx_t @var{ctx}})`  
`@since{1.1.7}`

The function `@code{gpgme_cancel_async}` attempts to cancel a pending operation in the context `@var{ctx}`. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of `@var{ctx}` is not modified).

`@end deftypefun`

`@c *****`  
`@c ***** Appendices *****`  
`@c *****`

`@include uiserver.texi`

`@node Debugging`

`@appendix How to solve problems`

`@cindex`

`debug`

`@cindex GPGME_DEBUG`

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like `@acronym{GPGME}` and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using `@command{gpg}` or `@command{gpgsm}` on the command line. If you can't figure out why things don't work, you may use `@acronym{GPGME}`'s built in trace feature. This feature is either enabled using the environment variable `@code{GPGME_DEBUG}` or, if this is not possible, by calling the function

`@code{gpgme_set_global_flag}`. The value is the trace level and an optional file name. If no file name is given the trace output is

printed to `@code{stderr}`.

@noindent

For example

@smallexample

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

@end

```
smallexample
```

@noindent

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

@node Deprecated Functions

@appendix Deprecated Functions

@cindex deprecated

For backward compatibility `@acronym{GPGME}` has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

**Warning:** These interfaces will be removed in a future version of `@acronym{GPGME}`.

```
@deftypefun void gpgme_key_release (@w{gpgme_key_t @var{key}})
```

The function `@code{gpgme_key_release}` is equivalent to

```
@code{gpgme_key_unref}.
```

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_import_ext (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{keydata}}, @w{int *@var{nr}})
@since{0.3.9}
```

The function `@code{gpgme_op_import_ext}` is equivalent to:

```
@example
```

```

gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
 @ {
 gpgme_import_result_t result = gpgme_op_import_result (ctx);
 *nr = result->considered;
 @ }
@end example
@end deftypefun

```

```

@deftp {Data type} {gpgme_error_t (*gpgme_edit_cb_t) @
(@w{void *@var{handle}}, @
 @w{gpgme_status_code_t @var{status}}, @
 @w{const char *@var{args}}, @
 @w{int @var{fd}})}

```

@tindex gpgme\_edit\_cb\_t

The @code{gpgme\_edit\_cb\_t} type is the type of functions which @acronym{GPGME} calls if it a key edit operation is on-going. The status code @var{status} and the argument line @var{args} are passed through by @acronym{GPGME} from the crypto engine. The file descriptor @var{fd} is -1 for normal status messages. If @var{status} indicates a command rather than a status message, the response to the command should be written to @var{fd}. The @var{handle} is provided by the user at start of operation.

The function should return @code{GPG\_ERR\_FALSE} if it did not handle the status code, @code{0} for success, or any other error value.

@end deftp

```

@deftypefun gpgme_error_t gpgme_op_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}},
@w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
@since{0.3.9}

```

Note: This function is deprecated, please use @code{gpgme\_op\_interact} instead.

The function @code{gpgme\_op\_edit} processes the key @var{KEY} interactively, using the edit callback function @var{FNC} with the handle @var{HANDLE}. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by @acronym{GPGME}.

The function returns the error code `GPG_ERR_NO_ERROR` if the edit operation completes successfully, `GPG_ERR_INV_VALUE` if `ctx` or `key` is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_edit_start (@w{gpgme_ctx_t} ctx, @w{gpgme_key_t} key, @w{gpgme_edit_cb_t} fnc, @w{void *} handle, @w{gpgme_data_t} out)
```

```
@since{0.3.9}
```

Note: This function is deprecated, please use `gpgme_op_interact_start` instead.

The function `gpgme_op_edit_start` initiates a `gpgme_op_edit` operation.

It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `ctx` or `key` is not a valid pointer.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_card_edit (@w{gpgme_ctx_t} ctx, @w{gpgme_key_t} key, @w{gpgme_edit_cb_t} fnc, @w{void *} handle, @w{gpgme_data_t} out)
```

Note: This function is deprecated, please use `gpgme_op_interact` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit` is analogous to `gpgme_op_edit`, but should be used to process the smart card corresponding to the key `key`.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_card_edit_start (@w{gpgme_ctx_t} ctx, @w{gpgme_key_t} key, @w{gpgme_edit_cb_t} fnc, @w{void *} handle, @w{gpgme_data_t} out)
```

Note: This function is deprecated, please use `gpgme_op_interact_start` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit_start` initiates a `gpgme_op_card_edit` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `ctx` or `key` is not a valid pointer.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_data_new_with_read_cb (@w{gpgme_data_t *}@var{dh}), @w{int
(*@var{readfunc})} (@w{void *@var{hook}}, @w{char *@var{buffer}}, @w{size_t @var{count}}, @w{size_t
*@var{nread}}), @w{void *@var{hook_value}})
```

The function `gpgme_data_new_with_read_cb` creates a new `gpgme_data_t` object and uses the callback function `readfunc` to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type

`GPGME`

provides. However, it can not be used to write data.

The callback function receives `hook_value` as its first argument whenever it is invoked. It should return up to `count` bytes in `buffer`, and return the number of bytes actually read in `nread`. It may return `0` in `nread` if no data is currently available. To indicate `EOF` the function should return with an error code of `-1` and set `nread` to `0`. The callback function may support to reset its internal read pointer if it is invoked with `buffer` and `nread` being `NULL` and `count` being `0`.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `dh` or `readfunc` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_data_rewind (@w{gpgme_data_t @var{dh}})
```

The function `gpgme_data_rewind` is equivalent to:

`@example`

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
? gpgme_error_from_errno (errno) : 0;
```

`@end example`

`@end deftypefun`

```
@deftp {Data type} gpgme_attr_t
```

The `gpgme_attr_t` type is used to specify a key or trust item attribute. The following attributes are defined:

`@table @code`

`@item GPGME_ATTR_KEYID`

This is the key ID of a sub key. It is representable as a string.

`@item GPGME_ATTR_FPR`

This is the fingerprint of a sub key. It is representable as a string.

`@item GPGME_ATTR_ALGO`

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the `@code{enum gcry_pk_algos}` values in the `gcrypt` library.

`@item GPGME_ATTR_LEN`

This is the key length of a sub key. It is representable as a number.

`@item GPGME_ATTR_CREATED`

This is the timestamp at creation time of a sub key. It is representable as a number.

`@item GPGME_ATTR_EXPIRE`

This is the expiration time of a sub key. It is representable as a number.

`@item GPGME_ATTR_USERID`

This is a user ID. There can be more than one user IDs in a `@var{gpgme_key_t}` object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

`@item GPGME_ATTR_NAME`

This is the name belonging to a user ID. It is representable as a string.

`@item GPGME_ATTR_EMAIL`

This is the email address belonging to a user ID. It is representable as a string.

`@item GPGME_ATTR_COMMENT`

This is the comment belonging to a user ID. It is representable as a string.

`@item GPGME_ATTR_VALIDITY`

This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

`@item GPGME_ATTR_UID_REVOKED`

This specifies if a user ID is revoked. It is representable as a number, and is `@code{1}` if the user ID is revoked, and `@code{0}` otherwise.

`@item GPGME_ATTR_UID_INVALID`



This specifies if a user ID is invalid. It is representable as a number, and is @code{1} if the user ID is invalid, and @code{0} otherwise.

@item GPGME\_ATTR\_TYPE

This returns information about the type of key. For the string function this will either be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509.

@item GPGME\_ATTR\_IS\_SECRET

This specifies if the key is a secret key. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME\_ATTR\_KEY\_REVOKED

This specifies if a sub key is revoked. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME\_ATTR\_KEY\_INVALID

This specifies if a sub key is invalid. It is representable as a number, and is @code{1} if the key is invalid, and @code{0} otherwise.

@item GPGME\_ATTR\_KEY\_EXPIRED

This specifies if a sub key is expired. It is representable as a number, and is @code{1} if the key is expired, and @code{0} otherwise.

@item GPGME\_ATTR\_KEY\_DISABLED

This specifies if a sub key is disabled.

It is representable as a number, and is @code{1} if the key is disabled, and @code{0} otherwise.

@item GPGME\_ATTR\_KEY\_CAPS

This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter "e" if the key can be used for encryption, "s" if the key can be used for signatures, and "c" if the key can be used for certifications.

@item GPGME\_ATTR\_CAN\_ENCRYPT

This specifies if a sub key can be used for encryption. It is representable as a number, and is @code{1} if the sub key can be used for encryption, and @code{0} otherwise.

@item GPGME\_ATTR\_CAN\_SIGN

This specifies if a sub key can be used to create data signatures. It is representable as a number, and is @code{1} if the sub key can be used for signatures, and @code{0} otherwise.

@item GPGME\_ATTR\_CAN\_CERTIFY

This specifies if a sub key can be used to create key certificates.  
It is representable as a number, and is `{1}` if the sub key can be used for certifications,  
and `{0}` otherwise.

@item GPGME\_ATTR\_SERIAL

The X.509 issuer serial attribute of the key. It is representable as a string.

@item GPGME\_ATTR\_ISSUE

The X.509 issuer name attribute of the key. It is representable as a string.

@item GPGME\_ATTR\_CHAINID

The X.509 chain ID can be used to build the certification chain. It is representable as a string.

@end table

@end deftp

```
@deftypefun {const char *} gpgme_key_get_string_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function `{gpgme_key_get_string_attr}` returns the value of the string-representable attribute `{var{what}}` of key `{var{key}}`. If the attribute is an attribute of a sub key or an user ID, `{var{idx}}` specifies the sub key or user ID of which the attribute value is returned. The argument `{var{reserved}}` is reserved for later use and should be `{NULL}`.

The string returned is only valid as long as the key is valid.

The function returns `{0}`

if an attribute can't be returned as a string, `{var{key}}` is not a valid pointer, `{var{idx}}` out of range, or `{var{reserved}}` not `{NULL}`.

@end deftypefun

```
@deftypefun {unsigned long} gpgme_key_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function `{gpgme_key_get_ulong_attr}` returns the value of the number-representable attribute `{var{what}}` of key `{var{key}}`. If the attribute is an attribute of a sub key or an user ID, `{var{idx}}` specifies the sub key or user ID of which the attribute value is returned. The argument `{var{reserved}}` is reserved for later use and should be `{NULL}`.

The function returns `{0}` if the attribute can't be returned as a number, `{var{key}}` is not a valid pointer, `{var{idx}}` out of range, or `{var{reserved}}` not `{NULL}`.

@end deftypefun

@c

@c Key Signatures

@c

The signatures on a key are only available if the key was retrieved via a listing operation with the @code{GPGME\_KEYLIST\_MODE\_SIGS} mode enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function @code{gpgme\_get\_key}.

@deftp {Data type} gpgme\_attr\_t

The @code{gpgme\_attr\_t} type is used to specify a key signature attribute. The following attributes are defined:

@table @code

@item GPGME\_ATTR\_KEYID

This is the key ID of the key which was used for the signature. It is representable as a string.

@item GPGME\_ATTR\_ALGO

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the @code{enum gcry\_pk\_algos} values in the gcrypt library.

@item GPGME\_ATTR\_CREATED

This is the timestamp at creation time of the signature. It is representable as a number.

@item GPGME\_ATTR\_EXPIRE

This is the expiration time of the signature. It is representable as a number.

@item GPGME\_ATTR\_USERID

This is the user ID associated with the signing key. The user ID is representable as a number.

@item GPGME\_ATTR\_NAME

This is the name belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_EMAIL

This is the email address belonging to a user ID. It is representable

as a string.

@item GPGME\_ATTR\_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_KEY\_REVOKED

This specifies if a key signature is a revocation signature. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@c @item GPGME\_ATTR\_KEY\_EXPIRED

@c This specifies if a key signature is expired. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@c

@item GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

@item GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

@item GPGME\_ATTR\_SIG\_STATUS

This is the same value as returned by @code{gpgme\_get\_sig\_status}.

@end table

@end deftp

```
@deftypefun {const char *} gpgme_key_sig_get_string_attr (@w{gpgme_key_t @var{key}}, @w{int @var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function @code{gpgme\_key\_sig\_get\_string\_attr} returns the value of the string-representable attribute @var{what} of the signature @var{idx} on the user ID @var{uid\_idx} in the key @var{key}. The argument @var{reserved} is reserved for later use and should be @code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0} if an attribute can't be returned as a string, @var{key} is not a valid pointer, @var{uid\_idx} or @var{idx} out of range, or @var{reserved} not @code{NULL}.

@end deftypefun

```
@deftypefun {unsigned long} gpgme_key_sig_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{int @var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function `gpgme_key_sig_get_ulong_attr` returns the value of the number-representable attribute `@var{what}` of the signature `@var{idx}` on the user ID `@var{uid_idx}` in the key `@var{key}`. The argument `@var{reserved}` is reserved for later use and should be `NULL`.

The function returns `0` if an attribute can't be returned as a string, `@var{key}` is not a valid pointer, `@var{uid_idx}` or `@var{idx}` out of range, or `@var{reserved}` not `NULL`.

```
@end deftypefun
```

```
@defntp {Data type} {enum gpgme_sig_stat_t}
@tindex gpgme_sig_stat_t
```

The `gpgme_sig_stat_t` type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

```
@table @code
```

```
@item GPGME_SIG_STAT_NONE
```

This status should not occur in normal operation.

```
@item GPGME_SIG_STAT_GOOD
```

This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

```
@item GPGME_SIG_STAT_GOOD_EXP
```

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

```
@item GPGME_SIG_STAT_GOOD_EXPKEY
```

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

```
@item GPGME_SIG_STAT_BAD
```

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

```
@item GPGME_SIG_STAT_NOKEY
```

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPGME\_SIG\_STAT\_NOSIG

This

status indicates that the signature data provided was not a real signature.

@item GPGME\_SIG\_STAT\_ERROR

This status indicates that there was some other error which prevented the signature verification.

@item GPGME\_SIG\_STAT\_DIFF

For the combined result this status means that at least two signatures have a different status. You can get each key's status with

@code{gpgme\_get\_sig\_status}.

@end table

@end deftp

@deftypefun {const char \*} gpgme\_get\_sig\_status (@w{gpgme\_ctx\_t @var{ctx}}, @w{int @var{idx}}, @w{gpgme\_sig\_stat\_t \*@var{r\_stat}}, @w{time\_t \*@var{r\_created}})

The function @code{gpgme\_get\_sig\_status} is equivalent to:

@example

```
gpgme_verify_result_t result;
```

```
gpgme_signature_t sig;
```

```
result = gpgme_op_verify_result (ctx);
```

```
sig = result->signatures;
```

```
while (sig && idx)
```

```
 @{
```

```
 sig = sig->next;
```

```
 idx--;
```

```
 @}
```

```
if (!sig || idx)
```

```
 return NULL;
```

```
if (r_stat)
```

```
 @{
```

```
 switch (gpg_err_code (sig->status))
```

```
 @{
```

```
case GPG_ERR_NO_ERROR:
```

```
 *r_stat = GPGME_SIG_STAT_GOOD;
```

```
break;
```

```
case GPG_ERR_BAD_SIGNATURE:
```

```
 *r_stat = GPGME_SIG_STAT_BAD;
```

```
break;
```

```

case GPG_ERR_NO_PUBKEY:
 *r_stat = GPGME_SIG_STAT_NOKEY;
 break;

case GPG_ERR_NO_DATA:
 *r_stat = GPGME_SIG_STAT_NOSIG;
 break;

case GPG_ERR_SIG_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXP;
 break;

case GPG_ERR_KEY_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
 break;

default:
 *r_stat = GPGME_SIG_STAT_ERROR;
 break;
@}
@}
if (r_created)
 *r_created = sig->timestamp;
return sig->fpr;
@end example
@end dectyfefun

@dectyfefun {const char *} gpgme_get_sig_string_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
The function @code{gpgme_get_sig_string_attr} is equivalent to:

@example
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
 @{
 sig = sig->next;
 idx--;
 @}
if (!sig || idx)
 return
NULL;

switch (what)

```

```

@{
case GPGME_ATTR_FPR:
 return sig->fpr;

case GPGME_ATTR_ERRTOK:
 if (whatidx == 1)
 return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
 else
return "";
default:
 break;
@}

```

```

return NULL;
@end example
@end dectyfefun

```

```

@dectyfefun {const char *} gpgme_get_sig_ulong_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})

```

The function @code{gpgme\_get\_sig\_ulong\_attr} is equivalent to:

```

@example
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

```

```

while (sig && idx)
@{
 sig = sig->next;
 idx--;
@}

```

```

if (!sig || idx)
 return 0;

```

```

switch (what)
@{
case GPGME_ATTR_CREATED:
 return sig->timestamp;

case GPGME_ATTR_EXPIRE:
 return sig->exp_timestamp;

case GPGME_ATTR_VALIDITY:
 return (unsigned long) sig->validity;

case GPGME_ATTR_SIG_STATUS:

```



```

 switch (sig->status)
 @{
case GPG_ERR_NO_ERROR:
 return GPGME_SIG_STAT_GOOD;

case GPG_ERR_BAD_SIGNATURE:
 return GPGME_SIG_STAT_BAD;

case GPG_ERR_NO_PUBKEY:
 return GPGME_SIG_STAT_NOKEY;

case GPG_ERR_NO_DATA:
 return GPGME_SIG_STAT_NOSIG;

case GPG_ERR_SIG_EXPIRED:
 return GPGME_SIG_STAT_GOOD_EXP;

case GPG_ERR_KEY_EXPIRED:
 return GPGME_SIG_STAT_GOOD_EXPKEY;

default:
 return GPGME_SIG_STAT_ERROR;
 @}

case GPGME_ATTR_SIG_SUMMARY:
 return sig->summary;

default:
 break;
 @}
return 0;
@end example
@end deftypefun

```

```

@deftypefun {const char *} gpgme_get_sig_key (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_key_t *@var{r_key}})

```

The function @code{gpgme\_get\_sig\_key} is equivalent to:

```

@example
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
 @{
 sig = sig->next;

```



```
zVWZC/NF3tPgbziXxQTNt34nS+9dbV/QFDLW0POcN7C0jR/hgkBjMEH2PezWhSj
mL/yLflUYAoxVpXjfc5aPJKqw0tR7m5ibznjCphE+FUMRg8EOmJcg6soeJ5QspU
k2dPN3+Y0zCTNRgAHEI+yIQbM6pio6v2c+UCtT1QhW4xSI38/kcEG8QiM55r1TUy
FcWAY5n5t1nNZtMxxse3LqEon3rKiLkBDQRbDB3nAQgAqfAjSjengERtM+ZYOwN0
QF2v2FuEuMe8mhju7Met7SN2zGv1LnhTNshEa9IABEjfZirE2Tqx4xCWDwDedK4
u1ToFvcnuAMnq2O47Sh+eTypsf6WPFtPBWf6ctKY31hFXjgoyDBULBvl43XU/D9C
Mt7nsKDPYHVrrnge/qWPYVcb+cO0sSwNImMcwQSdTQ3VBq7MeNS9ZeBcXi+XCjhN
kjNum2AQpkHHDQV7871yQ8RIILvZSSfkLb0/SNDU+bGaw2G3lcyKdIfZi2EWWZT
oCbH38I/+LV7nAEe4zFpHwW8X0Dkx2aLgxe6UszDH9L3eGhTLpJhOSiaanG+zZKm
+QARAQABiQE2BBgBCAAgFiEE4Fmh4IZtMa4TEXCITZouEzBBU9EFAlsMHecCGwwA
CgkQTZouEzBBU9H5TQgAolWvIsez/WW8N2tmZEnX0LOFNb+1S4L4X983njwNdoVI
w19pbj+8RIHF/H9kcPGi7jK96gvlykQn3uez/95D2AiRfW5KYdOouFisKgHpv8Ay
BrhclHv11yK+X/0iTD0scYaG7np5162xLkaxSO9hsz2fGv20RkaXCWkI69fWw0BR
XII5pZh2YFei2ZhH/tMIW65h3w0gtgaZBBdpZTOOW4zvghyN+0MSObqkI1BvUJu
caDFI4d6ZTmP5SY+pZyktZ4bg/vMH5VFxdIKgbLx9uVeTvOupvbAW0TnULYGUBQE
nm+S0zr3W18t64e4sS3oHse8zCqo1iiImpba6F1Oaw==
```

=y6DD

-----END

PGP PUBLIC KEY BLOCK-----

::: gpgme.lisp

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:::

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:::

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::: TODO

::: Set up the library.

(in-package :gpgme)

(deftype byte-array ())

'(simple-array (unsigned-byte 8) (\*)))

```

(deftype character-array ()
 '(simple-array character (*)))

;;;
Debugging.

(defvar *debug* nil "If debugging output should be given or not.")

;;; Load the foreign library.

(define-foreign-library libgpgme
 (:unix "libgpgme.so")
 (t (:default "libgpgme")))

(use-foreign-library libgpgme)

;;; System dependencies.

; Access to ERRNO.
(defun ("strerror" c-strerror) :string
 (err :int))

(defun get-errno ()
 errno)

(defun set-errno (errno)
 (setf *errno* errno))

(define-condition system-error (error)
 ((:errno :initarg :errno :reader system-error-errno))
 (:report (lambda (c stream)
 (format stream "System error: ~A: ~A"
 (system-error-errno c)
 (c-strerror (system-error-errno c))))))
 (:documentation "Signalled when an errno is encountered.))

; Needed to write passphrases.
(defun ("write" c-write) ssize-t
 (fd :int)
 (buffer :string) ; Actually :pointer, but we only need string.
 (size size-t))

(defun system-write (fd buffer size)
 (let ((res (c-write fd buffer size)))
 (when (< res 0) (error 'system-error
 :errno (get-errno))
 res))

```

;;;

;;; C Interface Definitions

;;;

;;; Data Type Interface

;;; Some new data types used for easier translation.

;;; The number of include certs. Translates to NIL for default.

```
(defctype cert-int-t
 (:wrapper :int
 :from-c translate-cert-int-t-from-foreign
 :to-c translate-cert-int-t-to-foreign))
```

;;; A string that may be NIL to indicate a null pointer.

```
(defctype string-or-nil-t
 (:wrapper :string
 :to-c translate-string-or-nil-t-to-foreign))
```

;;; Some opaque data types used by GPGME.

```
(defctype gpgme-ctx-t
 (:wrapper :pointer
 :to-c translate-gpgme-ctx-t-to-foreign)
 "The GPGME context type.")
```

```
(defctype gpgme-data-t
 (:wrapper :pointer
 :to-c translate-gpgme-data-t-to-foreign)
 "The GPGME data object type.")
```

;;; Wrappers for the libpgp-error library.

```
(defctype gpgme-error-t
 (:wrapper gpg-error::gpg-error-t
 :from-c translate-gpgme-error-t-from-foreign
 :to-c translate-gpgme-error-t-to-foreign)
 "The
 GPGME error type.")
```

```
(defctype gpgme-error-no-signal-t
 (:wrapper gpg-error::gpg-error-t
 :from-c translate-gpgme-error-no-signal-t-from-foreign)
 "The GPGME error type (this version does not signal conditions in translation.)")
```

```
(defctype gpgme-err-code-t gpg-error::gpg-err-code-t
 "The GPGME error code type.")
```

```

(defctype gpgme-err-source-t gpg-error::gpg-err-source-t
 "The GPGME error source type.")

(defun gpgme-err-make (source code)
 "Construct an error value from an error code and source."
 (gpg-err-make source code))

(defun gpgme-error (code)
 "Construct an error value from an error code."
 (gpgme-err-make :gpg-err-source-gpgme code))

(defun gpgme-err-code (err)
 "Retrieve an error code from the error value ERR."
 (gpg-err-code err))

(defun gpgme-err-source (err)
 "Retrieve an error source from the error value ERR."
 (gpg-err-source err))

(defun gpgme-strerror (err)
 "Return a string containing a description of the error code."
 (gpg-strerror err))

(defun
 gpgme-strsource (err)
 "Return a string containing a description of the error source."
 (gpg-strsource err))

(defun gpgme-err-code-from-errno (err)
 "Retrieve the error code for the system error. If the system error
 is not mapped, :gpg-err-unknown-errno is returned."
 (gpg-err-code-from-errno err))

(defun gpgme-err-code-to-errno (code)
 "Retrieve the system error for the error code. If this is not a
 system error, 0 is returned."
 (gpg-err-code-to-errno code))

(defun gpgme-err-make-from-errno (source err)
 (gpg-err-make-from-errno source err))

(defun gpgme-error-from-errno (err)
 (gpg-error-from-errno err))

;;;

(defcenum gpgme-data-encoding-t
 "The possible encoding mode of gpgme-data-t objects."

```

(:none 0)  
(:binary 1)  
(:base64 2)  
(:armor 3)  
(:url 4)  
(:urlesc 5)  
(:url0 6)  
(:mime 7))

:::

(defcenum gpgme-pubkey-algo-t  
"Public key algorithms from libgcrypt."

(:rsa 1)  
(:rsa-e 2)  
(:rsa-s 3)  
(:elg-e 16)  
(:dsa 17)  
(:ecc 18)  
(:elg 20)  
(:ecdsa 301)  
(:ecdh 302)  
(:eddsa 303))

(defcenum gpgme-hash-algo-t  
"Hash algorithms from libgcrypt."

(:none 0)  
(:md5 1)  
(:sha1 2)  
(:rmd160 3)  
(:md2 5)  
(:tiger 6)  
(:haval 7)  
(:sha256 8)  
(:sha384 9)  
(:sha512 10)  
(:sha224 11)  
(:md4 301)  
(:crc32 302)  
(:crc32-rfc1510 303)  
(:crc24-rfc2440 304))

:::

(defcenum gpgme-sig-mode-t  
"The available signature modes."

(:none 0)  
(:detach 1)

(:clear 2))

:::

(defcenum gpgme-validity-t

"The available validities for a trust item or key."

(:unknown 0)

(:undefined 1)

(:never 2)

(:marginal 3)

(:full 4)

(:ultimate 5))

:::

(defcenum gpgme-protocol-t

"The available protocols."

(:openpgp 0)

(:cms 1)

(:gpgconf 2)

(:assuan 3)

(:g13 4)

(:uiserver 5)

(:spawn 6)

(:default 254)

(:unknown 255))

:::

(defbitfield (gpgme-keylist-mode-t :unsigned-int)

"The available keylist mode flags."

(:local 1)

(:extern 2)

(:sigs 4)

(:sig-notations)

(:with-secret 16)

(:with-tofu 32)

(:ephemeral

128)

(:validate 256))

:::

(defbitfield (gpgme-sig-notation-flags-t :unsigned-int)

"The available signature notation flags."

(:human-readable 1)

(:critical 2))



```
(defctype gpgme-sig-notation-t
 (:wrapper :pointer
 :from-c translate-gpgme-sig-notation-t-from-foreign)
 "Signature notation pointer type.")
```

```
;; FIXME: Doesn't this depend on endianness?
```

```
(defbitfield (gpgme-sig-notation-bitfield :unsigned-int)
 (:human-readable 1)
 (:critical 2))
```

```
(defcstruct gpgme-sig-notation
 "Signature notations."
 (next gpgme-sig-notation-t)
 (name :pointer)
 (value :pointer)
 (name-len :int)
 (value-len :int)
 (flags gpgme-sig-notation-flags-t)
 (bitfield gpgme-sig-notation-bitfield))
```

```
;;;
```

```
(defcenum gpgme-status-code-t
 "The possible status codes for the edit operation."
 (:eof 0)
 (:enter 1)
 (:leave 2)
 (:abort 3)
 (:goodsig 4)
 (:badsig 5)
 (:errsig 6)
 (:badarmor 7)
 (:rsa-or-idea 8)
 (:keyexpired 9)
 (:keyrevoked 10)
 (:trust-undefined 11)
 (:trust-never
 12)
 (:trust-marginal 13)
 (:trust-fully 14)
 (:trust-ultimate 15)
 (:shm-info 16)
 (:shm-get 17)
 (:shm-get-bool 18)
 (:shm-get-hidden 19)
 (:need-passphrase 20)
 (:validsig 21)
 (:sig-id 22))
```

(:enc-to 23)  
(:nodata 24)  
(:bad-passphrase 25)  
(:no-pubkey 26)  
(:no-seckey 27)  
(:need-passphrase-sym 28)  
(:decryption-failed 29)  
(:decryption-okay 30)  
(:missing-passphrase 31)  
(:good-passphrase 32)  
(:goodmdc 33)  
(:badmdc 34)  
(:errmdc 35)  
(:imported 36)  
(:import-ok 37)  
(:import-problem 38)  
(:import-res 39)  
(:file-start 40)  
(:file-done 41)  
(:file-error 42)  
(:begin-decryption 43)  
(:end-decryption 44)  
(:begin-encryption 45)  
(:end-encryption 46)  
(:delete-problem 47)  
(:get-bool 48)  
(:get-line 49)  
(:get-hidden 50)  
(:got-it 51)  
(:progress 52)  
(:sig-created 53)  
(:session-key 54)  
(:notation-name 55)  
(:notation-data 56)  
(:policy-url 57)  
(:begin-stream 58)  
(:end-stream 59)  
(:key-created 60)  
(:userid-hint 61)  
(:unexpected  
62)  
(:inv-recp 63)  
(:no-recp 64)  
(:already-signed 65)  
(:sigexpired 66)  
(:expsig 67)  
(:expkeysig 68)  
(:truncated 69)

(:error 70)  
(:newsig 71)  
(:revkeysig 72)  
(:sig-subpacket 73)  
(:need-passphrase-pin 74)  
(:sc-op-failure 75)  
(:sc-op-success 76)  
(:cardctrl 77)  
(:backup-key-created 78)  
(:pka-trust-bad 79)  
(:pka-trust-good 80)  
(:plaintext 81)  
(:inv-sgnr 82)  
(:no-sgnr 83)  
(:success 84)  
(:decryption-info 85)  
(:plaintext-length 86)  
(:mountpoint 87)  
(:pinentry-launched 88)  
(:attribute 89)  
(:begin-signing 90)  
(:key-not-created 91)  
(:inquire-maxlen 92)  
(:failure 93)  
(:key-considered 94)  
(:tofu-user 95)  
(:tofu-stats 96)  
(:tofu-stats-long 97)  
(:notation-flags 98)  
(:decryption-compliance-mode 99)  
(:verification-compliance-mode 100))

;;;

```
(defctype gpgme-engine-info-t
 (:wrapper :pointer
 :from-c translate-gpgme-engine-info-t-to-foreign)
 "The engine information structure pointer type.")
```

```
(defstruct gpgme-engine-info
 "Engine information."
 (next gpgme-engine-info-t)
 (protocol gpgme-protocol-t)
 (file-name :string)
 (version :string)
 (req-version :string)
 (home-dir :string))
```

;;

```
(defctype gpgme-subkey-t
 (:wrapper :pointer
 :from-c translate-gpgme-subkey-t-from-foreign)
 "A subkey from a key.")
```

;; FIXME: Doesn't this depend on endianness?

```
(defbitfield (gpgme-subkey-bitfield :unsigned-int)
 "The subkey bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512)
 (:is-cardkey 1024)
 (:is-de-vs 2048))
```

```
(defcstruct gpgme-subkey
 "Subkey from a key."
 (next gpgme-subkey-t)
 (bitfield gpgme-subkey-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (length :unsigned-int)
 (keyid :string)
 (-keyid :char :count 17)
 (fpr :string)
 (timestamp :long)
 (expires :long))
```

```
(defctype gpgme-key-sig-t
 (:wrapper :pointer
 :from-c translate-gpgme-key-sig-t-from-foreign)
 "A signature on a user ID.")
```

;; FIXME: Doesn't this depend on endianness?

```
(defbitfield (gpgme-key-sig-bitfield :unsigned-int)
 "The key signature bitfield."
 (:revoked 1)
 (:expired 2)
 (:invalid 4)
 (:exportable 16))
```

```
(defcstruct gpgme-key-sig
 "A signature on a user ID."
 (next gpgme-key-sig-t)
 (bitfield gpgme-key-sig-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (keyid :string)
 (-keyid :char :count 17)
 (timestamp :long)
 (expires :long)
 (status gpgme-error-no-signal-t)
 (-class :unsigned-int)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (sig-class :unsigned-int))
```

```
(defctype gpgme-user-id-t
 (:wrapper :pointer
 :from-c translate-gpgme-user-id-t-from-foreign)
 "A user ID from a key.")
```

;; FIXME: Doesn't this depend on endianness?

```
(defbitfield (gpgme-user-id-bitfield :unsigned-int)
 "The user ID bitfield."
 (:revoked 1)
 (:invalid 2))
```

```
(defcstruct gpgme-user-id
 "A user ID from a key."
 (next
 gpgme-user-id-t)
 (bitfield gpgme-user-id-bitfield)
 (validity gpgme-validity-t)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (signatures gpgme-key-sig-t)
 (-last-key-sig gpgme-key-sig-t))
```

```
(defctype gpgme-key-t
 (:wrapper :pointer
 :from-c translate-gpgme-key-t-from-foreign
 :to-c translate-gpgme-key-t-to-foreign))
```

"A key from the keyring.")

;; FIXME: Doesn't this depend on endianness?

(defbitfield (gpgme-key-bitfield :unsigned-int)

"The key bitfield."

(:revoked 1)

(:expired 2)

(:disabled 4)

(:invalid 8)

(:can-encrypt 16)

(:can-sign 32)

(:can-certify 64)

(:secret 128)

(:can-authenticate 256)

(:is-qualified 512))

(defcstruct gpgme-key

"A signature on a user ID."

(-refs :unsigned-int)

(bitfield gpgme-key-bitfield)

(protocol gpgme-protocol-t)

(issuer-serial :string)

(issuer-name :string)

(chain-id :string)

(owner-trust gpgme-validity-t)

(subkeys gpgme-subkey-t)

(uids gpgme-user-id-t)

(-last-subkey gpgme-subkey-t)

(-last-uid gpgme-user-id-t)

(keylist-mode gpgme-keylist-mode-t))

;;;

;;; There is no support in CFFI to define callback C types and have

;;; automatic type checking with the callback definition.

(defctype gpgme-passphrase-cb-t :pointer)

(defctype gpgme-progress-cb-t :pointer)

(defctype gpgme-edit-cb-t :pointer)

;;;

;;; Function Interface

;;;

;;; Context management functions.

```

(defcfun ("gpgme_new" c-gpgme-new) gpgme-error-t
 (ctx :pointer))

(defcfun ("gpgme_release" c-gpgme-release) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_protocol" c-gpgme-set-protocol) gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t))

(defcfun ("gpgme_get_protocol" c-gpgme-get-protocol) gpgme-protocol-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_get_protocol_name" c-gpgme-get-protocol-name) :string
 (proto gpgme-protocol-t))

(defcfun ("gpgme_set_armor" c-gpgme-set-armor) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_armor" c-gpgme-get-armor) :boolean
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_textmode" c-gpgme-set-textmode) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_textmode" c-gpgme-get-textmode) :boolean
 (ctx gpgme-ctx-t))

(defconstant +include-certs-default+ -256)

(defcfun ("gpgme_set_include_certs" c-gpgme-set-include-certs) :void
 (ctx gpgme-ctx-t)
 (nr-of-certs cert-int-t))

(defcfun ("gpgme_get_include_certs" c-gpgme-get-include-certs) cert-int-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_keylist_mode" c-gpgme-set-keylist-mode) gpgme-error-t
 (ctx gpgme-ctx-t)
 (mode gpgme-keylist-mode-t))

(defcfun ("gpgme_get_keylist_mode" c-gpgme-get-keylist-mode)
 gpgme-keylist-mode-t
 (ctx gpgme-ctx-t))

```

```

(defcfun ("gpgme_set_passphrase_cb" c-gpgme-set-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-passphrase-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_passphrase_cb" c-gpgme-get-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_progress_cb"
 c-gpgme-set-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-progress-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_progress_cb" c-gpgme-get-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_locale" c-gpgme-set-locale) gpgme-error-t
 (ctx gpgme-ctx-t)
 (category :int)
 (value string-or-nil-t))

(defcfun ("gpgme_ctx_get_engine_info" c-gpgme-ctx-get-engine-info)
 gpgme-engine-info-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_ctx_set_engine_info" c-gpgme-ctx-set-engine-info)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir string-or-nil-t))

;;;

(defcfun ("gpgme_pubkey_algo_name" c-gpgme-pubkey-algo-name) :string
 (algo gpgme-pubkey-algo-t))

(defcfun ("gpgme_hash_algo_name" c-gpgme-hash-algo-name) :string
 (algo gpgme-hash-algo-t))

;;;

(defcfun ("gpgme_signers_clear" c-gpgme-signers-clear) :void

```



```

(ctx gpgme-ctx-t))

(defcfun ("gpgme_signers_add" c-gpgme-signers-add)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t))

(defcfun ("gpgme_signers_enum" c-gpgme-signers-enum) gpgme-key-t
 (ctx gpgme-ctx-t)
 (seq :int))

;;;

(defcfun ("gpgme_sig_notation_clear" c-gpgme-sig-notation-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_sig_notation_add" c-gpgme-sig-notation-add) gpgme-error-t
 (ctx gpgme-ctx-t)
 (name :string)
 (value string-or-nil-t)
 (flags gpgme-sig-notation-flags-t))

(defcfun ("gpgme_sig_notation_get" c-gpgme-sig-notation-get)
 gpgme-sig-notation-t
 (ctx gpgme-ctx-t))

;;; Run Control.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-io-cb-t :pointer)

(defctype gpgme-register-io-cb-t :pointer)

(defctype gpgme-remove-io-cb-t :pointer)

(defcenum gpgme-event-io-t
 "The possible events on I/O event callbacks."
 (:start 0)
 (:done 1)
 (:next-key 2)
 (:next-trustitem 3))

(defctype gpgme-event-io-cb-t :pointer)

(defcstruct

```

```

gpgme-io-cbs
"I/O callbacks."
(add gpgme-register-io-cb-t)
(add-priv :pointer)
(remove gpgme-remove-io-cb-t)
(event gpgme-event-io-cb-t)
(event-priv :pointer))

(defctype gpgme-io-cbs-t :pointer)

(defcfun ("gpgme_set_io_cbs" c-gpgme-set-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_get_io_cbs" c-gpgme-get-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_wait" c-gpgme-wait) gpgme-ctx-t
 (ctx gpgme-ctx-t)
 (status-p :pointer)
 (hang :int))

```

::: Functions to handle data objects.

::: There is no support in CFFI to define callback C types and have  
::: automatic type checking with the callback definition.

```

(defctype gpgme-data-read-cb-t :pointer)
(defctype gpgme-data-write-cb-t :pointer)
(defctype gpgme-data-seek-cb-t :pointer)
(defctype gpgme-data-release-cb-t :pointer)

(defcstruct gpgme-data-cbs
 "Data callbacks."
 (read gpgme-data-read-cb-t)
 (write gpgme-data-write-cb-t)
 (seek gpgme-data-seek-cb-t)
 (release gpgme-data-release-cb-t))

(defctype gpgme-data-cbs-t :pointer
 "Data callbacks pointer.")

(defcfun ("gpgme_data_read" c-gpgme-data-read) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))

```

```

(defcfun ("gpgme_data_write" c-gpgme-data-write) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))

(defcfun ("gpgme_data_seek" c-gpgme-data-seek) off-t
 (dh gpgme-data-t)
 (offset off-t)
 (whence :int))

(defcfun ("gpgme_data_new" c-gpgme-data-new) gpgme-error-t
 (dh-p :pointer))

(defcfun ("gpgme_data_release" c-gpgme-data-release) :void
 (dh gpgme-data-t))

(defcfun ("gpgme_data_new_from_mem" c-gpgme-data-new-from-mem) gpgme-error-t
 (dh-p :pointer)
 (buffer :pointer)
 (size size-t)
 (copy :int))

(defcfun ("gpgme_data_release_and_get_mem" c-gpgme-data-release-and-get-mem)
 :pointer
 (dh gpgme-data-t)
 (len-p :pointer))

(defcfun ("gpgme_data_new_from_cbs" c-gpgme-data-new-from-cbs) gpgme-error-t
 (dh-p :pointer)
 (cbs gpgme-data-cbs-t)
 (handle :pointer))

(defcfun ("gpgme_data_new_from_fd" c-gpgme-data-new-from-fd) gpgme-error-t
 (dh-p :pointer)
 (fd :int))

(defcfun ("gpgme_data_new_from_stream" c-gpgme-data-new-from-stream)
 gpgme-error-t
 (dh-p :pointer)
 (stream :pointer))

(defcfun ("gpgme_data_get_encoding" c-gpgme-data-get-encoding)
 gpgme-data-encoding-t
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_encoding" c-gpgme-data-set-encoding)
 gpgme-error-t
 (dh gpgme-data-t))

```

```

(enc gpgme-data-encoding-t))

(defcfun ("gpgme_data_get_file_name" c-gpgme-data-get-file-name) :string
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_file_name" c-gpgme-data-set-file-name) gpgme-error-t
 (dh gpgme-data-t)
 (file-name string-or-nil-t))

(defcfun ("gpgme_data_new_from_file" c-gpgme-data-new-from-file) gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (copy :int))

(defcfun ("gpgme_data_new_from_filepart" c-gpgme-data-new-from-filepart)
 gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (fp
 :pointer)
 (offset off-t)
 (length size-t))

;;; Key and trust functions.

(defcfun ("gpgme_get_key" c-gpgme-get-key) gpgme-error-t
 (ctx gpgme-ctx-t)
 (fpr :string)
 (key-p :pointer)
 (secret :boolean))

(defcfun ("gpgme_key_ref" c-gpgme-key-ref) :void
 (key gpgme-key-t))

(defcfun ("gpgme_key_unref" c-gpgme-key-unref) :void
 (key gpgme-key-t))

;;; Crypto operations.

(defcfun ("gpgme_cancel" c-gpgme-cancel) gpgme-error-t
 (ctx gpgme-ctx-t))

;;;

(defctype gpgme-invalid-key-t
 (:wrapper :pointer
 :from-c translate-gpgme-invalid-key-t-from-foreign)
 "An invalid key structure.")

```

```
(defcstruct gpgme-invalid-key
 "An invalid key structure."
 (next gpgme-invalid-key-t)
 (fpr :string)
 (reason gpgme-error-no-signal-t))
```

::: Encryption.

```
(defcstruct gpgme-op-encrypt-result
 "Encryption result structure."
 (invalid-recipients gpgme-invalid-key-t))
```

```
(defctype gpgme-op-encrypt-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-encrypt-result-t-from-foreign)
 "An encryption result structure.")
```

```
(defcfun ("gpgme_op_encrypt_result" c-gpgme-op-encrypt-result)
 gpgme-op-encrypt-result-t
 (ctx gpgme-ctx-t))
```

```
(defbitfield gpgme-encrypt-flags-t
 (:always-trust 1)
 (:no-encrypt-to 2)
 (:prepare 4)
 (:expect-sign 8)
 (:no-compress 16)
 (:symmetric 32)
 (:throw-keyids 64)
 (:wrap 128)
 (:want-address 256))
```

```
(defcfun ("gpgme_op_encrypt_start" c-gpgme-op-encrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))
```

```
(defcfun ("gpgme_op_encrypt" c-gpgme-op-encrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))
```

```
(defcfun ("gpgme_op_encrypt_sign_start" c-gpgme-op-encrypt-sign-start)
```

```

 gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign"
 c-gpgme-op-encrypt-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

```

::: Decryption.

```

(defctype gpgme-recipient-t
 (:wrapper :pointer
 :from-c translate-gpgme-recipient-t-from-foreign)
 "A recipient structure.")

```

```

(defcstruct gpgme-recipient
 "Recipient structure."
 (next gpgme-recipient-t)
 (keyid :string)
 (-keyid :char :count 17)
 (pubkey-algo gpgme-pubkey-algo-t)
 (status gpgme-error-no-signal-t))

```

```

(defbitfield gpgme-op-decrypt-result-bitfield
 "Decryption result structure bitfield."
 (:wrong-key-usage 1)
 (:is-de-vs 2)
 (:is-mine 4))

```

```

(defcstruct gpgme-op-decrypt-result
 "Decryption result structure."
 (unsupported-algorithm :string)
 (bitfield gpgme-op-decrypt-result-bitfield)
 (recipients gpgme-recipient-t)
 (file-name :string))

```

```

(defctype gpgme-op-decrypt-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-decrypt-result-t-from-foreign)
 "A decryption result structure.")

```

```

(defcfun ("gpgme_op_decrypt_result" c-gpgme-op-decrypt-result)
 gpgme-op-decrypt-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_decrypt_start" c-gpgme-op-decrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt" c-gpgme-op-decrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify_start" c-gpgme-op-decrypt-verify-start)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify" c-gpgme-op-decrypt-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

```

::: Signing.

```

(defctype gpgme-new-signature-t
 (:wrapper :pointer
 :from-c translate-gpgme-new-signature-t-from-foreign)
 "A new signature structure.")

```

```

(defcstruct gpgme-new-signature
 "New signature structure."
 (next gpgme-new-signature-t)
 (type gpgme-sig-mode-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t)
 (-obsolete-class :unsigned-long)
 (timestamp :long)
 (fpr :string)
 (-obsolete-class-2 :unsigned-int)
 (sig-class :unsigned-int))

```

```

(defcstruct gpgme-op-sign-result
 "Signing result structure."
 (invalid-signers gpgme-invalid-key-t)
 (signatures gpgme-new-signature-t))

```

```

(defctype gpgme-op-sign-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-sign-result-t-from-foreign)
 "A signing result structure.")

(defcfun ("gpgme_op_sign_result" c-gpgme-op-sign-result)
 gpgme-op-sign-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_sign_start" c-gpgme-op-sign-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

(defcfun ("gpgme_op_sign" c-gpgme-op-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

;;; Verify.

```

```

(defbitfield (gpgme-sigsum-t :unsigned-int)
 "Flags
 used for the summary field in a gpgme-signature-t."
 (:valid #x0001)
 (:green #x0002)
 (:red #x0004)
 (:key-revoked #x0010)
 (:key-expired #x0020)
 (:sig-expired #x0040)
 (:key-missing #x0080)
 (:crl-missing #x0100)
 (:crl-too-old #x0200)
 (:bad-policy #x0400)
 (:sys-error #x0800)
 (:tofu-conflict #x1000))

```

```

(defctype gpgme-signature-t
 (:wrapper :pointer
 :from-c translate-gpgme-signature-t-from-foreign)
 "A signature structure.")

```

```

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-signature-bitfield :unsigned-int)
 "The signature bitfield."

```



(:wrong-key-usage 1)

(:pka-trust 2)

(:chain-model 4)

(:is-de-vs 8))

(defcstruct gpgme-signature

"Signature structure."

(next gpgme-signature-t)

(summary gpgme-sigsum-t)

(fpr :string)

(status gpgme-error-no-signal-t)

(notations gpgme-sig-notation-t)

(timestamp :unsigned-long)

(exp-timestamp :unsigned-long)

(bitfield gpgme-signature-bitfield)

(validity gpgme-validity-t)

(validity-reason

gpgme-error-no-signal-t)

(pubkey-algo gpgme-pubkey-algo-t)

(hash-algo gpgme-hash-algo-t))

(defcstruct gpgme-op-verify-result

"Verify result structure."

(signatures gpgme-signature-t)

(file-name :string))

(defctype gpgme-op-verify-result-t

(:wrapper :pointer

:from-c translate-gpgme-op-verify-result-t-from-foreign)

"A verify result structure.")

(defcfun ("gpgme\_op\_verify\_result" c-gpgme-op-verify-result)

gpgme-op-verify-result-t

(ctx gpgme-ctx-t))

(defcfun ("gpgme\_op\_verify\_start" c-gpgme-op-verify-start) gpgme-error-t

(ctx gpgme-ctx-t)

(sig gpgme-data-t)

(signed-text gpgme-data-t)

(plaintext gpgme-data-t))

(defcfun ("gpgme\_op\_verify" c-gpgme-op-verify) gpgme-error-t

(ctx gpgme-ctx-t)

(sig gpgme-data-t)

(signed-text gpgme-data-t)

(plaintext gpgme-data-t))

::: Import.

```

(defbitfield (gpgme-import-flags-t :unsigned-int)
 "Flags used for the import status field."
 (:new #x0001)
 (:uid #x0002)
 (:sig #x0004)
 (:subkey #x0008)
 (:secret
 #x0010))

(defctype gpgme-import-status-t
 (:wrapper :pointer
 :from-c translate-gpgme-import-status-t-from-foreign)
 "An import status structure.")

(defcstruct gpgme-import-status
 "New import status structure."
 (next gpgme-import-status-t)
 (fpr :string)
 (result gpgme-error-no-signal-t)
 (status :unsigned-int))

(defcstruct gpgme-op-import-result
 "Import result structure."
 (considered :int)
 (no-user-id :int)
 (imported :int)
 (imported-rsa :int)
 (unchanged :int)
 (new-user-ids :int)
 (new-sub-keys :int)
 (new-signatures :int)
 (new-revocations :int)
 (secret-read :int)
 (secret-imported :int)
 (secret-unchanged :int)
 (skipped-new-keys :int)
 (not-imported :int)
 (imports gpgme-import-status-t))

(defctype gpgme-op-import-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-import-result-t-from-foreign)
 "An import status result structure.")

(defcfun ("gpgme_op_import_result" c-gpgme-op-import-result)
 gpgme-op-import-result-t

```

```

(ctx gpgme-ctx-t)

(defcfun ("gpgme_op_import_start" c-gpgme-op-import-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_import" c-gpgme-op-import) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

;;; Export.

(defcfun ("gpgme_op_export_start" c-gpgme-op-export-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_export" c-gpgme-op-export) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

;;; FIXME: Extended export interfaces require array handling.

;;; Key generation.

(defbitfield (gpgme-genkey-flags-t :unsigned-int)
 "Flags used for the key generation result bitfield."
 (:primary #x0001)
 (:sub #x0002)
 (:uid #x0004))

(defcstruct gpgme-op-genkey-result
 "Key generation result structure."
 (bitfield gpgme-genkey-flags-t)
 (fpr :string))

(defctype gpgme-op-genkey-result-t :pointer
 "A
 key generation result structure.")

(defcfun ("gpgme_op_genkey_result" c-gpgme-op-genkey-result)
 gpgme-op-genkey-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_genkey_start" c-gpgme-op-genkey-start) gpgme-error-t

```

```
(ctx gpgme-ctx-t)
(parms :string)
(pubkey gpgme-data-t)
(seckey gpgme-data-t))
```

```
(defcfun ("gpgme_op_genkey" c-gpgme-op-genkey) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))
```

::: Key deletion.

```
(defcfun ("gpgme_op_delete_start" c-gpgme-op-delete-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))
```

```
(defcfun ("gpgme_op_delete" c-gpgme-op-delete) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))
```

::: FIXME: Add edit interfaces.

::: Keylist interface.

```
(defbitfield (gpgme-keylist-flags-t :unsigned-int)
 "Flags used for the key listing result bitfield."
 (:truncated #x0001))
```

```
(defcstruct gpgme-op-keylist-result
 "Key listing result structure."
 (bitfield
 gpgme-keylist-flags-t))
```

```
(defctype gpgme-op-keylist-result-t :pointer
 "A key listing result structure.")
```

```
(defcfun ("gpgme_op_keylist_result" c-gpgme-op-keylist-result)
 gpgme-op-keylist-result-t
 (ctx gpgme-ctx-t))
```

```
(defcfun ("gpgme_op_keylist_start" c-gpgme-op-keylist-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (secret_only :boolean))
```

;;; FIXME: Extended keylisting requires array handling.

```
(defcfun ("gpgme_op_keylist_next" c-gpgme-op-keylist-next) gpgme-error-t
 (ctx gpgme-ctx-t)
 (r-key :pointer))
```

```
(defcfun ("gpgme_op_keylist_end" c-gpgme-op-keylist-end) gpgme-error-t
 (ctx gpgme-ctx-t))
```

;;; Various functions.

```
(defcfun ("gpgme_check_version" c-gpgme-check-version) :string
 (req-version string-or-nil-t))
```

```
(defcfun ("gpgme_get_engine_info" c-gpgme-get-engine-info) gpgme-error-t
 (engine-info-p :pointer))
```

```
(defcfun ("gpgme_set_engine_info" c-gpgme-set-engine-info) gpgme-error-t
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir
 string-or-nil-t))
```

```
(defcfun ("gpgme_engine_check_version" c-gpgme-engine-check-version)
 gpgme-error-t
 (proto gpgme-protocol-t))
```

;;;

;;; L I S P I N T E R F A C E

;;;

;;;

;;; Lisp type translators.

;;;

;;; Both directions.

;;; cert-int-t is a helper type that takes care of representing the  
;;; default number of certs as NIL.

```
(defun translate-cert-int-t-from-foreign (value)
 (cond
 ((eql value +include-certs-default+) nil)
 (t value)))
```

```
(defun translate-cert-int-t-to-foreign (value)
 (cond
 (value value)))
```

```
(t +include-certs-default+)))
```

```
;;; string-or-nil-t translates a null pointer to NIL and vice versa.
;;; Translation from foreign null pointer already works as expected.
```

```
(defun translate-string-or-nil-t-to-foreign (value)
 (cond
 (value value)
 (t (null-pointer))))))
```

```
;;; Output only.
```

```
;;; These type translators only convert from foreign type, because we
;;; never use these types in the other direction.
```

```
;;; Convert gpgme-engine-info-t linked lists into a
list of property
;;; lists. Note that this converter will automatically be invoked
;;; recursively.
;;;
;;; FIXME: Should we use a hash table (or struct, or clos) instead of
;;; property list, as recommended by the Lisp FAQ?
```

```
(defun translate-gpgme-engine-info-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next protocol file-name version req-version home-dir)
 value (:struct gpgme-engine-info))
 (append (list protocol (list
 :file-name file-name
 :version version
 :req-version req-version
 :home-dir home-dir))
 next))))))
```

```
(defun translate-gpgme-invalid-key-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next fpr reason)
 value (:struct gpgme-invalid-key))
 (append (list (list :fpr fpr
 :reason reason))
 next))))))
```

```
(defun translate-gpgme-op-encrypt-result-t-from-foreign (value)
 (cond
```

```

(null-pointer-p value) nil)
(t (with-foreign-slots

((invalid-recipients)
 value (:struct gpgme-op-encrypt-result))
(list :encrypt
 (list :invalid-recipients invalid-recipients))))))

(defun translate-gpgme-recipient-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next keyid pubkey-algo status)
 value (:struct gpgme-recipient))
 (append (list (list :keyid keyid
 :pubkey-algo pubkey-algo
 :status status))
 next))))))

(defun translate-gpgme-op-decrypt-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((unsupported-algorithm bitfield recipients file-name)
 value (:struct gpgme-op-decrypt-result))
 (list :decrypt (list :unsupported-algorithm unsupported-algorithm
 :bitfield bitfield
 :recipients recipients
 :file-name file-name))))))

(defun translate-gpgme-new-signature-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next
 type pubkey-algo hash-algo timestamp fpr sig-class)
 value (:struct gpgme-new-signature))
 (append (list (list :type type
 :pubkey-algo pubkey-algo
 :hash-algo hash-algo
 :timestamp timestamp
 :fpr fpr
 :sig-class sig-class))
 next))))))

(defun translate-gpgme-op-sign-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)

```

```
(t (with-foreign-slots
 ((invalid-signers signatures)
 value (:struct gpgme-op-sign-result))
 (list :sign (list :invalid-signers invalid-signers
 :signatures signatures))))))
```

```
(defun translate-gpgme-signature-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next summary fpr status notations timestamp
 exp-timestamp bitfield validity validity-reason
 pubkey-algo hash-algo)
 value (:struct gpgme-signature))
 (append (list (list :summary summary
 :fpr fpr
 :status status
 :notations notations
 :timestamp timestamp

 :exp-timestamp exp-timestamp
 :bitfield bitfield
 :validity validity
 :validity-reason validity-reason
 :pubkey-algo pubkey-algo))
 next))))))
```

```
(defun translate-gpgme-op-verify-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((signatures file-name)
 value (:struct gpgme-op-verify-result))
 (list :verify (list :signatures signatures
 :file-name file-name))))))
```

```
(defun translate-gpgme-import-status-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next fpr result status)
 value (:struct gpgme-import-status))
 (append (list (list :fpr fpr
 :result result
 :status status))
 next))))))
```

```
(defun translate-gpgme-op-import-result-t-from-foreign (value)
```



```

(cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((considered no-user-id imported imported-rsa unchanged
 new-user-ids new-sub-keys new-signatures
 new-revocations
 secret-read secret-imported
 secret-unchanged skipped-new-keys not-imported
 imports)
 value (:struct gpgme-op-import-result))
 (list :verify (list :considered considered
 :no-user-id no-user-id
 :imported imported
 :imported-rsa imported-rsa
 :unchanged unchanged
 :new-user-ids new-user-ids
 :new-sub-keys new-sub-keys
 :new-signatures new-signatures
 :new-revocations new-revocations
 :secret-read secret-read
 :secret-imported secret-imported
 :secret-unchanged secret-unchanged
 :skipped-new-keys skipped-new-keys
 :not-imported not-imported
 :imports imports)))))))

;;; Error handling.

;;; Use gpgme-error-no-signal-t to suppress automatic error handling
;;; at translation time.
;;;
;;; FIXME: Part of this probably should be in gpg-error!

(define-condition gpgme-error (error)
 ((value :initarg :gpgme-error :reader gpgme-error-value))
 (:report (lambda (c stream)

 (format stream "GPGME returned error: ~A (~A)"
 (gpgme-strerror (gpgme-error-value c))
 (gpgme-strsource (gpgme-error-value c))))
 (:documentation "Signalled when a GPGME function returns an error.")))

(defun translate-gpgme-error-t-from-foreign (value)
 "Raise a GPGME-ERROR if VALUE is non-zero."
 (when (not (eql (gpgme-err-code value) :gpg-err-no-error))
 (error 'gpgme-error :gpgme-error value))
 (gpg-err-canonicalize value))

```

```

(defun translate-gpgme-error-t-to-foreign (value)
 "Canonicalize the error value."
 (if (eql (gpgme-err-code value) :gpg-err-no-error)
 0
 (gpg-err-as-value value)))

(defun translate-gpgme-error-no-signal-t-from-foreign (value)
 "Canonicalize the error value."
 (gpg-err-canonicalize value))

;;; *INTERNAL* Lispy Function Interface that is still close to the C
;;; interface.

;;; Passphrase callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.

(defvar
 passphrase-handles (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
 passphrase callback object as value.")

(defcallback passphrase-cb gpgme-error-t ((handle :pointer)
 (uid-hint :string)
 (passphrase-info :string)
 (prev-was-bad :boolean)
 (fd :int))
 (handler-case
 (let* ((passphrase-cb
 (gethash (pointer-address handle) *passphrase-handles*))
 (passphrase
 (cond
 ((functionp passphrase-cb)
 (concatenate 'string
 (funcall passphrase-cb uid-hint passphrase-info
 prev-was-bad)
 '(\Newline))))
 (t (concatenate 'string passphrase-cb '(\Newline))))
 (passphrase-len (length passphrase))
 ;; FIXME: Could be more robust.
 (res (system-write fd passphrase passphrase-len)))
 (cond
 ((< res passphrase-len) ; FIXME: Blech. A weak attempt to be robust.
 (gpgme-error :gpg-err-ival))
 (t (gpgme-error :gpg-err-no-error))))
 (gpgme-error (err)

```

```
(gpgme-error-value err))
(system-error (err) (gpgme-error-from-errno (system-error-errno err)))
;; FIXME: The original error gets lost here.
(condition (err) (progn
 (when *debug*
 (format t "DEBUG: passphrase-cb: Unexpressable: ~A~%"
 err))
 (gpgme-error :gpg-err-general))))))
```

;;; CTX is a C-pointer to the context.

```
(defun gpgme-set-passphrase-cb (ctx cb)
 "Set the passphrase callback for CTX."
 (let ((handle (pointer-address ctx)))
 (cond
 (cb (setf (gethash handle *passphrase-handles*) cb)
 (c-gpgme-set-passphrase-cb ctx (callback passphrase-cb) ctx))
 (t (c-gpgme-set-passphrase-cb ctx (null-pointer) (null-pointer))
 (remhash handle *passphrase-handles*))))))
```

;;; Progress callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable  
 ;;; default implementation for ease-of-use.

```
(defvar *progress-handles* (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding

 progress callback

 object as value.")
```

```
(defcallback progress-cb :void ((handle :pointer)
 (what :string)
 (type :int)
 (current :int)
 (total :int))
 (handler-case
 (let* ((progress-cb
 (gethash (pointer-address handle) *progress-handles*)))
 (funcall progress-cb what type current total))
 ;; FIXME: The original error gets lost here.
 (condition (err) (when *debug*
 (format t "DEBUG: progress-cb: Unexpressable: ~A~%"
 err))))))
```

;;; CTX is a C-pointer to the context.

```
(defun gpgme-set-progress-cb (ctx cb)
 "Set the progress callback for CTX."
 (let ((handle (pointer-address ctx)))
 (cond
```

```

(cb (setf (gethash handle *progress-handles*) cb)
 (c-gpgme-set-progress-cb ctx (callback progress-cb) ctx))
(t (c-gpgme-set-progress-cb ctx (null-pointer) (null-pointer))
 (remhash handle *progress-handles*))))

```

;;; Context management.

```

(defun gpgme-new (&key (protocol :openpgp) armor textmode include-certs
 keylist-mode passphrase progress file-name
 home-dir)
 "Allocate a new GPGME context."
 (with-foreign-object (ctx-p 'gpgme-ctx-t)
 (c-gpgme-new ctx-p)
 (let ((ctx (mem-ref ctx-p 'gpgme-ctx-t)))
 ;;; Set locale?
 (gpgme-set-protocol ctx protocol)
 (gpgme-set-armor ctx armor)
 (gpgme-set-textmode ctx textmode)
 (when include-certs (gpgme-set-include-certs ctx include-certs))
 (when keylist-mode (gpgme-set-keylist-mode ctx keylist-mode))
 (gpgme-set-passphrase-cb ctx passphrase)
 (gpgme-set-progress-cb ctx progress)
 (gpgme-set-engine-info ctx protocol
 :file-name file-name :home-dir home-dir)
 (when *debug* (format t "DEBUG: gpgme-new: ~A~%" ctx)
 ctx)))

```

```

(defun gpgme-release (ctx)
 "Release a GPGME context."
 (when *debug* (format t "DEBUG: gpgme-release: ~A~%" ctx))
 (c-gpgme-release ctx))

```

```

(defun gpgme-set-protocol (ctx proto)
 "Set the protocol to be used by CTX to PROTO."
 (c-gpgme-set-protocol ctx proto))

```

```

(defun gpgme-get-protocol (ctx)
 "Get
 the protocol used with CTX."
 (c-gpgme-get-protocol ctx))

```

```

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme-get-protocol-name

```

```

(defun gpgme-set-armor (ctx armor)
 "If ARMOR is true, enable armor mode in CTX, disable it otherwise."
 (c-gpgme-set-armor ctx armor))

```

```

(defun gpgme-armor-p (ctx)
 "Return true if armor mode is set for CTX."
 (c-gpgme-get-armor ctx))

(defun gpgme-set-textmode (ctx textmode)
 "If TEXTMODE is true, enable text mode mode in CTX, disable it otherwise."
 (c-gpgme-set-textmode ctx textmode))

(defun gpgme-textmode-p (ctx)
 "Return true if text mode mode is set for CTX."
 (c-gpgme-get-textmode ctx))

(defun gpgme-set-include-certs (ctx &optional certs)
 "Include up to CERTS certificates in an S/MIME message."
 (c-gpgme-set-include-certs ctx certs))

(defun gpgme-get-include-certs (ctx)
 "Return the number of certs to include in an S/MIME message,
 or NIL if the default is used."
 (c-gpgme-get-include-certs ctx))

(defun gpgme-get-keylist-mode (ctx)
 "Get the keylist mode in CTX."
 (c-gpgme-get-keylist-mode ctx))

(defun gpgme-set-keylist-mode (ctx mode)
 "Set the keylist mode in CTX."
 (c-gpgme-set-keylist-mode ctx mode))

;;; FIXME: How to handle locale? cffi-grovel?

(defun gpgme-get-engine-info (&optional ctx)
 "Retrieve the engine info for CTX, or the default if CTX is omitted."
 (cond
 (ctx (c-gpgme-ctx-get-engine-info ctx))
 (t (with-foreign-object (info-p 'gpgme-engine-info-t)
 (c-gpgme-get-engine-info info-p)
 (mem-ref info-p 'gpgme-engine-info-t))))))

(defun gpgme-set-engine-info (ctx proto &key file-name home-dir)
 "Set the engine info for CTX, or the default if CTX is NIL."
 (cond
 (ctx (c-gpgme-ctx-set-engine-info ctx proto file-name home-dir))
 (t (c-gpgme-set-engine-info proto file-name home-dir))))

;;; FIXME: How to do pretty printing?

```

```

;;;
;;; gpgme_pubkey_algo_name, gpgme_hash_algo_name

(defun gpgme-set-signers (ctx keys)
 "Set the signers for the context CTX."
 (c-gpgme-signers-clear ctx)
 (dolist (key keys) (c-gpgme-signers-add ctx key)))

;;;

(defun gpgme-set-sig-notation (ctx notations)
 "Set the sig notation for the context CTX."
 (c-gpgme-sig-notation-clear ctx)
 (dolist (notation notations)
 (c-gpgme-sig-notation-add
 ctx (first notation) (second notation) (third notation))))

(defun gpgme-get-sig-notation (ctx)
 "Get the signature notation data for the context CTX."
 (c-gpgme-sig-notation-get ctx))

;;; FIXME: Add I/O callback interface, for integration with clg.

;;; FIXME: Add gpgme_wait?

;;; Streams
;;; -----
;;;
;;; GPGME uses standard streams. You can define your own streams, or
;;; use the existing file or string streams.
;;;
;;; A stream-spec is either a stream, or a list with a stream as its
;;; first argument followed by keyword parameters: encoding,
;;; file-name.
;;;
;;; FIXME: Eventually, we should provide a class that can be mixed
;;; into stream classes and which provides accessors for encoding and
;;; file-names. This interface
;;; should be provided in addition to the
;;; above sleazy interface, because the sleazy interface is easier to
;;; use (less typing), and is quite sufficient in a number of cases.
;;;
;;; For best results, streams with element type (unsigned-byte 8)
;;; should be used. Character streams may work if armor mode is used.

;;; Do we need to provide access to GPGME data objects through streams
;;; as well? It seems to me that specific optimizations, like
;;; directly writing to file descriptors, is better done by extending

```

;;; the sleazy syntax (stream-spec) instead of customized streams.  
;;; Customized streams do buffering, and this may mess up things. Mmh.

```
(defvar *data-handles* (make-hash-table)
 "Hash table with GPGME data user callback handle address as key
 and the corresponding stream as value.")

;;; The release callback removes the stream from the *data-handles*
;;; hash and releases the CBS structure that is used as the key in
;;; that hash. It is implicitly invoked (through
GPGME) by
;;; gpgme-data-release.
(defcallback data-release-cb :void ((handle :pointer))
 (unwind-protect (remhash (pointer-address handle) *data-handles*)
 (when (not (null-pointer-p handle)) (foreign-free handle))))

(defcallback data-read-cb ssize-t ((handle :pointer) (buffer :pointer)
 (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-read-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
 (cond
 (stream
 (let* ((stream-type (stream-element-type stream))
 (seq (make-array size :element-type stream-type))
 (read (read-sequence seq stream)))
 (cond
 ((equal stream-type '(unsigned-byte 8))
 (dotimes (i read)
 (setf (mem-aref buffer :unsigned-char i)
 (aref (the byte-array seq) i))))
 ((eql stream-type 'character)
 (dotimes (i read)
 (setf (mem-aref buffer :unsigned-char
 i)
 (char-code (aref (the character-array seq) i))))))
 (t
 (dotimes (i read)
 (setf (mem-aref buffer :unsigned-char i)
 (coerce (aref seq i) '(unsigned-byte 8))))))
 (when *debug* (format t "DEBUG: gpgme-data-read-cb: read ~A~%" read))
 read))
 (t
 (set-errno +ebadf+
 -1))))

(defcallback data-write-cb ssize-t ((handle :pointer) (buffer :pointer)
 (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-write-cb: want ~A~%" size))
```

```

(let ((stream (gethash (pointer-address handle) *data-handles*)))
 (cond
 (stream
 (let* ((stream-type (stream-element-type stream))
 (seq (make-array size :element-type stream-type)))
 (cond
 ((equal stream-type '(unsigned-byte 8))
 (dotimes (i size)
 (setf (aref (the byte-array seq) i)
 (mem-aref buffer :unsigned-char i))))
 ((eql stream-type 'character)
 (dotimes (i size)
 (setf (aref (the character-array seq) i)
 (code-char (mem-aref buffer :unsigned-char i)))))
 (t
 (dotimes (i size)
 (setf (aref seq i)
 (coerce (mem-aref buffer :unsigned-char i) stream-type))))))
 (write-sequence seq stream)
 size))
 (t
 (set-errno +ebadf+
 -1))))

```

;;; This little helper macro allows us to swallow the cbs structure by  
 ;;; simply setting it to a null pointer, but still protect against  
 ;;; conditions.

```

(defmacro with-cbs-swallowed ((cbs) &body body)
 `(let ((,cbs (foreign-alloc '(:struct gpgme-data-cbs))))
 (unwind-protect (progn ,@body)
 (when (not (null-pointer-p ,cbs)) (foreign-free ,cbs))))

```

```

(defun gpgme-data-new (stream &key encoding file-name)
 "Allocate a new GPGME data object for STREAM."
 (with-foreign-object (dh-p 'gpgme-data-t)
 ;; We allocate one CBS structure
 for each stream we wrap in a
 ;; data object. Although we could also share all these
 ;; structures, as they contain the very same callbacks, we need a
 ;; unique C pointer as handle anyway to look up the stream in the
 ;; callback. This is a convenient one to use.

```

```

(with-cbs-swallowed (cbs)
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'read)
 (callback data-read-cb))
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'write)
 (callback data-write-cb))
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'seek)
 (null-pointer))

```



```

(setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'release)
 (callback data-release-cb))
(c-gpgme-data-new-from-cbs dh-p cbs cbs)
(let ((dh (mem-ref dh-p 'gpgme-data-t)))
 (when encoding (gpgme-data-set-encoding dh encoding))
 (when file-name (gpgme-data-set-file-name dh file-name))
 ;; Install the stream into the hash table and
 swallow the cbs
 ;; structure while protecting against any errors.
 (unwind-protect
 (progn
 (setf (gethash (pointer-address cbs) *data-handles*) stream)
 (setf cbs (null-pointer))))
 (when (not (null-pointer-p cbs)) (c-gpgme-data-release dh))
 (when *debug* (format t "DEBUG: gpgme-data-new: ~A~%" dh)
 dh))))

;; This function releases a GPGME data object. It implicitly
;; invokes the data-release-cb function to clean up associated junk.
(defun gpgme-data-release (dh)
 "Release a GPGME data object."
 (when *debug* (format t "DEBUG: gpgme-data-release: ~A~%" dh)
 dh))
(c-gpgme-data-release dh))

(defclass data ()
 (c-data) ; The C data object pointer
 (:documentation "The GPGME data type.))

(defmethod initialize-instance :after ((data data) &key streamspec
 &allow-other-keys)
 (let ((c-data (if (listp streamspec)
 (apply #'gpgme-data-new streamspec)
 (gpgme-data-new streamspec)))
 (cleanup t))
 (unwind-protect
 (progn
 (setf (slot-value data 'c-data) c-data)
 (finalize data (lambda () (gpgme-data-release c-data)))
 (setf cleanup nil))
 (if cleanup (gpgme-data-release c-data))))))

(defun translate-gpgme-data-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (cond
 ((null value) (null-pointer))
 ((pointerp value) value)
 (t (slot-value value 'c-data))))

```

```

(defmacro with-gpgme-data ((dh streamspec) &body body)
 `(let ((,dh (make-instance 'data :streamspec ,streamspec)))
 ,@body))

(defun gpgme-data-get-encoding (dh)
 "Get the encoding associated with the data object DH."
 (c-gpgme-data-get-encoding dh))

(defun gpgme-data-set-encoding (dh encoding)
 "Set the encoding associated with the data object DH to ENCODING."
 (c-gpgme-data-set-encoding dh encoding))

(defun gpgme-data-get-file-name (dh)
 "Get the file name associated with the data object
 DH."
 (c-gpgme-data-get-file-name dh))

(defun gpgme-data-set-file-name (dh file-name)
 "Set the file name associated with the data object DH to FILE-NAME."
 (c-gpgme-data-set-file-name dh file-name))

;;; FIXME: Add key accessor interfaces.

(defun gpgme-get-key (ctx fpr &optional secret)
 "Get the key with the fingerprint FPR from the context CTX."
 (with-foreign-object (key-p 'gpgme-key-t)
 (c-gpgme-get-key ctx fpr key-p secret)
 (mem-ref key-p 'gpgme-key-t)))

(defun gpgme-key-ref (key)
 "Acquire an additional reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-ref: ~A~%" key))
 (c-gpgme-key-ref key))

(defun gpgme-key-unref (key)
 "Release a reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-unref: ~A~%" key))
 (c-gpgme-key-unref key))

;;; FIXME: We REALLY need pretty printing for keys and all the other
;;; big structs.

;;; Various interfaces.

(defun gpgme-check-version (&optional req-version)
 (c-gpgme-check-version req-version))

;;;

```

```

;;;
The *EXPORTED* CLOS interface.
;;;

;;; The context type.

;;; We wrap the C context pointer into a class object to be able to
;;; stick a finalizer on it.

(defclass context ()
 (c-ctx ; The C context object pointer.
 signers ; The list of signers.
 sig-notation) ; The list of signers.
 (:documentation "The GPGME context type.))

(defmethod initialize-instance :after ((ctx context) &rest rest
 &key &allow-other-keys)
 (let ((c-ctx (apply #'gpgme-new rest))
 (cleanup t))
 (unwind-protect
 (progn (setf (slot-value ctx 'c-ctx) c-ctx)
 (finalize ctx (lambda () (gpgme-release c-ctx))))
 (setf cleanup nil))
 (if cleanup (gpgme-release c-ctx))))

(defun translate-gpgme-ctx-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-ctx)))

(defmacro context (&rest rest)
 "Create a new GPGME context."
 `(make-instance 'context ,@rest))

;;; The context type: Accessor
functions.

;;; The context type: Accessor functions: Protocol.

(defgeneric protocol (ctx)
 (:documentation "Get the protocol of CONTEXT.))

(defmethod protocol ((ctx context))
 (gpgme-get-protocol ctx))

(defgeneric (setf protocol) (protocol ctx)
 (:documentation "Set the protocol of CONTEXT to PROTOCOL.))

;;; FIXME: Adjust translator to reject invalid protocols. Currently,

```

```
;;; specifying an invalid protocol throws a "NIL is not 32 signed int"
;;; error. This is suboptimal.
(defmethod (setf protocol) (protocol (ctx context))
 (gpgme-set-protocol ctx protocol))
```

```
;;; The context type: Accessor functions: Armor.
;;; FIXME: Is it good style to make foop setf-able? Or should it be
;;; foo/foop for set/get?
```

```
(defgeneric armorp (ctx)
 (:documentation "Get the armor flag of CONTEXT."))
```

```
(defmethod armorp ((ctx context))
 (gpgme-armor-p ctx))
```

```
(defgeneric (setf armorp) (armor ctx)
 (:documentation "Set the armor flag of CONTEXT to ARMOR."))
```

```
(defmethod (setf armorp) (armor (ctx
 context))
 (gpgme-set-armor ctx armor))
```

```
;;; The context type: Accessor functions: Textmode.
;;; FIXME: Is it good style to make foop setf-able? Or should it be
;;; foo/foop for set/get?
```

```
(defgeneric textmodep (ctx)
 (:documentation "Get the text mode flag of CONTEXT."))
```

```
(defmethod textmodep ((ctx context))
 (gpgme-textmode-p ctx))
```

```
(defgeneric (setf textmodep) (textmode ctx)
 (:documentation "Set the text mode flag of CONTEXT to TEXTMODE."))
```

```
(defmethod (setf textmodep) (textmode (ctx context))
 (gpgme-set-textmode ctx textmode))
```

```
;;; The context type: Accessor functions: Include Certs.
```

```
(defgeneric include-certs (ctx)
 (:documentation "Get the number of included certificates in an
 S/MIME message, or NIL if the default is used."))
```

```
(defmethod include-certs ((ctx context))
 (gpgme-get-include-certs ctx))
```

```
(defgeneric (setf include-certs) (certs ctx)
```

```
(:documentation "Return the number of certificates to include in an
 S/MIME message, or
NIL if the default is used."))
```

```
(defmethod (setf include-certs) (certs (ctx context))
 (gpgme-set-include-certs ctx certs))
```

::: The context type: Accessor functions: Engine info.

```
(defgeneric engine-info (ctx)
 (:documentation "Retrieve the engine info for CTX."))
```

```
(defmethod engine-info ((ctx context))
 (gpgme-get-engine-info ctx))
```

```
(defgeneric (setf engine-info) (info ctx)
 (:documentation "Set the engine info for CTX."))
```

```
(defmethod (setf engine-info) (info (ctx context))
 (dolist (proto '(:openpgp :cms))
 (let ((pinfo (getf info proto)))
 (when pinfo
 (gpgme-set-engine-info ctx proto :file-name (getf pinfo :file-name)
 :home-dir (getf pinfo :home-dir)))))))
```

::: The context type: Accessor functions: Keylist mode.

```
(defgeneric keylist-mode (ctx)
 (:documentation "Get the keylist mode of CTX."))
```

```
(defmethod keylist-mode ((ctx context))
 (gpgme-get-keylist-mode ctx))
```

```
(defgeneric (setf keylist-mode) (mode ctx)
 (:documentation "Set the keylist mode of CTX to MODE."))
```

```
(defmethod
 (setf keylist-mode) (mode (ctx context))
 (gpgme-set-keylist-mode ctx mode))
```

::: The context type: Accessor functions: Signers.

```
(defgeneric signers (ctx)
 (:documentation "Get the signers of CTX."))
```

```
(defmethod signers ((ctx context))
 (slot-value ctx 'signers))
```

```
(defgeneric (setf signers) (signers ctx)
 (:documentation "Set the signers of CTX to SIGNERS."))
```

```
(defmethod (setf keylist-mode) (signers (ctx context))
 (gpgme-set-signers ctx signers)
 (setf (slot-value ctx 'signers) signers))
```

;;; The context type: Accessor functions: Sig notations.

```
(defgeneric sig-notations (ctx)
 (:documentation "Get the signature notations of CTX."))
```

```
(defmethod sig-notations ((ctx context))
 (slot-value ctx 'signers))
```

```
(defgeneric (setf sig-notations) (notations ctx)
 (:documentation "Set the signature notations of CTX to NOTATIONS."))
```

```
(defmethod (setf sig-notations) (notations (ctx context))
 (gpgme-set-signers ctx notations)
 (setf (slot-value ctx 'notations) notations))
```

;;;

The context type: Support macros.

```
(defmacro with-context ((ctx &rest rest) &body body)
 `(let ((,ctx (make-instance 'context ,@rest)))
 ,@body))
```

;;; The key type.

```
(defclass key ()
 (c-key) ; The C key object pointer.
 (:documentation "The GPGME key type."))
```

;;; In the initializer, we swallow the c-key argument.

```
(defmethod initialize-instance :after ((key key) &key c-key
 &allow-other-keys)
 (setf (slot-value key 'c-key) c-key)
 (finalize key (lambda () (gpgme-key-unref c-key))))
```

```
(defun translate-gpgme-key-t-from-foreign (value)
 (when *debug* (format t "DEBUG: import key: ~A~%" value))
 (make-instance 'key :c-key value))
```

```
(defun translate-gpgme-key-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-key)))
```

```
(defmethod print-object ((key key) stream)
 (print-unreadable-object (key stream :type t :identity t)
 (format stream "~s" (fpr key))))
```

;;; The key type:

Accessor functions.

;;; FIXME: The bitfield and flags contain redundant information at  
;;; this point. FIXME: Deal nicer with zero-length name (policy url)  
;;; and zero length value (omit?) and human-readable (convert to string).  
;;; FIXME: Turn binary data into sequence or vector or what it should be.  
;;; FIXME: Turn the whole thing into a hash?

```
(defun translate-gpgme-sig-notation-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next name value name-len value-len flags bitfield)
 value (:struct gpgme-sig-notation))
 (append (list (list
 :name name
 :value value
 :name-len name-len
 :value-len value-len
 :flags flags
 :bitfield bitfield))
 next))))))
```

;;; FIXME: Deal nicer with timestamps. bitfield field name?

```
(defun translate-gpgme-subkey-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next bitfield pubkey-algo length keyid fpr timestamp expires)
 value (:struct gpgme-subkey))
```

```
 (append (list (list
 :bitfield bitfield
 :pubkey-algo pubkey-algo
 :length length
 :keyid keyid
 :fpr fpr
 :timestamp timestamp
 :expires expires))
 next))))))
```

```
(defun translate-gpgme-key-sig-t-from-foreign (value)
```

```
(cond
```

```

(null-pointer-p value) nil)
(t (with-foreign-slots
 ((next bitfield pubkey-algo keyid timestamp expires status
 uid name email comment sig-class)
 value (:struct gpgme-key-sig))
(append (list (list
:bitfield bitfield
:pubkey-algo pubkey-algo
:keyid keyid
:timestamp timestamp
:expires expires
:status status
:uid uid
:name name
:email email
:comment comment
:sig-class sig-class))
next))))))

```

```

(defun translate-gpgme-user-id-t-from-foreign (value)
(cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next bitfield validity uid name email comment signatures)
 value (:struct gpgme-user-id))
(append (list (list
:bitfield bitfield
:validity validity
:uid uid
:name
name
:email email
:comment comment
:signatures signatures))
next))))))

```

```

(defun key-data (key)
(with-slots (c-key) key
 (with-foreign-slots
 ((bitfield protocol issuer-serial issuer-name chain-id
 owner-trust subkeys uids keylist-mode)
 c-key (:struct gpgme-key))
(list
 :bitfield bitfield
 :protocol protocol
 :issuer-serial issuer-serial
 :issuer-name issuer-name
 :chain-id chain-id

```



```
:owner-trust owner-trust
:subkeys subkeys
:uids uids
:keylist-mode keylist-mode))
))
```

```
(defgeneric fpr (key)
(:documentation "Get the primary fingerprint of the key."))
```

```
(defmethod fpr ((key key))
(getf (car (getf (key-data key) :subkeys)) :fpr))
```

```
;;; The context type: Crypto-Operations.
```

```
(defgeneric get-key (ctx fpr &optional secret)
(:documentation "Get the (secret) key FPR from CTX."))
```

```
(defmethod get-key ((ctx context) fpr &optional secret)
(gpgme-get-key ctx fpr secret))
```

```
;;; Encrypt.
```

```
(defgeneric
op-encrypt (ctx recp plain cipher &key always-trust sign)
(:documentation "Encrypt."))
```

```
(defmethod op-encrypt ((ctx context) recp plain cipher
&key always-trust sign)
(with-foreign-object (c-recp :pointer (+ 1 (length recp)))
(dotimes (i (length recp))
(setf (mem-aref c-recp 'gpgme-key-t i) (elt recp i)))
(setf (mem-aref c-recp :pointer (length recp)) (null-pointer))
(with-gpgme-data (in plain)
(with-gpgme-data (out cipher)
(let ((flags))
(if always-trust (push :always-trust flags))
(cond
(sign
(c-gpgme-op-encrypt-sign ctx c-recp flags in out)
(append (c-gpgme-op-encrypt-result ctx)
(c-gpgme-op-sign-result ctx)))
(t
(c-gpgme-op-encrypt ctx c-recp flags in out)
(c-gpgme-op-encrypt-result ctx))))))))))
```

```
;;; Decrypt.
```

```
(defgeneric op-decrypt (ctx cipher plain &key verify)
 (:documentation "Decrypt."))
```

```
(defmethod op-decrypt ((ctx context) cipher plain &key verify)
 (with-gpgme-data (in cipher)
 (with-gpgme-data
 (out plain)
 (cond
 (verify
 (c-gpgme-op-decrypt-verify ctx in out)
 (append (c-gpgme-op-decrypt-result ctx)
 (c-gpgme-op-verify-result ctx))))
 (t
 (c-gpgme-op-decrypt ctx in out)
 (c-gpgme-op-decrypt-result ctx))))))
```

;;; Signing.

```
(defgeneric op-sign (ctx plain sig &optional mode)
 (:documentation "Sign."))
```

```
(defmethod op-sign ((ctx context) plain sig &optional (mode :none))
 (with-gpgme-data (in plain)
 (with-gpgme-data (out sig)
 (c-gpgme-op-sign ctx in out mode)
 (c-gpgme-op-sign-result ctx))))
```

;;; Verify.

```
(defgeneric op-verify (ctx sig text &key detached)
 (:documentation "Verify."))
```

```
(defmethod op-verify ((ctx context) sig text &key detached)
 (with-gpgme-data (in sig)
 (with-gpgme-data (on text)
 (c-gpgme-op-verify ctx in (if detached on nil)
 (if detached nil on))
 (c-gpgme-op-verify-result ctx))))
```

;;; Import.

```
(defgeneric op-import (ctx keydata)
 (:documentation "Import."))
```

```
(defmethod op-import ((ctx context) keydata)
 (with-gpgme-data (in keydata)
 (c-gpgme-op-import ctx in))
```

```

(c-gpgme-op-import-result ctx)))

;;; Export.

(defgeneric op-export (ctx pattern keydata)
 (:documentation "Export public key data matching PATTERN to the
 stream KEYDATA."))

(defmethod op-export ((ctx context) pattern keydata)
 (with-gpgme-data (dh keydata)
 (c-gpgme-op-export ctx pattern 0 dh)))

;;; Key generation.

;;;
;;; Initialization
;;;

(defun check-version (&optional req-version)
 "Check that the GPGME version requirement is satisfied."
 (gpgme-check-version req-version))

(defparameter *version* (check-version)
 "The version number of GPGME used.")
#-*- mode: org -*-
#+TITLE: A Short History of the GPGME bindings for Python
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

* Overview
:PROPERTIES:
:CUSTOM_ID: overview
:END:

| Version: | 0.0.1 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |

```

The GPGME Python bindings passed through many hands and numerous phases before, after a fifteen year journey, coming full circle to

return to the source. This is a short explanation of that journey.

\*\* In the beginning

:PROPERTIES:  
:CUSTOM\_ID: in-the-beginning  
:END:

In 2002 John Goerzen released PyME; Python bindings for the GPGME module which utilised the current release of Python of the time and SWIG.<sup>[fn:1]</sup> Shortly after creating it and ensuring it worked he stopped supporting it, though he left his work available on his Gopher site.

\*\* Keeping the flame alive

:PROPERTIES:  
:CUSTOM\_ID: keeping-the-flame-alive  
:END:

A couple of years later the project was picked up by Igor Belyi and actively developed and maintained by him from 2004 to 2008. Igor's whereabouts at the time of this document's creation are unknown, but the current authors do hope he is well. We're assuming (or hoping) that life did what life does and made continuing untenable.

\*\* Passing the torch

:PROPERTIES:  
:CUSTOM\_ID: passing-the-torch  
:END:

In 2014 Martin Albrecht wanted to patch a bug in the PyME code and discovered the absence of Igor. Following a discussion on the PyME mailing list he became the new maintainer for PyME, releasing version 0.9.0 in May of that year. He remains the maintainer of the original PyME release in Python 2.6 and 2.7 (available via PyPI).

\*\* Coming full circle

:PROPERTIES:  
:CUSTOM\_ID: ouroboros  
:END:

In 2015 Ben McGinnes approached Martin about a Python 3 version, while investigating how complex a task this would be the task ended up being completed. A subsequent discussion with Werner Koch led

to the decision to fold the Python 3 port back into the original GPGME release in the languages subdirectory for non-C bindings under the module name of =pyme3=.

In 2016 this PyME module was integrated back into the GPGME project by Justus Winter. During the course of this work Justus adjusted the port to restore limited support for Python 2, but not as many minor point releases as the original PyME package supports. During the course of this integration the package was renamed to more accurately reflect its status as a component of GPGME. The =pyme3= module was renamed to =gpg= and adopted by the upstream GnuPG team.

In 2017 Justus departed G10code and the GnuPG team. Following this Ben returned to maintain of gpgme Python bindings and continue building them from that point.

\* Relics of the past

:PROPERTIES:

:CUSTOM\_ID: relics-past

:END:

There are a few things, in addition to code specific factors, such as SWIG itself, which are worth noting here.

\*\* The Annoyances of Git

:PROPERTIES:

:CUSTOM\_ID: the-annoyances-of-git

:END:

As anyone who has ever worked with git knows, submodules are horrible way to deal with pretty much anything. In the interests of avoiding migraines, that was skipped with addition of the PyME code to GPGME.

Instead the files were added to a subdirectory of the =lang/= directory, along with a copy of the entire git log up to that point as a separate file within the =lang/python/docs/= directory.[fn:2]

As the log for PyME is nearly 100KB and the log for GPGME is approximately 1MB, this would cause considerable bloat, as well as some confusion, should the two be merged.

Hence the unfortunate, but necessary, step to simply move the files. A regular repository version has been maintained should it be possible to implement this better in the future.

## \*\* The Perils of PyPI

```
:PROPERTIES:
:CUSTOM_ID: the-perils-of-pypi
:END:
```

The early port of the Python 2 `pyme` module as `pyme3` was never added to PyPI while the focus remained on development and testing during 2015 and early 2016. Later in 2016, however, when Justus completed his major integration work and subsequently renamed the module from `pyme3` to `gpg`, some prior releases were also provided through PyPI.

Since these bindings require a matching release of the GPGME libraries in order to function, it was determined that there was little benefit in also providing a copy through PyPI since anyone obtaining the GPGME source code would obtain the Python bindings source code at the same time. Whereas there was the potential to sew confusion amongst Python users installing the module from PyPI, only to discover that without the relevant C files, header files or SWIG compiled binaries, the Python module did them little good.

There are only two files on PyPI which might turn up in a search for this module or a sample of its content:

1. `gpg (1.8.0)` - Python bindings for GPGME GnuPG cryptography library
2. `pyme (0.9.0)` - Python support for GPGME GnuPG cryptography library

## \*\*\* GPG 180 - Python bindings for GPGME GnuPG cryptography library

```
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-180
:END:
```

This is the most recent version to reach PyPI and is the version of the official Python bindings which shipped with GPGME 1.8.0. If you have GPGME 1.8.0 installed and `/only/` 1.8.0 installed, then it is probably safe to use this copy from PyPI.

As there have been a lot of changes since the release of GPGME 1.8.0, the GnuPG Project recommends not using this version of the module and instead installing the current version of GPGME along with the Python bindings included with that package.

## \*\*\* PyME 090 - Python support for GPGME GnuPG cryptography library

```
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-90
```

:END:

This is the last release of the PyME bindings maintained by Martin Albrecht and is only compatible with Python 2, it will not work with Python 3. This is the version of the software from which the port from Python 2 to Python 3 code was made in 2015.

Users of the more recent Python bindings will recognise numerous points of similarity, but also significant differences. It is likely that the more recent official bindings will feel "more pythonic."

For those using Python 2, there is essentially no harm in using this module, but it may lack a number of more recent features added to GPGME.

#### \* Footnotes

[fn:1] In all likelihood this would have been Python 2.2 or possibly Python 2.3.

[fn:2] The entire PyME git log and other preceding VCS logs are located in the `=gpgme/lang/python/docs/old-commits.log=` file.

```
HACKING -*- org -*-
#+TITLE: Hacking notes for GPGME
#+STARTUP: showall
```

#### \* How to contribute

\*\* No more ChangeLog files

Do not modify any of the ChangeLog files in GPGME. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist" time. As such, there are strict requirements on the form of the commit log messages. The old ChangeLog files have all be renamed to ChangeLog-2011

\*\* Commit log requirements

Your commit log should always start with a one-line summary, the second line should be blank, and the remaining lines are usually ChangeLog-style entries for all affected files. However, it's fine -- even recommended -- to write a few lines of prose describing the change, when the summary and ChangeLog entries don't give enough of the big picture. Omit the leading TABs that you're used to seeing

in a "real" ChangeLog file, but keep the maximum line length at 72 or smaller, so that the generated ChangeLog lines, each with its leading TAB, will not exceed 80 columns. If you want to add text which shall not be copied to the ChangeLog, separate it by a line consisting of two dashes at the begin of a line.

Note that ./autogen.sh installs a git hook to do some basic syntax checking on the commit log message.

Typo fixes and documentation updates don't need a ChangeLog entry; thus you would use a commit message like

```
#+begin_example
Fix typo in a comment

--
#+end_example
```

The marker line here is important; without it the first line would appear in the ChangeLog.

If you exceptionally need to have longer lines in a commit log you may do this after this scissor line:

```
#+begin_example
----- >8 -----
#+end_example
```

(hash, blank, 24 dashes, blank, scissor, blank, 24 dashes).

Note that such a comment will be removed if the git commit option `--cleanup-scissor=` is used.

## \*\* License policy

GPGME is currently licensed under the LGPLv2.1+ with tools and the manual being under the GPLv3+. We may eventually update to a newer version of the licenses or a combination of them. It is thus important, that all contributed code allows for an update of the license; for example we can't accept code under the LGPLv2(only).

If you want to contribute code or documentation to GPGME you are asked to assert that the contribution is in accordance to the "GPGME Developer's Certificate of Origin" as found in the file "DCO". Except for a slight wording change, this DCO is identical to the one used by the Linux kernel. Please take these simple steps:

- Decide which mail address you want to use. Please have your real name in the address and not a pseudonym. Anonymous contributions



can only be done if you find a proxy who certifies for you.

- If your employer or school might claim ownership of code written by you; you need to talk to them to make sure that you have the right to contribute under the DCO.
- Send an OpenPGP signed mail to the `gnupg-devel@gnupg.org` public mailing list from your mail address. Include a copy of the DCO as found in the official master branch. Insert your name and email address into the DCO in the same way you want to use it later.

Example:

```
Signed-off-by: Joe R. Hacker <joe@example.org>
```

If you need it, you may perform simple transformations on the mail address: Replacing "@" by " at " or "." by " dot ".)

- That's it. From now on you only need to add a "Signed-off-by:" line with your name and mail address to the GIT commit message. It is recommended to send the patches using a PGP/MIME signed mail.

#### \*\* Coding standards

Please follow the GNU coding standards. If you are in doubt consult the existing code as an example. Do no re-indent code without a need. If you really need to do it, use a separate commit for such a change.

- C99 syntax should not be used; stick to C90.
- Please do not use C++ `///  
=` style comments.
- Try to fit lines into 80 columns.
- Ignore signed/unsigned pointer mismatches
- No arithmetic on void pointers; cast to `char*` first.

#### \*\* Commit log keywords

- GnuPG-bug-id :: Values are comma or space delimited bug numbers from `bug.gnupg.org` pertaining to this commit.
- Debian-bug-id :: Same as above but from the Debian bug tracker.
- CVE-id :: CVE id number pertaining to this commit.
- Regression-due-to :: Commit id of the regression fixed by this commit.
- Fixes-commit :: Commit id this commit fixes.
- Reported-by :: Value is a name or mail address of a bug reporter.
- Suggested-by :: Value is a name or mail address of someone who suggested this change.

- Co-authored-by :: Name or mail address of a co-author
- Some-comments-by :: Name or mail address of the author of additional comments (commit log or code).
- Proofread-by :: Sometimes used by translation commits.
- Signed-off-by :: Name or mail address of the developer

\* Debug hints

- Use gpgme-tool for manual tests.
- The envvar GPGME\_DEBUG enables debugging; see debug.[ch] for details.

Configuration files may go here. Note that config.h.in is auto-generated so that this file is not in git.

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-04-06 Werner Koch <wk@g10code.com>

- \* gpg-error.m4: Update from current libgpg-error repo.

2010-05-07 Werner Koch <wk@g10code.com>

- \* libassuan.m4: Update from libassuan svn.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

- \* libassuan.m4: Fix LIBASSUAN\_VERSION.

2006-06-08 Marcus Brinkmann <marcus@g10code.de>

- \* pth.m4: Add --all to pth-config invocation.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

- \* pth.m4: Fix code generation (required for Max OS X). Submitted by Emanuele Giaquinta <exg@gentoo.org>.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

- \* glib-2.0.m4: New file.

2004-12-28 Werner Koch <wk@g10code.com>

\* pth.m4: Changed quoting for use with automake 1.9.

2004-09-14

Marcus Brinkmann <marcus@g10code.de>

\* pth.m4: Disable `_ac_pth_line`, and don't fail if Pth is not found.

\* glibc21.m4: New file.

\* gpg-error.m4: New file.

\* pth.m4: New file.

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1.15.1

GPGME Developer's Certificate of Origin. Version 1.0

=====

By making a contribution to the GPGME project, I certify that:

(a) The contribution was created in whole or in part by me and I have the right to submit it under the free software license indicated in the file; or

(b) The contribution is based upon previous work that, to the best of my knowledge, is covered under an appropriate free software license and I have the right under that license to submit that work with modifications, whether created in whole or in part by me, under the same free software license (unless I am permitted to submit under a different license), as indicated in the file; or

(c) The contribution was provided directly to me by some other person who certified (a), (b) or (c) and I have not modified it.

(d) I understand and agree that this project and the contribution are public and that a record of the contribution (including all personal information I submit with it, including my

sign-off) is maintained indefinitely and may be redistributed consistent with this project or the free software license(s) involved.

Signed-off-by: [Your name and mail address]  
2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2008-11-08 Moritz <moritz@gnu.org>

\* gpgme.lisp (size-t): Wrong call to defctype: function accepts optional, not keyword argument.

(ssize-t): Likewise.

(off-t): Likewise.

(gpgme-data-t, gpgme-ctx-t): Likewise.

(gpgme-error-t): Likewise.

(gpgme-error-no-signal-t): Likewise.

(gpgme-err-code-t): Likewise.

(gpgme-err-source-t): Likewise.

(gpgme-sig-notation-t, gpgme-engine-info-t): Likewise.

(gpgme-subkey-t): Likewise.

(gpgme-key-sig-t): Likewise.

(gpgme-user-id-t): Likewise.

(gpgme-key-t): Likewise.

(gpgme-data-cbs-t): Likewise.

(gpgme-invalid-key-t): Likewise.

(gpgme-op-encrypt-result-t): Likewise.

(gpgme-recipient-t): Likewise.

(gpgme-op-decrypt-result-t): Likewise.

(gpgme-new-signature-t):

Likewise.

(gpgme-op-sign-result-t): Likewise.

(gpgme-signature-t): Likewise.

(gpgme-op-verify-result-t): Likewise.

(gpgme-import-status-t): Likewise.

(gpgme-op-import-result-t): Likewise.

(gpgme-op-genkey-result-t): Likewise.

(gpgme-op-keylist-result-t): Likewise.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

\* Initial release.

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`HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html08 `HB

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/OF

# \*- mode: org \*-

#+TITLE: What Was New in the GPGME Python Bindings and Documentation

#+AUTHOR: Ben McGinnes

#+LATEX\_COMPILER: xelatex

#+LATEX\_CLASS: article

#+LATEX\_CLASS\_OPTIONS: [12pt]

#+LATEX\_HEADER: \usepackage{xltextra}

#+LATEX\_HEADER: \usepackage[margin=1in]{geometry}

#+LATEX\_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

#+LATEX\_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

\* What Was New

:PROPERTIES:

:CUSTOM\_ID: new-stuff

:END:

| Version: | 0.0.1 |

```
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |
```

The following are all the past /What's New/ sections for the Python Bindings HOWTO and other documentation.

\*\* What Was New in GPGME 1120

:PROPERTIES:

:CUSTOM\_ID: gpgme-1-12-0

:END:

The most obviously new point for those reading this guide is this section on other new things, but that's hardly important. Not given all the other things which spurred the need for adding this section and its subsections.

\*\*\* New in GPGME 1120

:PROPERTIES:

:CUSTOM\_ID: new-stuff-1-12-0

:END:

There have been quite a number of additions to GPGME and the Python bindings to it since the last release of GPGME with versions 1.11.0 and 1.11.1 in April, 2018.

The bullet points of new additions are:

- an expanded section on [\[\[file:gpgme-python-howto#installation\]\[installing\]\]](#) and [\[\[file:gpgme-python-howto#snafu\]\[troubleshooting\]\]](#) the Python bindings.
- The release of Python 3.7.0; which appears to be working just fine with our bindings, in spite of intermittent reports of problems for many other Python projects with that new release.
- Python 3.7 has been moved to the head of the specified python versions list in the build process.
- In order to fix some other issues, there are certain underlying functions which are more exposed through the [\[\[file:gpgme-python-howto#howto-get-context\]\[gpg.Context\(\)\]\]](#), but ongoing documentation ought to clarify that or otherwise provide the best means of using the bindings. Some additions to `=gpg.core=` and the `=Context()=`, however, were intended (see below).
- Continuing work in identifying and confirming the cause of

oft-reported [\[\[file:gpgme-python-howto#snafu-runtime-not-funtime\]\]](#) [problems installing the Python bindings on Windows]].

- GSOC: Google's Surreptitiously Ordered Conscription ... erm ... oh, right; Google's Summer of Code. Though there were two hopeful candidates this year; only one ended up involved with the GnuPG Project directly, the other concentrated on an unrelated third party project with closer ties to one of the GNU/Linux distributions than to the GnuPG Project. Thus the Python bindings benefited from GSOC participant Jacob Adams, who added the `key_import` function; building on prior work by Tobias Mueller.
- Several new methods functions were added to the `gpg.Context()`, including: [\[\[file:gpgme-python-howto#howto-import-key\]\]](#) [`key_import`], [\[\[file:gpgme-python-howto#howto-export-key\]\]](#) [`key_export`], [\[\[file:gpgme-python-howto#howto-export-public-key\]\]](#) [`key_export_minimal`] and [\[\[file:gpgme-python-howto#howto-export-secret-key\]\]](#) [`key_export_secret`].
- Importing and exporting examples include versions integrated with Marcel Fest's recently released [\[\[https://github.com/Selfnet/hkp4py\]\]](https://github.com/Selfnet/hkp4py) [HKP for Python] module. Some [\[\[file:gpgme-python-howto#hkp4py\]\]](#) [additional notes on this module] are included at the end of the HOWTO.
- Instructions for dealing with semi-walled garden implementations like ProtonMail are also included. This is intended to make things a little easier when communicating with users of ProtonMail's services and should not be construed as an endorsement of said service. The GnuPG Project neither favours, nor disfavors ProtonMail and the majority of this deals with interacting with the ProtonMail keyserver.
- Semi-formalised the location where [\[\[file:gpgme-python-howto#draft-editions\]\]](#) [draft versions] of this HOWTO may periodically be accessible. This is both for the reference of others and testing the publishing of the document itself. Renamed this file at around the same time.
- The Texinfo documentation build configuration has been replicated from the parent project in order to make to maintain consistency with that project (and actually ship with each release).
- a reStructuredText (=rst=) version is also generated for Python developers more used to and comfortable with that format as it is the standard Python documentation format and Python developers may wish to use it with Sphinx. Please note that there has been no testing of the reStructuredText version with Sphinx at all. The reST file was generated by the simple expedient of using [\[\[https://pandoc.org/\]\]](https://pandoc.org/) [Pandoc].
- 
- Added a new section for [\[\[file:gpgme-python-howto#advanced-use\]\]](#) [advanced or experimental use].
- Began the advanced use cases with [\[\[file:gpgme-python-howto#cython\]\]](#) [a section] on using the module with [\[\[https://cython.org/\]\]](https://cython.org/) [Cython].
- Added a number of new scripts to the `=example/howto/=` directory; some of which may be in advance of their planned sections of the HOWTO (and some are just there because it seemed like a good idea at the time).

- Cleaned up a lot of things under the hood.

This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

\* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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File: gpgme.info, Node: UI Server Decrypt, Next: UI Server Verify, Prev: UI Server Sign, Up: UI Server Protocol

### A.3 UI Server: Decrypt a Message

=====

Decryption may include the verification of OpenPGP messages. This is due to the often used combined signing/encryption modus of OpenPGP. The client may pass an option



to the server to inhibit the signature verification. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N

Set the file descriptor for the message to be decrypted to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The decryption is started with the command:

-- Command: DECRYPT --protocol=NAME [--no-verify]

[--export-session-key]

NAME is the encryption protocol used for the message. For a description of the allowed protocols see the ENCRYPT command.

This argument is mandatory. If the option --no-verify is given, the server

should not try to verify a signature, in case the input

data is an OpenPGP combined message. If the option

--export-session-key is given and the underlying engine knows how to export the session key, it will appear on a status line

File: gpgme.info, Node: UI Server Verify, Next: UI Server Set Input Files, Prev: UI Server Decrypt, Up: UI Server Protocol

#### A.4 UI Server: Verify a Message

=====

The server needs to support the verification of opaque signatures as well as detached signatures. The kind of input sources controls what kind message is to be verified.

-- Command: MESSAGE FD=N

This command is used with detached signatures to set the file descriptor for the signed data to N. The data is binary encoded (used verbatim). For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: INPUT FD=N

Set the file descriptor for the opaque message or the signature

part

of a detached signature to N. The message sent to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded and only used for opaque signatures. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The verification is then started using:

-- Command: VERIFY --protocol=NAME [--silent]

NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. This argument is mandatory. Depending on the combination of MESSAGE INPUT and OUTPUT commands, the server needs to select the appropriate verification mode:

MESSAGE and INPUT

This indicates a detached signature. Output data is not applicable.

INPUT

This indicates an opaque signature. As no output command has been given, the server is only required to check the signature.

INPUT and OUTPUT

This indicates an opaque signature. The server shall write the signed data to the file descriptor set by the output command. This data shall even be written if the signatures can't be verified.

With --silent the server shall not display any dialog; this is for example used by the client to get the content of opaque signed messages. The client expects the server to send at least this status information before the final OK response:

-- Status line: SIGSTATUS FLAG DISPLAYSTRING

Returns the status for the signature and a short string explaining the status. Valid values for FLAG are:

none

The message has a signature but it could not be verified due to a missing key.

green

The signature is fully valid.

yellow

The signature is valid but additional information was shown regarding the validity of the key.

red

The signature is not valid.

DISPLAYSTRING is a percent-and-plus-encoded string with a short human readable description of the status. For example

S SIGSTATUS green Good+signature+from+Keith+Moon+<keith@example.net>

Note that this string needs to fit into an Assuan line and should be short enough to be displayed as short one-liner on the clients window. As usual the encoding of this string is UTF-8 and it should be send in its translated form.

The server shall send one status line for every signature found on the message.

File: gpgme.info, Node: UI Server Set Input Files, Next: UI Server Sign/Encrypt Files, Prev: UI Server Verify, Up: UI Server Protocol

A.5 UI Server: Specifying the input files to operate on.

=====

All file related UI

server commands operate on a number of input files or directories, specified by one or more FILE commands:

-- Command: FILE [--clear] NAME

Add the file or directory NAME to the list of pathnames to be processed by the server. The parameter NAME must be an absolute path name (including the drive letter) and is percent escaped (in particular, the characters %, = and white space characters are always escaped). If the option --clear is given, the list of files is cleared before adding NAME.

Historical note: The original spec did not define --clear but the keyword --continued after the file name to indicate that more files are to be expected. However, this has never been used and thus removed from the specs.

File: gpgme.info, Node: UI Server Sign/Encrypt Files, Next: UI Server Verify/Decrypt Files, Prev: UI Server Set Input Files, Up: UI Server Protocol

## A.6 UI Server: Encrypting and signing files.

---

First,

the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: ENCRYPT\_FILES --nohup

-- Command: SIGN\_FILES --nohup

-- Command: ENCRYPT\_SIGN\_FILES --nohup

Request that the files specified by FILE are encrypted and/or signed. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to encrypt or sign a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for each input file a new file is created under the original filename plus a protocol specific extension (like .gpg or .sig), which contain the encrypted/signed file or a detached signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The ENCRYPT\_SIGN\_FILES command requests a combined sign and encrypt operation. It may not be available for all protocols (for example, it is available for OpenPGP but not for CMS).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: UI Server Verify/Decrypt Files, Next: UI Server Import/Export Keys, Prev: UI Server Sign/Encrypt Files, Up: UI Server Protocol

## A.7 UI Server: Decrypting and verifying files.

---

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: DECRYPT\_FILES --nohup

-- Command: VERIFY\_FILES --nohup

-- Command: DECRYPT\_VERIFY\_FILES

--nohup

Request that the files specified by FILE are decrypted and/or verified. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to decrypt or verify a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for decryption, a new file is created for each input file under the original filename minus a protocol specific extension (like .gpg) which contains the original plaintext. For verification a status is displayed for each signed input file, indicating if it is signed, and if yes, if the signature is valid. For files that are signed and encrypted, the VERIFY command transiently decrypts the file to verify the enclosed signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: UI Server Import/Export Keys, Next: UI Server Checksum Files, Prev: UI Server Verify/Decrypt Files, Up: UI Server Protocol

#### A.8 UI Server: Managing certificates.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: IMPORT\_FILES --nohup

Request that the certificates contained in the files specified by FILE are imported into the local certificate databases.

For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

FIXME: It may be nice to support an EXPORT command as well, which is enabled by the context menu of the background of a directory.

File: gpgme.info, Node: UI Server Checksum Files, Next: Miscellaneous UI Server Commands, Prev: UI Server Import/Export Keys, Up: UI Server Protocol

#### A.9 UI Server: Create and verify checksums for files.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: CHECKSUM\_CREATE\_FILES --nohup

Request that checksums are created for the files specified by FILE. The choice of checksum algorithm and the destination storage and format for the created checksums depend on the

preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

-- Command: CHECKSUM\_VERIFY\_FILES --nohup

Request that checksums are created for the files specified by FILE and verified against previously created and stored checksums. The choice of checksum algorithm and the source storage and format for previously created checksums depend on the preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

If the source storage of previously created checksums is available

to the user through the Windows shell, this command may also accept such checksum files as FILE arguments. In this case, the UI server should instead verify the checksum of the referenced files as if they were given as INPUT files.

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

## A.10 Miscellaneous UI Server Commands

=====

The server needs to implement the following commands which are not related to a specific command:

### -- Command: GETINFO WHAT

This is a multi purpose command, commonly used to return a variety of information. The required subcommands as described by the WHAT parameter are:

#### pid

Return the process id of the server in decimal notation using an Assuan data line.

To allow the server to pop up the windows in the correct relation to the client, the client is advised to tell the server by sending the option:

### -- Command option: window-id NUMBER

The NUMBER represents the native window ID of the clients current window. On Windows systems this is a windows handle (HWND) and on X11 systems it is the X Window ID. The number needs to be given as a hexadecimal value so that it is easier to convey pointer values (e.g. HWND).

A client may want to fire up the certificate manager of the server. To do this it uses the Assuan command:

### -- Command: START\_KEYMANAGER

The server shall pop up the main window of the key manager (aka certificate manager). The client expects that the key manager is brought into the foreground and that this command immediately returns (does not wait until the key manager has been fully brought up).

A client may want to fire up the configuration dialog of the server. To do this it uses the Assuan command:

### -- Command: START\_CONFDIALOG

The server shall pop up its configuration dialog. The client expects that this dialog is brought into the foreground and that this command immediately returns (i.e. it does not wait until the

dialog has been fully brought up).

When doing an operation on a mail, it is useful to let the server know the address of the sender:

-- Command: SENDER [--info] [--protocol=NAME] EMAIL  
EMAIL is the plain ASCII encoded address ("addr-spec" as per RFC-2822) enclosed in angle brackets. The address set with this command is valid until a successful completion of the operation or until a RESET command. A second command overrides the effect of the first one; if EMAIL is not given and --info is not used, the server shall use the default signing key.

If option --info is not given, the server shall also suggest a protocol to use for signing. The client may use this suggested protocol on its own discretion. The same status line as with PREP\_ENCRYPT is used for this.

The option --protocol may be used to give the server a hint on which signing protocol should be preferred.

To allow the UI-server to visually identify a running operation or to associate operations the server MAY support the command:

-- Command: SESSION NUMBER [STRING]  
The NUMBER is an arbitrary value, a server may use to associate simultaneous running sessions. It is a 32 bit unsigned integer with 0 as a special value indicating that no session association shall be done.

If STRING is given, the server may use this as the title of a window or, in the case of an email operation, to extract the senders address. The string may contain spaces; thus no plus-escaping is used.

This command may be used at any time and overrides the effect of the last command. A RESET undoes the effect of this command.

File: gpgme.info, Node: Debugging, Next: Deprecated Functions, Prev: UI Server Protocol, Up: Top

## Appendix B How to solve problems

\*\*\*\*\*

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true



for applications using a complex library like GPGME and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using `gpg` or `gpgsm` on the command line. If you cant figure out why things dont work, you may use GPGMEs built in trace feature. This feature is either enabled using the environment variable `GPGME_DEBUG` or, if this is not possible, by calling the function `gpgme_set_global_flag`. The value is the trace level and an optional file name. If no file name is given the trace output is printed to `stderr`.

For example

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

File: [gpgme.info](#), Node: [Deprecated Functions](#), Next: [Library Copying](#), Prev: [Debugging](#), Up: [Top](#)

## Appendix C Deprecated Functions

\*\*\*\*\*

For backward compatibility GPGME has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

**\*Warning:\*** These interfaces will be removed in a future version of GPGME.

-- Function: `void gpgme_key_release (gpgme_key_t KEY)`  
The function `gpgme_key_release` is equivalent to `gpgme_key_unref`.

-- Function: `gpgme_error_t gpgme_op_import_ext (gpgme_ctx_t CTX,  
gpgme_data_t KEYDATA, int *NR)`  
SINCE: 0.3.9

The function `gpgme_op_import_ext` is equivalent to:

```
gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
{
 gpgme_import_result_t result = gpgme_op_import_result (ctx);
 *nr = result->considered;
}
```

-- Data type: `gpgme_error_t (*gpgme_edit_cb_t) (void *HANDLE,  
gpgme_status_code_t STATUS, const char *ARGS, int FD)`

The `gpgme_edit_cb_t` type is the type of functions which GPGME calls if it a key edit operation is on-going. The status code `STATUS` and the argument line `ARGS` are passed through by GPGME from the crypto engine. The file descriptor `FD` is -1 for normal status messages. If `STATUS` indicates a command rather than a status message, the response to the command should be written to `FD`. The `HANDLE` is provided by the user at start of operation.

The function should return `GPG_ERR_FALSE` if it did not handle the status code, 0 for success, or any other error value.

-- Function: `gpgme_error_t gpgme_op_edit (gpgme_ctx_t CTX,  
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,  
gpgme_data_t OUT)`  
SINCE: 0.3.9

Note: This function is deprecated, please use `gpgme_op_interact` instead.

The function `gpgme_op_edit` processes the key `KEY` interactively, using the edit callback function `FNC` with the handle `HANDLE`. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object `OUT`.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

The function returns the error code `GPG_ERR_NO_ERROR` if the edit operation completes successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEY`

is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: `gpgme_error_t gpgme_op_edit_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

SINCE: 0.3.9

Note: This function is deprecated, please use `gpgme_op_interact_start` instead.

The function `gpgme_op_edit_start` initiates a `gpgme_op_edit` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_card_edit (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

Note: This function is deprecated, please use `gpgme_op_interact` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit` is analogous to `gpgme_op_edit`, but should be used to process the smart card corresponding to the key `KEY`.

-- Function: `gpgme_error_t gpgme_op_card_edit_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

Note: This function is deprecated, please use `gpgme_op_interact_start` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit_start` initiates a

`gpgme_op_card_edit` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_data_new_with_read_cb`

```
(gpgme_data_t *DH, int (*READFUNC) (void *HOOK, char *BUFFER,
size_t COUNT, size_t *NREAD), void *HOOK_VALUE)
```

The function `gpgme_data_new_with_read_cb` creates a new `gpgme_data_t` object and uses the callback function `READFUNC` to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type GPGME provides. However, it can not be used to write data.

The callback function receives `HOOK_VALUE` as its first argument whenever it is invoked. It should return up to `COUNT` bytes in `BUFFER`, and return the number of bytes actually read in `NREAD`. It

may return 0 in `NREAD` if no data is currently available. To indicate EOF the function should return with an error code of -1 and set `NREAD` to 0. The callback function may support to reset its internal read pointer if it is invoked with `BUFFER` and `NREAD` being `NULL` and `COUNT` being 0.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `READFUNC` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_rewind (gpgme_data_t DH)`

The function `gpgme_data_rewind` is equivalent to:

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
? gpgme_error_from_errno (errno) : 0;
```

-- Data type: `gpgme_attr_t`

The `gpgme_attr_t` type is used to specify a key or trust item attribute. The following attributes are defined:

#### `GPGME_ATTR_KEYID`

This is the key ID of a sub key. It is representable as a string.

#### `GPGME_ATTR_FPR`

This is the fingerprint of a sub key. It is representable as a string.

#### `GPGME_ATTR_ALGO`

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the enum `gcry_pk_algos` values in the `gcrypt` library.

#### GPGME\_ATTR\_LEN

This is the key length of a sub key. It is representable as a number.

#### GPGME\_ATTR\_CREATED

This is the timestamp at creation time of a sub key. It is representable as a number.

#### GPGME\_ATTR\_EXPIRE

This is the expiration time of a sub key. It is representable as a number.

#### GPGME\_ATTR\_USERID

This is a user ID. There can be more than one user IDs in a GPGME\_KEY\_T object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

#### GPGME\_ATTR\_NAME

This is the name belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_VALIDITY

This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

#### GPGME\_ATTR\_UID\_REVOKED

This specifies if a user ID is revoked. It is representable as a number, and is 1 if the user ID is revoked, and 0 otherwise.

#### GPGME\_ATTR\_UID\_INVALID

This specifies if a user ID is invalid. It is representable as a number, and is 1 if the user ID is invalid, and 0 otherwise.

#### GPGME\_ATTR\_TYPE

This

returns information about the type of key. For the string function this will either be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509.

#### GPGME\_ATTR\_IS\_SECRET

This specifies if the key is a secret key. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_REVOKED

This specifies if a sub key is revoked. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_INVALID

This specifies if a sub key is invalid. It is representable as a number, and is 1 if the key is invalid, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_EXPIRED

This specifies if a sub key is expired. It is representable as a number, and is 1 if the key is expired, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_DISABLED

This specifies if a sub key is disabled. It is representable as a number, and is 1 if the key is disabled, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_CAPS

This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter e if the key can be used for encryption, s if the key can be used for signatures, and c if the key can be used for certifications.

#### GPGME\_ATTR\_CAN\_ENCRYPT

This specifies if a sub key can be used for encryption. It is representable as a number, and is 1 if the sub key can be used for encryption, and 0 otherwise.

#### GPGME\_ATTR\_CAN\_SIGN

This specifies if a sub key can be used to create data signatures. It is representable as a number, and is 1 if the sub key can be used for signatures, and 0 otherwise.

#### GPGME\_ATTR\_CAN\_CERTIFY

This specifies if a sub key can be used to create key certificates. It is representable as a number, and is 1 if the sub key can be used for certifications, and 0 otherwise.

#### GPGME\_ATTR\_SERIAL

The X.509 issuer serial attribute of the key. It is representable as a string.

#### GPGME\_ATTR\_ISSUE

The X.509 issuer name attribute of the key. It is representable as a string.

#### GPGME\_ATTR\_CHAINID

The X.509 chain ID can be used to build the certification chain. It is representable as a string.

-- Function: `const char * gpgme_key_get_string_attr (gpgme_key_t KEY, gpgme_attr_t WHAT, const void *RESERVED, int IDX)`

The function `gpgme_key_get_string_attr` returns the value of the string-representable attribute `WHAT` of key `KEY`. If the attribute is an attribute of a sub key or an user ID, `IDX` specifies the sub key or user ID of which the attribute value is returned. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a string, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED` not `NULL`.

-- Function: `unsigned long gpgme_key_get_ulong_attr (gpgme_key_t KEY, gpgme_attr_t WHAT, const void *RESERVED, int IDX)`

The function `gpgme_key_get_ulong_attr` returns the value of the number-representable attribute `WHAT` of key `KEY`. If the attribute is an attribute of a sub key or an user ID, `IDX` specifies the sub key or user ID of which the attribute value is returned. The argument `RESERVED` is reserved for later use and should be `NULL`.

The function returns 0 if the attribute cant be returned as a number, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED` not `NULL`.

The signatures on a key are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIGS` mode enabled, because it is expensive to retrieve

all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function `gpgme_get_key`.

-- Data type: `gpgme_attr_t`

The `gpgme_attr_t` type is used to specify a key signature attribute. The following attributes are defined:

#### `GPGME_ATTR_KEYID`

This is the key ID of the key which was used for the signature. It is representable as a string.

#### `GPGME_ATTR_ALGO`

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the enum `gcry_pk_algos` values in the `gcrypt` library.

#### `GPGME_ATTR_CREATED`

This is the timestamp at creation time of the signature. It is representable as a number.

#### `GPGME_ATTR_EXPIRE`

This is the expiration time of the signature. It is representable as a number.

#### `GPGME_ATTR_USERID`

This is the user ID associated with the signing key. The user ID is representable as a number.

#### `GPGME_ATTR_NAME`

This is the name belonging to a user ID. It is representable as a string.

#### `GPGME_ATTR_EMAIL`

This is the email address belonging to a user ID. It is representable as a string.

#### `GPGME_ATTR_COMMENT`

This is the comment belonging to a user ID. It is representable as a string.

#### `GPGME_ATTR_KEY_REVOKED`

This specifies if a key signature is a revocation signature.



It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

#### GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

#### GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

#### GPGME\_ATTR\_SIG\_STATUS

This is the same value as returned by `gpgme_get_sig_status`.

-- Function: `const char * gpgme_key_sig_get_string_attr`  
(`gpgme_key_t KEY`, `int UID_IDX`, `gpgme_attr_t WHAT`,  
`const void *RESERVED`, `int IDX`)

The function `gpgme_key_sig_get_string_attr` returns the value of the string-representable attribute `WHAT` of the signature `IDX` on the user ID `UID_IDX` in the key `KEY`. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `UID_IDX` or `IDX` out of range, or `RESERVED` not `NULL`.

-- Function: `unsigned long gpgme_key_sig_get_ulong_attr`  
(`gpgme_key_t KEY`, `int UID_IDX`, `gpgme_attr_t`  
`WHAT`,  
`const void *RESERVED`, `int IDX`)

The function `gpgme_key_sig_get_ulong_attr` returns the value of the number-representable attribute `WHAT` of the signature `IDX` on the user ID `UID_IDX` in the key `KEY`. The argument `RESERVED` is reserved for later use and should be `NULL`.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `UID_IDX` or `IDX` out of range, or `RESERVED` not `NULL`.

-- Data type: `enum gpgme_sig_stat_t`

The `gpgme_sig_stat_t` type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

#### GPGME\_SIG\_STAT\_NONE

This status should not occur in normal operation.

#### GPGME\_SIG\_STAT\_GOOD

This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

#### GPGME\_SIG\_STAT\_GOOD\_EXP

This status indicates that  
the signature is valid but expired.

For the combined result this status means that all signatures are valid and expired.

#### GPGME\_SIG\_STAT\_GOOD\_EXPKEY

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

#### GPGME\_SIG\_STAT\_BAD

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

#### GPGME\_SIG\_STAT\_NOKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

#### GPGME\_SIG\_STAT\_NOSIG

This status indicates that the signature data provided was not a real signature.

#### GPGME\_SIG\_STAT\_ERROR

This status indicates that there was some other error which prevented the signature verification.

#### GPGME\_SIG\_STAT\_DIFF

For the combined result this status means that at least two signatures have a different status. You can get each keys status with `gpgme_get_sig_status`.

-- Function: `const char * gpgme_get_sig_status (gpgme_ctx_t CTX, int IDX, gpgme_sig_stat_t *R_STAT, time_t *R_CREATED)`

The function `gpgme_get_sig_status` is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
 sig = sig->next;
 idx--;
}
if (!sig || idx)
 return NULL;

if (r_stat)
{
 switch (gpg_err_code (sig->status))
 {
case GPG_ERR_NO_ERROR:
 *r_stat = GPGME_SIG_STAT_GOOD;
 break;

case GPG_ERR_BAD_SIGNATURE:
 *r_stat = GPGME_SIG_STAT_BAD;
 break;

case GPG_ERR_NO_PUBKEY:
 *r_stat = GPGME_SIG_STAT_NOKEY;
 break;

case GPG_ERR_NO_DATA:
 *r_stat = GPGME_SIG_STAT_NOSIG;
 break;

case GPG_ERR_SIG_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXP;
 break;

case GPG_ERR_KEY_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
 break;

default:
 *r_stat = GPGME_SIG_STAT_ERROR;
 break;
}
}

```

```
if (r_created)
 *r_created = sig->timestamp;
return sig->fpr;
```

-- Function: const char \* gpgme\_get\_sig\_string\_attr (gpgme\_ctx\_t CTX,  
int IDX, gpgme\_attr\_t WHAT, int WHATIDX)

The function gpgme\_get\_sig\_string\_attr is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
 sig = sig->next;
 idx--;
}
if (!sig || idx)
 return NULL;

switch (what)
{
case GPGME_ATTR_FPR:
 return sig->fpr;

case GPGME_ATTR_ERRTOK:
 if (whatidx == 1)
 return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
 else
 return "";
default:
 break;
}

return NULL;
```

-- Function: const char \* gpgme\_get\_sig\_ulong\_attr (gpgme\_ctx\_t CTX,  
int IDX, gpgme\_attr\_t WHAT, int WHATIDX)

The function gpgme\_get\_sig\_ulong\_attr is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;
```

```

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
sig = sig->next;
idx--;
}
if (!sig || idx)
return 0;

switch (what)
{
case GPGME_ATTR_CREATED:
return sig->timestamp;

case GPGME_ATTR_EXPIRE:
return sig->exp_timestamp;

case GPGME_ATTR_VALIDITY:
return (unsigned long) sig->validity;

case GPGME_ATTR_SIG_STATUS:
switch (sig->status)
{
case GPG_ERR_NO_ERROR:
return GPGME_SIG_STAT_GOOD;

case GPG_ERR_BAD_SIGNATURE:
return GPGME_SIG_STAT_BAD;

case GPG_ERR_NO_PUBKEY:
return GPGME_SIG_STAT_NOKEY;

case GPG_ERR_NO_DATA:
return GPGME_SIG_STAT_NOSIG;

case GPG_ERR_SIG_EXPIRED:

return GPGME_SIG_STAT_GOOD_EXP;

case GPG_ERR_KEY_EXPIRED:
return GPGME_SIG_STAT_GOOD_EXPKEY;

default:
return GPGME_SIG_STAT_ERROR;
}
}

```

```

case GPGME_ATTR_SIG_SUMMARY:
 return sig->summary;

default:
 break;
}
return 0;

```

-- Function: const char \* gpgme\_get\_sig\_key (gpgme\_ctx\_t CTX, int IDX, gpgme\_key\_t \*R\_KEY)

The function gpgme\_get\_sig\_key is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
 sig = sig->next;
 idx--;
}
if (!sig || idx)
 return gpg_error (GPG_ERR_EOF);

return gpgme_get_key (ctx, sig->fpr, r_key, 0);

```

File: gpgme.info, Node: Library Copying, Next: Copying,  
 Prev: Deprecated Functions, Up: Top

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\*\*\*\*\*

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[This is the first released version of the Lesser GPL. It also counts  
 as the successor of the GNU Library Public License, version 2, hence the  
 version number 2.1.]

Preamble

=====

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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\* PROTOCOL: UI Server Encrypt. (line 98)

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\* SENDER: Miscellaneous UI Server Commands.  
(line 50)

\* SESSION: Miscellaneous UI Server  
Commands.  
(line 69)

\* SIGN: UI Server Sign. (line 33)

\* SIGN\_FILES: UI Server Sign/Encrypt Files.  
(line 10)

\* SIGSTATUS: UI Server Verify. (line 56)

\* ssize\_t (\*gpgme\_data\_read\_cb\_t) (void \*HANDLE, void \*BUFFER, size\_t SIZE): Callback Based Data Buffers.

(line 10)

\* ssize\_t (\*gpgme\_data\_write\_cb\_t) (void \*HANDLE, const void \*BUFFER, size\_t SIZE): Callback Based Data Buffers.

(line 27)

\* START\_CONFDIALOG: Miscellaneous UI Server Commands.

(line 41)

\* START\_KEYMANAGER: Miscellaneous UI Server Commands.

(line 31)

\* struct gpgme\_data\_cbs: Callback Based Data Buffers.

(line 59)

\* struct gpgme\_io\_cbs: Registering I/O Callbacks.

(line 6)

\* VERIFY: UI Server Verify. (line 31)

\* VERIFY\_FILES: UI Server Verify/Decrypt Files.

(line 10)

\* void (\*gpgme\_data\_release\_cb\_t) (void \*HANDLE): Callback Based Data Buffers.

(line 54)

\* void (\*gpgme\_event\_io\_cb\_t) (void \*DATA, gpgme\_event\_io\_t TYPE, void \*TYPE\_DATA): I/O Callback Interface.

(line 83)

\* void (\*gpgme\_progress\_cb\_t)(void \*HOOK, const char \*WHAT, int TYPE, int CURRENT, int TOTAL): Progress Meter Callback.

(line 6)

\* void (\*gpgme\_remove\_io\_cb\_t) (void \*TAG): I/O Callback Interface.

(line 48)

\* window-id: Miscellaneous UI Server Commands.

(line 21)

Wenn Sie dies lesen können, ist es wohl nicht  
geheim genug.

hkp4py

requests

Additional license notices for GPGME.            -\*- org -\*-

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with any binary distributions derived from the GNU C Library.

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For files:

- cJSON.c, cJSON.h



#+begin\_quote

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#+end\_quote

# -\*- mode: org -\*-

#+TITLE: Maintenance Mode

#+AUTHOR: Ben McGinnes

#+LATEX\_COMPILER: xelatex

#+LATEX\_CLASS: article

#+LATEX\_CLASS\_OPTIONS: [12pt]

#+LATEX\_HEADER: \usepackage{xltextra}

#+LATEX\_HEADER: \usepackage[margin=1in]{geometry}

#+LATEX\_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

#+LATEX\_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

\* Maintenance Mode from 2019

:PROPERTIES:

:CUSTOM\_ID: maintenance-mode

:END:

Version:	0.0.1
GPGME Version:	1.13.0
Author:	Ben McGinnes <ben@gnupg.org>
Author GPG Key:	DB4724E6FA4286C92B4E55C4321E4E2373590E5D
Language:	Australian English, British English
xml:lang:	en-AU, en-GB, en

From the beginning of 2019 the Python bindings to GPGME will enter maintenance mode, meaning that new features will not be added and only bug fixes and security fixes will be made.

This also means that documentation beyond that existing at the end of 2018 will not be developed further except to correct errors.

Though use of these bindings appears to have been quite well received, there has been no indication of what demand there is, if any for either financial backing of the current Python bindings development or support contracts with g10code GmbH citing the necessity of including the bindings.

\*\* Maintainer from 2019 onward

```
:PROPERTIES:
:CUSTOM_ID: maintenance-mode-bm
:END:
```

How does this affect the position of GnuPG Python Bindings Maintainer?

Well, I will remain as maintainer of the bindings; but without funding for that position, the amount of time I will be able to dedicate solely to this task will be limited and reduced to volunteered time. As with all volunteered time and effort in free software projects, this will be subject to numerous external imperatives.

\*\* Using the Python Bindings from 2019 and beyond

```
:PROPERTIES:
:CUSTOM_ID:
maintenance-mode-blade-runner
:END:
```

For most, if not all, Python developers using these bindings; they will continue to just work the same as they always have. Expansions of GPGME itself are usually handled by SWIG with the existing code and thus bindings are generated properly when the bindings are installed alongside GPGME and when the latter is built from source.

In the rare circumstances where that is not enough to address some new addition to GPGME, then that is a bug and thus subject to the maintenance mode provisions (i.e. it will be fixed following a bug report being raised and your humble author will need to remember where the timesheet template was filed, depending on how many years off such an event is).

All the GPGME functionality will continue to be accessible via the

lower level, dynamically generated methods which match the GPGME C documentation. While the more intuitively Pythonic higher level layer already covers the vast majority of functionality people require with key generation, signatures, certifications (key signing), encryption, decryption, verification, validation, trust levels and so on.

Any wanted features lacking in the Python bindings are usually lacking because they are missing from GPGME itself (e.g. revoking keys via the API) and in such cases they are usually deliberately excluded. More discussion of these issues can be found in the archives of the [\[https://lists.gnupg.org/mailman/listinfo/gnupg-devel\]](https://lists.gnupg.org/mailman/listinfo/gnupg-devel) [gnupg-devel mailing list].

Any features existing in the dynamically generated layer for which people want a specific, higher level function included to make it more Pythonic (e.g. to avoid needing to learn or memorise cryptographic mode values or GnuPG status code numbers), would be a feature request and /not/ a bug.

It is still worthwhile requesting it, but the addition of such a feature would not be guaranteed and provided on a purely volunteer basis. Expediting such a request would require funding that request.

Those with a commercial interest in expediting such a feature request already know how to [\[https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset\]](https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset) [expedite it] (use the message field to state what feature is being requested).

\*\* Documentation formats

```
:PROPERTIES:
:CUSTOM_ID: docs
:END:
```

The documentation has been written in Org mode for GNU Emacs, with both Texinfo and reStructuredText formats generated from that. The Texinfo files are intended for use with the rest of the GnuPG documentation; while the reStructuredText files are intended for use with Docutils and Sphinx, as with other Python projects.

\*\*\* Cautionary Notes regarding Sphinx and EPUB

```
:PROPERTIES:
:CUSTOM_ID: sphinx-made-epubs-suck
:END:
```

Though Python's Docutils in conjunction with Sphinx is capable of

generating some very useful HTML sites, as proven by [\[https://readthedocs.org/\]](https://readthedocs.org/)[\[Read the Docs\]](#) and the [\[https://docs.python.org/\]](https://docs.python.org/)[\[Python documentation\]](#), there are a number of output formats it does not

handle well. At the top of the list of things it manages to break so atrociously as to be embarrassing is the [\[http://idpf.org/epub/\]](http://idpf.org/epub/)[\[EPUB 3\]](#) format.

The automatically generated EPUB of the CPython documentation always contains hundreds of validation errors and even the modest amount of documentation here [\[https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub\]](https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub)[\[produced a file\]](#) with approximately thirty validation errors. As the volume of documentation content increases, so does the induced errors. Whereas Texinfo doesn't produce EPUB output at all, nor does Org-mode.

Should there ever be genuine demand for this format, lodge a [\[https://dev.gnupg.org/maniphest/task/edit/form/4/\]](https://dev.gnupg.org/maniphest/task/edit/form/4/)[\[feature request\]](#) case marked for [\[https://dev.gnupg.org/p/BenM/\]](https://dev.gnupg.org/p/BenM/)[\[my\]](#) attention. The means of generating such files flawlessly is already available, but is not yet part of the GnuPG build system. Nor is it integrated with a means of converting Org

mode input files to the relevant base format automatically, as can already be done when converting Org to reStructuredText or Org to Texinfo. As a certain amount of work would be required to get it done, there would need to be clear demand for that work to be done. Just GNU it!

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

- \* m4/pth.m4: Removed.
- \* configure.ac: Remove check for pth and automake conditional HAVE\_PTH.

2011-06-16 Marcus Brinkmann <marcus@g10code.com>

Release 1.3.1

- \* configure.ac: Set LT version to C19/A8/R0.

2011-05-06 Marcus Brinkmann <marcus@g10code.com>

- \* Makefile.am (SUBDIRS): Remove complus.

\* configure.ac (AC\_CONFIG\_FILES): Remove complus/Makefile.

(BUILD\_COMPLUS): Remove AM\_CONDITIONAL.

\* complus/: Remove very old and stale component.

\* acinclude.m4 (GNUPG\_FIX\_HDR\_VERSION): Remove.

2011-04-14 Werner Koch <wk@g10code.com>

\* configure.ac: Require automake 1.11.

2011-04-06 Werner Koch <wk@g10code.com>

\* autogen.sh (--build-w32):

Support option --build-w64.

\* configure.ac (HAVE\_W64\_SYSTEM): Define.

(INSERT\_TYPEDEFS\_FOR\_GPGME\_H): New.

(GPGME\_CONFIG\_HOST): New.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

\* configure.ac (NEED\_LIBASSUAN\_VERSION): Bump to 2.0.2 for system hooks.

2010-12-30 Werner Koch <wk@g10code.com>

\* configure.ac: Support a git revision.

2010-11-03 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CHECK\_HEADERS): Check for sys/types.h and  
sys.stat.h.

2010-11-02 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CHECK\_HEADERS): Check for sys.time.h.

2010-08-19 Werner Koch <wk@g10code.com>

\* configure.ac (AH\_BOTTOM): Define GPG\_ERR\_ENABLE\_ERRNO\_MACROS.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for setlocale.

2010-05-07 Werner Koch <wk@g10code.com>

\* configure.ac: Change checks to always require libassuan.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh: Update the thing.

\* configure.ac: Check for locale.h.

2010-05-06

Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Detect Windows CE.

(HAVE\_W32CE\_SYSTEM): New symbol and automake conditional.

\* ltmain.sh, m4/libtool.m4: Patch so that it works for Windows CE.

\* configure.ac: Require libgpg-error 1.8.

2010-03-15 Werner Koch <wk@g10code.com>

\* configure.ac (emacs\_local\_vars\_begin)

(emacs\_local\_vars\_read\_only, emacs\_local\_vars\_end): New.

2010-01-22 Werner Koch <wk@g10code.com>

\* autogen.sh (--build-w32): Add --with-libassuan-prefix.

2010-01-11 Marcus Brinkmann <marcus@g10code.de>

Release 1.3.0.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Do not use echo -n. Test for \_\_thread.

2009-12-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Make largefile check more robust.

2009-12-10 Werner Koch <wk@g10code.com>

\* configure.ac: Check for getgid and getegid.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

Update to libtool 2.2.6a.

\* configure.ac: Invoke AC\_CONFIG\_MACRO\_DIR.

(AC\_LIBTOOL\_WIN32\_DLL,

AC\_LIBTOOL\_RC): Replace by ...

(LT\_PREREQ, LT\_INIT, LT\_LANG): ... these.

\* config.guess, config.sub, install-sh, ltmain.sh, m4/libtool.m4:

Updated to libtool 2.2.6a.

\* m4/ltoptions.m4, m4/ltsugar.m4, m4/ltversion.m4,  
m4/lt~obsolete.m4: New files from libtool 2.2.6a.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Activate UIServer if FD passing is enabled and  
Assuan is available.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for argp.h and error\_t.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPG\_VERSION\_DEFAULT): Bump to 1.4.0 as 1.3.0  
was development versions only.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add support for G13.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_CONFIG\_FILES): Remove assuan/Makefile.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Replace internal libassuan by external libassuan.

\* m4/libassuan.m4:

New file.

\* Makefile.am (assuan): Remove variable.

(SUBDIRS): Remove \${assuan}.

\* assuan/: Removed.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add AC\_TYPE\_UINTPTR\_T.

\* assuan/assuan.h [\_ASSUAN\_IN\_GPGME\_BUILD\_ASSUAN]: Declare  
\_gpgme\_io\_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

Released GPGME 1.2.0.

\* configure.ac (my\_version): Set to 1.2.0.

(LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump.

(LIBGPGME\_LT\_REVISION): Reset.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add infrastructure for compile time check of  
\_FILE\_OFFSET\_BITS.

2009-04-19 Moritz <moritz@gnu.org>

\* Makefile.am (DISTCHECK\_CONFIGURE\_FLAGS): Specify --with-gpg.

2009-03-06 Marcus Brinkmann <marcus@g10code.de>

\* assuan/: Update to libassuan SVN 2009-03-06.

2009-01-26 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CONFIG\_FILES): Add tests/opassuan/Makefile.

2008-12-08 Marcus Brinkmann <marcus@g10code.de>

Release GPGME

1.1.8.

\* configure.ac: Bump API revision.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

\* configure.ac: Replace gpgme paths with src.

\* gpgme: Move to ...

\* src: ... this new directory.

2008-10-20 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CONFIG\_FILES): Add gpgme.h.

(GNUPG\_FIX\_HDR\_VERSION): Remove.

2008-10-17 Marcus Brinkmann <marcus@g10code.com>

Release GPGME 1.1.7.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2008-09-19 Moritz <moritz@gnu.org>

\* configure.ac: Remove bogus "esac".

2008-09-16 Marcus Brinkmann <marcus@g10code.com>



\* configure.ac (\_XOPEN\_SOURCE) [apple-darwin]: Define it.

2008-07-04 Werner Koch <wk@g10code.com>

\* config.guess, config.sub: Update to 2007-11-19. Also update missing et al scripts.

2008-04-01 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_INIT): Fix quoting.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Bump required version of automake up to 1.10.

\* autogen.sh: Fix

aclocal check.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

Release GPGME 1.1.6.

\* configure.ac: Support gpgconf.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

\* assuan-pipe-connect.c (pipe\_connect\_gpgme): Do not close process handle here. Use this function also on Unix systems.

\* assuan-pipe-connect.c (pipe\_connect\_gpgme): Fix last change.

\* assuan-pipe-connect.c (pipe\_connect\_gpgme): New function, use it if \_ASSUAN\_IN\_GPGME\_BUILD\_ASSUAN.

2007-09-17 Werner Koch <wk@g10code.com>

\* configure.ac: Use the svn version magic.

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for C++, Qt and support --enable-w32-qt.

\* m4/pkg.m4: New file.

2007-08-21 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (--enable-w32-glib): Use --enableval, not --withval.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

\* assuan/assuan-socket.c (`_assuan_close`): Always use `close()`.  
\* assuan/assuan.h (`_gpgme_io_close`): New prototype.  
(`close`): New  
macro, define as `_gpgme_io_close`.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

\* assuan/assuan-io.c (`_assuan_simple_read`, `_assuan_simple_write`):  
Always use `read/write` (which means `_gpgme_io_read` and  
`_gpgme_io_write`).

2007-07-09 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.5.

\* `configure.ac` (`LIBGPGME_LT_REVISION`): Bump for release.

2007-07-08 Marcus Brinkmann <marcus@g10code.de>

\* `configure.ac` (`GPGSM_DEFAULT`) [`*-mingw32*`]: Initialize it.  
(`HAVE_ASSUAN_H`): Set to 1 if we have it.  
(`funopen`): Use `AC_REPLACE_FUNCS`.  
(`USE_DESCRIPTOR_PASSING`): Define to 1 if we have it. Do not  
define it at all if we don't.  
(`NETLIBS`) [`have_w32_system`]: Add `-lws2_32`.  
(`DIRSEP_C`, `DIRSEP_S`, `EXPSEP_C`, `EXPSEP_S`, `PATHSEP_S`)  
[`HAVE_DOSISH_SYSTEM`]: Remove definitions.

\* `assuan/assuan.h` (`_assuan_funopen`): Define to `_gpgme_funopen`.  
\* `assuan/funopen.c`: Move to `../gpgme/funopen.c`.  
\* `assuan/Makefile.am` (`libassuan_la_SOURCES`): Remove `funopen.c`.

2007-07-04 Marcus Brinkmann <marcus@g10code.de>

\*  
`assuan/Makefile.am` (`INCLUDES`): Include `$(top_srcdir)/gpgme`.  
\* `assuan/assuan.h`: Include `<ath.h>` instead of trying to duplicate  
the definitions.

\* `assuan/`: Update files to 2007-07-04 version of `assuan`.

\* `autogen.sh`: Use `= not ==` in test.

2007-03-05 Werner Koch <wk@g10code.com>

Released 1.1.4.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

\* autogen.sh: New option --force.

2007-01-29 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.3.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2007-01-26 Werner Koch <wk@g10code.com>

\* configure.ac: Changed gpg and gpgsm version checks to work with arbitrary names of the gpg binary. New option --disable-gpg-test and --disable-gpgsm-test.

2007-01-09 Werner Koch <wk@g10code.com>

\* configure.ac (NEED\_GPG\_VERSION, NEED\_GPGSM\_VERSION): Must define after it may have been changed by an option.

2007-01-08 Werner Koch <wk@g10code.com>

\* configure.ac: Require gpg-error 1.4 due to the use of gpg\_error\_from\_syserror.  
(HAVE\_ASSUAN\_H):  
New.

2007-01-05 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add options --with-gpg-version and --with-gpgsm-version to allow overriding the minimum version requirements.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Fix two typos in last change.

2006-12-03 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Use descriptor passing only if --enable-fd-passing is provided.

\* configure.ac: Add check for use of descriptor passing.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPG\_VERSION): Bump to 1.3.0.

2006-09-19 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Turn stpcpy into a replacement function.  
Check for unistd.h and add setenv as replacement function.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for network libraries and set NETLIBS.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

\* lang, lang/cl: New subdirectories.  
\*  
lang/Makefile.am, lang/README: New files.  
\* configure.ac (AC\_CONFIG\_FILES): Add lang/Makefile,  
lang/cl/Makefile and lang/cl/gpgme.asd.  
\* Makefile.am (SUBDIRS): Add lang.

2006-03-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.1.

\* configure.ac (LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump for  
release.  
(LIBGPGME\_LT\_REVISION): Reset to 0 for release.

2006-01-05 Werner Koch <wk@g10code.com>

\* configure.ac: Test for inline feature.  
(AH\_BOTTOM): New to define the pure attribute.

2006-01-03 Werner Koch <wk@g10code.com>

\* configure.ac: Append SVN revision to the version.

2005-11-18 Werner Koch <wk@g10code.com>

\* configure.ac (BUILD\_REVISION): New.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add support for --enable-w32-glib (disabled by  
default). Invoke AM\_PATH\_GLIB\_2\_0.

2005-11-16 Werner Koch <wk@g10code.com>

\* configure.ac  
(CFLAGS) [W32]: Make sure that -mms-bitfields are used.

2005-11-15 Werner Koch <wk@g10code.com>

\* configure.ac: Create BUILD\_FILEVERSION from SVN Revision.  
\* autogen.sh [W32]: Build shared and static versions of the library.

2005-10-20 Marcus Brinkmann <marcus@g10code.de>

\* w32-dll/ChangeLog, w32-dll/build-dll, w32-dll/gpgme.def: Remove files.

\* configure.ac: Instead checking for windres and dlltool, invoke AC\_LIBTOOL\_WIN32\_DLL and AC\_LIBTOOL\_RC.  
\* src/Makefile.am [HAVE\_W32\_SYSTEM]: Use libtool, which simplifies the rules.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.0.

\* configure.ac (LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump for release.  
(LIBGPGME\_LT\_REVISION): Reset to 0 for release.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (HAVE\_PTH): Don't add \$PTH\_CFLAGS to \$CFLAGS here.

2005-08-26 Werner Koch <wk@g10code.com>

\* configure.ac (SEPCONSTANTS): New to define DIRSEP\_C et al.

2005-08-19 Werner Koch <wk@g10code.com>

\*  
configure.ac [W32]: Create values for versioninfo.rc and list substitute versioninfo.rc.  
\* configure.ac: Define ENABLE\_GPGSM.

2005-08-08 Werner Koch <wk@g10code.com>

\* configure.ac (stpcpy): Changed from replace to test.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AH\_BOTTOM): Removed.

2005-03-09 Werner Koch <wk@g10code.com>

\* acinclude.m4 (GNUPG\_CHECK\_VA\_COPY): Assume no when cross-compiling.

\* Makefile.am (EXTRA\_DIST): Include autogen.sh

\* autogen.sh: Added the usual code to build for W32 (--build-w32).

\* configure.ac: Fixed the mingw32 host string, removed OS/2 stuff.

(HAVE\_DRIVE\_LETTERS): Removed.

(HAVE\_W32\_SYSTEM): Added.

(AC\_GNU\_SOURCE): New to replace the identical AH\_VERBATIM.

(AH\_BOTTOM): Added.

2004-12-28 Werner Koch <wk@g10code.com>

Released 1.0.2.

\* Makefile.am (AUTOMAKE\_OPTIONS): Build bzip 2 version.

(ACLOCAL\_AMFLAGS): Add -I m4.

\* configure.ac: Require automake 1.9.3 and autoconf 2.59.

\* acinclude.m4:

Changed quoting for automake 1.9.

\* README: Use SHA1 instead of MD5.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Replace ttypename\_r if it doesn't exist (and warn in that case).

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

\* README: Refer to COPYING.LESSER and "each file" instead of COPYING.

\* COPYING.LESSER: New file.

\* gpgme.spec.in (%doc): Add COPYING.LESSER.

\* acinclude.m4, configure.ac, Makefile.am: Change license to LGPL 2.1 or later.

\* TODO: Add copyright notice.

\* README.CVS: Likewise.

\* configure.ac (GPGSM\_VERSION): Fix filter to get it.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.1.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump up to 2.  
(AC\_INIT): Set version to 1.0.1.

\* configure.ac: Set HAVE\_GPGSM to true only if \$GPGSM is not "no".

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.0.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump up to 1.  
(AC\_INIT): Set version to 1.0.0.

\* Makefile.am  
(EXTRA\_DIST): Remove README-alpha.  
\* README-alpha: Remove file.

2004-09-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Disable AC\_CONFIG\_MACRO\_DIR for now.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Improve diagnostics with version check.

\* configure.ac: Print diagnostics about found thread libraries at  
the end. Check for the versions of GPG and GPGSM and print the  
found versions at the end.

(HAVE\_GPGSM): Do not require GPGSM to exist and be readable.  
(AC\_CONFIG\_MACRO\_DIR): Invoke with argument m4.

\* acinclude.m4: Add copyright notice.  
(jm\_GLIBC21, AM\_PATH\_GPG\_ERROR, \_AC\_PTH\_ERROR, \_AC\_PTH\_VERBOSE,  
AC\_CHECK\_PTH): Removed.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for <sys/uio.h>.

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

Released 0.9.0.

\* configure.ac (AC\_INIT): Set version number to 0.9.0.  
(LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump up by one.

(LIBGPGME\_LT\_REVISION): Reset to zero.

2004-05-21

Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (GPGME\_CONFIG\_API\_VERSION): New variable, substitute it.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.7.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump it up.

2004-04-02 Thomas Schwinge <schwinge@nic-nac-project.de>

\* autogen.sh: Added ACLOCAL\_FLAGS.

2004-04-06 Werner Koch <wk@gnupg.org>

Released 0.4.6.

\* config.guess, config.sub, ltmain.sh: Updated to those from libtools 1.5.4.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.5.

\* configure.ac (NEED\_GPGSM\_VERSION): Bump up to 1.9.6.

\* Makefile.am (EXTRA\_DIST): Remove autogen.sh and README.CVS.

2004-02-18 Werner Koch <wk@gnupg.org>

\* configure.ac: Make the check for funopen fail with just a warning.

2004-02-11 Werner Koch <wk@gnupg.org>

\* autogen.sh (check\_version): Removed bashism and simplified.

2004-02-10 Werner Koch <wk@gnupg.org>

\* configure.ac: Fixed funopen test change.

2004-02-06 Moritz Schulte



<mo@g10code.com>

\* configure.ac: Fix funopen replacement mechanism.

2004-01-31 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add invocation of AC\_SYS\_LARGEFILE, AC\_TYPE\_OFF\_T and AC\_FUNC\_FSEEKO.

2004-01-12 Werner Koch <wk@gnupg.org>

Released 0.4.4.

\* configure.ac: Bumbed LT\_Revision; now at C12/A1/R1.

(NEED\_GPGSM\_VERSION): Set to 1.9.3.

(min\_automake\_version): Added.

\* README.CVS: New.

\* Makefile.am (EXTRA\_DIST): Added README.CVS.

\* autogen.sh: Updated.

2003-11-19 Werner Koch <wk@gnupg.org>

\* acinclude.m4: Add AM\_PATH\_GPG\_ERROR.

\* configure.ac: Check for timegm. Made warning messages more prominent.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.3.

\* configure.ac (LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump up by 1.

(LIBGPGME\_LT\_REVISION): Set to 0.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Require libgpg-error 0.5.

\* acinclude.m4: Remove libtool cruft, add jm\_GLIBC21.

\* configure.ac: Add check for

getenv\_r, and call jm\_GLIBC21.

Define HAVE\_THREAD\_SAFE\_GETENV if appropriate.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Remove GPGME\_CONFIG\_LIBS and GPGME\_CONFIG\_CFLAGS.

2003-09-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Move invocation of AC\_CANONICAL\_HOST up to suppress warning by autoconf.

2003-08-30 Robert Schiele <rschiele@uni-mannheim.de>

\* gpgme.spec.in: % {\_infodir}/dir is not packaged, remove to prevent checking failure.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: If building Assuan, check for funopen and fopencookie, and make isascii, putc\_unlocked and memrchr replacement functions.  
(AM\_PATH\_GPG\_ERROR): Require 0.3.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Bump version to 0.4.3.

2003-07-30 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump up to 1.

Released 0.4.2.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac:  
Complain if libgpg-error is not found.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Bump version to 0.4.2.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_CURRENT): Bump up to 11.

\* configure.ac: Use AM\_PATH\_GPG\_ERROR.

\* configure.ac: Check for libgpg-error. Define GPG\_ERR\_SOURCE\_DEFAULT.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPG\_VERSION): Bump up to 1.2.2.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

In all files, replace the Gpgme\* type names with the new gpgme\_\* type names.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

\* assuan/: Update files to 2002-11-10 version of assuan.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

\* bonobo/gpgme.c, bonobo/main.c, bonobo/main.h, bonobo/Makefile, bonobo/Makefile.am, bonobo/Makefile.in: Dead files removed.

\* configure.ac: Remove automake conditional BUILD\_BONOBO (AC\_CONFIG\_FILES): Remove bonobo/Makefile.

\*

Makefile.am (bonobo): Remove variable.

(SUBDIRS): Remove \${bonobo}.

\* configure.ac: Remove all uses of GNUPG\_CHECK\_TYPEDEF, for byte, ushort, ulong, u16 and u32.

\* acinclude.m4 (GNUPG\_CHECK\_TYPEDEF): Remove macro.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: New conditional HAVE\_LD\_VERSION\_SCRIPT. Call AC\_CANONICAL\_HOST, use host instead target.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Bump up to 0.4.1.

Released 0.4.0.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh (automake\_vers): Require 1.7 (really 1.7.1) for the conditional source distribution bug fix.

2002-12-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_CURRENT): Increase by one. (LIBGPGME\_LT\_AGE, LIBGPGME\_LT\_REVISION): Set to 0.

2002-11-28 Marcus Brinkmann <marcus@g10code.de>

\* NEWS: Add note about moving "gpgmeplug" to the "cryptplug" package.

\* README: Remove instructions related to "gpgmeplug".

\* configure.ac:  
Remove enable option "gpgmeplug" and automake  
conditional BUILD\_GPGMEPLUG, as well as the status info about it.  
(GPGMEPLUG): Remove variable.  
\* Makefile.am (gpgmeplug): Remove variable.  
(SUBDIRS): Remove \${gpgmeplug}.  
\* cryptplug.h, gpgme-openpgp.c, gpgmeplug.dox, gpgme-smime.c,  
Makefile.am, gpgmeplug.c, ChangeLog: Files removed.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Disable GPGSM for all dosish systems.

2002-10-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add automake conditional HAVE\_GPGSM.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Bump version up to 0.4.0.  
(NEED\_GPG\_VERSION): Bump up to 1.2.0.  
(NEED\_GPGSM\_VERSION): Bump up to 0.9.0.  
\* README: Update version numbers.  
\* NEWS: Start entry for 0.4.0.

2002-09-20 Werner Koch <wk@gnupg.org>

Released 0.3.11.

\* configure.ac: Bump up LIBGPGME\_LT\_REVISION.

\* configure.ac (AC\_CHECK\_HEADERS): Check for sys/select.h.

2002-09-04 Marcus Brinkmann  
<marcus@g10code.de>

\* autogen.sh (autoconf\_vers): Bump up to 2.53 to get the @&t@  
quadrigraph. Always cutting the edge!

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Create and substitute LTLIBOBS.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.10.

\* NEWS: Update for 0.3.9 release.

\* configure.ac: Bump up LIBGPGME\_LT\_REVISION.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.spec.in: Changed user name in Wojciech Polak's email address from ghostface to polak per request by himself.

2002-08-28 Werner Koch <wk@gnupg.org>

\* acinclude.m4 (GNUPG\_CHECK\_VA\_COPY): New.  
\* configure.ac: Use it.

2002-08-23 Werner Koch <wk@gnupg.org>

\* configure.ac (GPGME\_CONFIG\_CFLAGS): Renamed from GPGME\_CFLAGS and removed the libpath because it is set by the config script.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Bump version number to 0.3.10.

\* NEWS: Add template for development version.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

Released 0.3.9.

\* NEWS: Update for 0.3.9 release.

\* Makefile.am (EXTRA\_DIST): Add gpgme.spec.in.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* jnlib/argparse.c, jnlib/argparse.h, jnlib/ChangeLog,  
jnlib/dotlock.c, jnlib/dotlock.h, jnlib/libjnlib-config.h,  
jnlib/logging.c, jnlib/logging.h, jnlib/Makefile.am,  
jnlib/mischelp.h, jnlib/README, jnlib/stringhelp.c,  
jnlib/stringhelp.h, jnlib/strlist.c, jnlib/strlist.h,  
jnlib/types.h, jnlib/xmalloc.c, jnlib/xmalloc.h: Remove files.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (SUBDIRS): Remove jnlib.

\* configure.ac: Don't check for unsigned short or unsigned long.

Don't check for memicmp, strtolr, strtoul, memmove, stricmp.

Make stpcpy a replaced function.

Don't define HAVE\_JNLIB\_LOGGING.

Don't generate jnlib/Makefile.

2002-07-02 Werner Koch <wk@gnupg.org>

\* configure.ac: Bumbed version number to 0.3.9; add a comment on when to change it.

\* gpgme.spec.in:

New. Contributed by Wojciech Polak.

\* Makefile.am (dist-hook): New.

\* AUTHORS: Added Wojciech and bug reporting addresses.

2002-06-25 Werner Koch <wk@gnupg.org>

Released 0.3.8.

\* configure.ac: Bumbed LT version to 9/3/0.

(NEED\_GPGSM\_VERSION): Need 0.3.8 due to fixed export command.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.7.

\* configure.ac (AC\_INIT): Set version to 0.3.7.

(LIBGPGME\_LT\_REVISION): Add one.

\* README: Document version requirement correctly.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* acinclude.m4: Fix Pth check so that it doesn't error out if pth is not found.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add checks for Pth and pthreads.

\* acinclude.m4: Add slightly hacked check for pth (seems to be an autoconf version problem).

2002-05-21 Werner Koch <wk@gnupg.org>

\* configure.ac (NEED\_GPGSM\_VERSION): We need gpgsm 0.3.7.

2002-05-03 Werner Koch <wk@gnupg.org>

Released 0.3.6.

2002-04-05

Marcus Brinkmann <marcus@g10code.de>

- \* acconfig.h: File removed.
- \* configure.ac (NEED\_GPG\_VERSION): Add description.
- (NEED\_GPGSM\_VERSION): Likewise.
- (HAVE\_DOSISH\_SYSTEM): Likewise.
- (HAVE\_DRIVE\_LETTERS): Likewise.
- (GPG\_PATH): Likewise.
- (GPGSM\_PATH): Likewise.
- \* acinclude.m4 (GNUPG\_CHECK\_TYPEDEF): Likewise.

2002-04-01 Werner Koch <wk@gnupg.org>

Released 0.3.5.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: Add automake conditional HAVE\_DOSISH\_SYSTEM.

2002-03-04 Werner Koch <wk@gnupg.org>

- \* configure.ac: Bumbed version to 0.3.4-cvs to continue development.

Released 0.3.4.

- \* configure.ac: Bumbed LT version numbers to (7,1,0), requires gpgsm 0.3.1.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac (AC\_INIT): Change version number to snapshot CVS version.

2002-02-13 Werner Koch <wk@gnupg.org>

- \* configure.ac (vasprintf,fopencookie): Add checks.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac (AC\_INIT):  
Bump version to 0.3.3.
- \* jnlib/Makefile.am: Revert to older version that includes xmalloc but not dotlock and some other files. Reported by Stphane Corttsy.

2002-02-10 Marcus Brinkmann <marcus@g10code.de>

- \* Released 0.3.2.

\* configure.ac (AC\_INIT): Bump version to 0.3.2.  
\* jnlib/libjnlibconfig.h: Revert to older version that doesn't expect libgcrypt. Reported by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* Released 0.3.1.

\* configure.ac (LIBGPGME\_LT\_CURRENT): Bump it up to 6!  
(NEED\_GPGSM\_VERSION): Bump it up to 0.3.0!  
(AC\_INIT): Bump version to 0.3.1

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (HAVE\_JNLIB\_LOGGING): Define always for assuan.

2001-12-19 Werner Koch <wk@gnupg.org>

\* configure.ac (VERSION,PACKAGE): Defined and subst. Used for AM\_INIT\_AUTOMAKE and moved all version number more to the top.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh (libtool\_vers):  
Bump to 1.4.

\* configure.ac (LIBGPGME\_LT\_CURRENT): Increment.  
(LIBGPGME\_LT\_AGE): Reset.  
Improve comment.  
Fix wrong comment character.

2001-12-18 Werner Koch <wk@gnupg.org>

\* acinclude.m4 (GNUPG\_FIX\_HDR\_VERSION): Fixed for new automake.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (GPG): Substitute this variable.  
(GPGSM): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_CONFIG\_FILES): Add tests/gpg/Makefile and tests/gpgsm/Makefile.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>



\* Makefile.am (gpgmeplug): New variable, set to gpgmeplug if [BUILD\_GPGMEPLUG].  
\* configure.ac (AC\_CONFIG\_FILES): Add gpgmeplug/Makefile. Support --enable-gpgmeplug.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh: Tighten version dependencies.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (SUBDIRS): Support building the assuan library (currently if GPGSM\_PATH is set)..  
\* configure.ac: Support building the assuan library.  
\* assuan: New directory, populated with the Assuan library (copied from the newpg repository).

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPGSM\_VERSION): New variable. Treat it similarly to NEED\_GPG\_VERSION.  
\* acconfig.h: Likewise.

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

\* configure.in: Renamed to ...  
\* configure.ac: ... this. Update to autoconf 2.52. Lots of small changes in the transition. Support --with-gpg=PATH and --with-gpgsm=PATH options. Check if test suites can be run.  
\* acconfig.h: Add GPGSM\_PATH.  
\* Makefile.am: New variable `tests', set to `tests' if RUN\_GPG\_TESTS.  
(SUBDIRS): Replace string `tests' with variable `tests'.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh: Invoke automake with `-a' (add missing files). Do not invoke configure.

2001-09-17 Werner Koch <wk@gnupg.org>

Released 0.2.3.

\* configure.in (NEED\_GPG\_VERSION): Set to 1.0.6. Incremented LT current

and age.

\* Makefile.am (SUBDIRS): Add doc

2001-06-12 Werner Koch <wk@gnupg.org>

Released 0.2.2.

2001-04-05 Werner Koch <wk@gnupg.org>

\* configure.in (NEED\_GPG\_VERSION): Set to 1.0.4g

2001-04-02 Werner Koch <wk@gnupg.org>

Released 0.2.1.

Changed the copyright notices all over the place.

2001-02-28 Werner Koch <wk@gnupg.org>

Released 0.2.0.

2001-01-18 Werner Koch <wk@gnupg.org>

\* autogen.sh: Added option --build-w32.

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2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-05-11 Marcus Brinkmann <marcus@g10code.com>

\* gpgsm/Makefile.am (DISTCLEANFILES): Move to ...  
(CLEANFILES): ... here.

(clean-local): New rule.

\* gpg/Makefile.am (DISTCLEANFILES): Move to ...

(CLEANFILES): ... here.

2011-05-05 Marcus Brinkmann <marcus@g10code.com>

\* gpg/Makefile.am: Unset GPG\_AGENT\_INFO when setting up local configuration.

(clean-local): Shut down local gpg-agent.

2011-05-04 Marcus Brinkmann <marcus@g10code.com>

\* gpg/t-import.c (check\_result): Complete secret key pair counting and disable status check, as GPG 2.1 currently emits two IMPORT\_OK lines and we only look at the first.

2011-04-27 Marcus Brinkmann <marcus@g10code.com>

\* gpg/Makefile.am (DISTCLEANFILES):

Add S.gpg-agent.

(mkdemodirs, ./Alpha/Secret.gpg): Remove targets.

(GNUPGHOME): Export as absolute build directory (for gpg-agent).

(./pubring.gpg): Remove --homedir option, import secdemo.asc.

(clean-local): Rewrite.

\* gpg/secdemo.asc: New file.

\* gpg/pubkey-1.asc, gpg/seckey-1.asc: Change passphrase to "abc" (now needed as GnuPG 2.1 asks for secret key passphrase on import).

\* gpg/t-keylist.c (keys): Update key info for Joe Random Hacker.

(main): Disable check for can\_encrypt, as this is now in a different subkey.

\* gpg/t-encrypt-sign.c (check\_result): Allow RMD160 hash algorithm.

\* gpg/t-import.c (check\_result): One secret key pair now counts as two secret keys, allow that.

2009-11-03 Werner Koch <wk@g10code.com>

\* run-support.h (fail\_if\_err): Include program name.

\* run-sign.c (main): Add option --uiserver.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

\* opassuan/t-command.c: Update to new interface.

2009-10-15 Werner Koch <wk@g10code.com>

\* run-verify.c:

New.

2009-08-06 Werner Koch <wk@g10code.com>

\* run-sign.c: New.

2009-07-07 Werner Koch <wk@g10code.com>

\* run-keylist.c (main): Add options --cms and --openpgp.

\* gpg/pgp-keylist.c: Rename to ...

\* run-keylist.c: ... this.

\* gpg/pgp-import.c: Rename to ...

\* run-import.c: ... this.

\* gpg/pgp-export.c: Rename to ...

\* run-export.c: ... this.

\* run-support.h: New. Copied from gpg/t-support.h.

\* gpg/Makefile.am (noinst\_PROGRAMS): Remove them.

\* Makefile.am (noinst\_PROGRAMS): Add them.

(noinst\_HEADERS): New.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-support.h (passphrase\_cb): Implement write() according to the book to silence compiler warning.

\* gpgsm/t-support.h (passphrase\_cb): Likewise.

2009-06-16 Werner Koch <wk@g10code.com>

\* gpg/pgp-import.c: New.

\* gpg/t-support.h (print\_import\_result, nonnull): Factored out from other tools.

\* gpg/pgp-export.c, gpg/pgp-keylist.c: New.

2009-06-09 Werner Koch <wk@g10code.com>

\* gpg/Makefile.am

(./pubring.gpg): Ignore errors in case of already imported keys. Add --no-permission-warning and remove obsolete --allow-secret-key-import.

\* gpg/mkdemodirs.in (GPG): Add --no-permission-warning.

\* gpg/t-edit.c (edit\_fnc): Use gpgme\_io\_write.

2009-04-19 Moritz <moritz@gnu.org>

\* gpg/Makefile.am (EXTRA\_DIST): Replaced mkdemodirs with mkdemodirs.in.  
(mkdemodirs): New target.  
(clean-local): Added command for removing mkdemodirs script.  
(./Alpha/Secret.gpg): Added dependency on mkdemodirs.

\* gpg/mkdemodirs: Renamed to ...  
\* gpg/mkdemodirs.in: ... here.  
\* gpg/mkdemodirs.in (GPG): Derive value from @GPG@ instead of  
hard-coding "gpg".

2009-02-24 Werner Koch <wk@g10code.com>

\* opassuan/t-command.c: Adjust for changed new op\_assuan interface.

2009-02-03 Werner Koch <wk@g10code.com>

\* gpg/t-keylist.c (main): Check that new fields is\_cardkey and  
card\_number are not set.

2009-01-26 Werner Koch <wk@g10code.com>

\* opassuan/: New.  
\* opassuan/Makefile.am:  
New.  
\* opassuan/t-command.c: New.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (INCLUDES): Fix path to include file.  
\* gpg/Makefile.am (INCLUDES), gpgsm/Makefile.am (INCLUDES): Likewise.

2008-11-18 Werner Koch <wk@g10code.com>

\* gpgsm/cms-decrypt.c: New.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

\* gpgsm/Makefile.am (INCLUDES, LDADD): Replace gpgme path with src.  
\* gpg/Makefile.am (INCLUDES, LDADD, t\_thread1\_LDADD): Likewise.  
\* Makefile.am (LDADD): Likewise.

2008-10-30 Werner Koch <wk@g10code.com>

\* gpgsm/cms-keylist.c: New.

2008-06-19 Werner Koch <wk@g10code.com>

\* gpg/t-gpgconf.c (dump\_arg): Add new types. Print strings in

quotes.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (DISTCLEANFILES): Add pubring.kbx~.

2008-01-10 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-gpgconf.c (main): Allow for dirmngr not to be available.

\* gpg/Makefile.am (./gpg-agent.conf): Correct pinentry path.

\* gpg/pinentry:

New file.

\* gpg/Makefile.am (DISTCLEANFILES, all-local): Add gpg-agent.conf

(./gpg-agent.conf): New target.

(EXTRA\_DIST): Add pinentry.

\* gpg/t-gpgconf.c (main): Exit early if compiled without gpgconf.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (CLEANFILES): Add pubring.kbx and dirmngr.conf.

\* Makefile.am (TESTS\_ENVIRONMENT): Use absolute path for GNUPGHOME.

\* gpg/Makefile.am (TESTS\_ENVIRONMENT): Use absolute path for GNUPGHOME.

\* gpgsm/Makefile.am (TESTS\_ENVIRONMENT): Use absolute path for GNUPGHOME.

\* gpg/Makefile.am (TESTS): Add t-gpgconf.

t-gpgconf.c: New file.

2007-11-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (show\_auditlog): Check for GPG\_ERR\_ASS\_UNKNOWN\_CMD.

2007-11-23 Werner Koch <wk@g10code.com>

\* gpgsm/t-verify.c (check\_result): Don't exit on error but set a flag.

(main): Consult flag for return value.

(show\_auditlog): New.

(main): Use it.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

\* t-engine-info.c

(check\_engine\_info): Fix debug output.

\* gpg/Makefile.am (tests\_unix): New variable.

(TESTS): Use it.

\* gpg/t-support.h (passphrase\_cb) [HAVE\_W32\_SYSTEM]: Use WriteFile instead of write.

\* gpg/t-wait.c [HAVE\_W32\_SYSTEM]: Define sleep as \_sleep.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (main): Release TEXT and SIG.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (key\_id): Change := into =.

2007-07-12 Werner Koch <wk@g10code.com>

\* gpgsm/t-support.h (init\_gpgme) [W32]: Do not init the locales as the constants are not available.

2007-02-26 Werner Koch <wk@g10code.com>

\* gpg/t-verify.c (double\_plaintext\_sig): New.

(main): Check it.

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (main): Skip unknown keys. Newer versions of GPGSM import more keys than older ones.

2005-12-06 Werner Koch <wk@g10code.com>

\* gpg/t-keylist.c (main): Changed for that secondary keys now have a fingerprint.

\*

gpg/t-keylist-sig.c (main): Ditto.

\* gpgsm/t-keylist.c (main): Ditto. The test used to be wrong.

2005-10-18 Werner Koch <wk@g10code.com>

\* gpg/pubdemo.asc, gpg/secdemo.asc: Add 2 expired subkeys to Whisky.

\* gpg/t-keylist.c: Reordered list to match new demo keyring. Add arg for number of subkeys and for extra checking function.

(main): Enhanced a few error outputs. Changed subkey counting. Call extra checking function.

(check\_whisky): New.

2005-10-07 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (main): Allow for an email address as a second uid.

\* gpg/t-sig-notation.c: Change critical notation to something GnuPG understands.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (EXTRA\_DIST): Remove gpg.conf.  
(DISTCLEANFILES): Add gpg.conf.  
(all-local): Add gpg.conf.  
(./gpg.conf): New target.  
\* gpg/gpg.conf: Remove file.

\* gpg/Makefile.am (EXTRA\_DIST): Add gpg.conf.

\* gpg/Makefile.am (TESTS): Add t-sig-notation.  
\* gpg/t-sig-notation.c  
(check\_result): New file.  
\* gpg/t-verify.c (check\_result): Also check the length of the notation data.  
\* gpg/gpg.conf: New file.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (TESTS): Add t-filename.  
\* gpg/t-filename.c: New file.

2005-09-23 Werner Koch <wk@g10code.com>

\* gpg/t-support.h (init\_gpgme) [W32]: Don't use LC\_MESSAGES.  
  
\* gpg/t-encrypt-large.c: New test.  
\* gpg/Makefile.am (TESTS): Add t-encrypt-large.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (TESTS): Add t-wait.  
\* gpg/t-wait.c (main): New test.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

\* gpg/mkdemodirs: Add copyright notice.  
  
\* gpgsm/Makefile.am, gpgsm/t-support.h, gpgsm/t-decrypt.c,  
gpgsm/t-encrypt.c, gpgsm/t-export.c, gpgsm/t-genkey.c,  
gpgsm/t-import.c, gpgsm/t-keylist.c, gpgsm/t-sign.c,



gpgsm/t-verify.c, gpg/Makefile.am, gpg/t-decrypt.c,  
gpg/t-decrypt-verify.c, gpg/t-edit.c, gpg/t-encrypt.c,  
gpg/t-encrypt-sign.c, gpg/t-encrypt-sym.c,  
gpg/t-eventloop.c,  
gpg/t-export.c, gpg/t-genkey.c, gpg/t-import.c, gpg/t-keylist.c,  
gpg/t-keylist-sig.c, gpg/t-sign.c, gpg/t-signers.c,  
gpg/t-support.h, gpg/t-thread1.c, gpg/t-trustlist.c,  
gpg/t-verify.c, Makefile.am, t-data.c, t-engine-info.c,  
t-version.c: Change license to LGPL.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (struct): Add new fields VALIDITY and  
KEY\_LENGTH.

(main): Use them.

\* gpgsm/t-import.c (check\_result): New argument total\_stat.

(main): Pass this argument. Reduce number of total considered  
keys to 1 for the second test.

2004-04-05 Werner Koch <wk@gnupg.org>

\* gpgsm/Makefile.am: Changed the faked system time to 20011213T12000.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c: Add chain IDs.

2004-03-03 Werner Koch <wk@gnupg.org>

\* gpgsm/t-export.c (main): Also check exporting 2 certificates.

2004-02-17 Werner Koch <wk@gnupg.org>

\* gpgsm/t-import.c (check\_result): gpgsm does now  
return info in  
the result->imports; adjust for that.

\* gpgsm/Makefile.am (TESTS\_ENVIRONMENT): Reset the GPG\_AGENT\_INFO.

Include config.h at the top of each C source. This is required  
due to LFS support.

\* gpg/t-keylist-sig.c (main): s/class/sig\_class/.

\* gpg/t-signers.c (check\_result): Ditto.

\* gpg/t-sign.c (check\_result): Ditto.

\* gpg/t-encrypt-sign.c (check\_result): Ditto.

\* gpgsm/t-sign.c (check\_result): Ditto.

2004-01-12 Werner Koch <wk@gnupg.org>

- \* gpg/t-keylist-sig.c (main): Temporary disabled one test due top gpg 1.3.4 problems.
- \* gpg/t-import.c (check\_result): Likewise.

2003-11-19 Werner Koch <wk@gnupg.org>

- \* gpg/t-support.h (DIM): Added.
- \* gpg/t-verify.c (check\_result): Rewrote test for notations because the order of notations is not guaranteed.
- \* gpgsm/t-support.h (fail\_if\_err): Also print the numeric values.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-eventloop.c: Include <sys/types.h> for old systems.
- \* gpgsm/Makefile.am (DISTCLEANFILES): Add random\_seed.
- \* gpg/t-thread1.c (thread\_one): Do not call initialize\_gpgme. Likewise.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-thread1.c (main): Call init\_gpgme here. (initialize\_gpgme): Function removed.
- \* gpg/t-thread1.c: New file.
- \* gpg/Makefile.am (TESTS): Add t-thread1.c. (t\_thread1\_LDADD): New variable. (LDADD): Remove GPG Error lib.
- \* gpgsm/Makefile.am (LDADD): Likewise.
- \* gpg/t-import.c (main): Likewise.
- \* gpg/t-keylist-sig.c (main): Likewise.
- \* gpg/t-keylist.c (main): Likewise.
- \* gpg/t-sign.c (main): Likewise.
- \* gpg/t-signers.c (main): Likewise.
- \* gpg/t-trustlist.c (main): Likewise.
- \* gpgsm/t-support.h: Include <stdlib.h> and <locale.h>. (init\_gpgme): New function.
- \* gpg/t-support.h: Likewise.
- \* gpgsm/t-verify.c (main): Call init\_gpgme.
- \* gpgsm/t-decrypt.c (main): Likewise.
- \* gpgsm/t-encrypt.c (main): Likewise.

- \* gpgsm/t-export.c (main): Likewise.
- \* gpgsm/t-genkey.c (main): Likewise.
- \* gpgsm/t-import.c (main):  
Likewise.
- \* gpgsm/t-keylist.c (main): Likewise.
- \* gpgsm/t-sign.c (main): Likewise.
- \* gpg/t-verify.c (main): Call init\_gpgme.
- \* gpg/t-decrypt-verify.c (main): Likewise.
- \* gpg/t-decrypt.c (main): Likewise.
- \* gpg/t-edit.c (main): Likewise.
- \* gpg/t-encrypt-sign.c (main): Likewise.
- \* gpg/t-encrypt-sym.c (main): Likewise.
- \* gpg/t-encrypt.c (main): Likewise.
- \* gpg/t-eventloop.c (main): Likewise.
- \* gpg/t-export.c (main): Likewise.
- \* gpg/t-genkey.c (main): Likewise.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-sign.c (check\_result): Change output format for signature class to unsigned int.
- \* gpg/t-signers.c (check\_result): Likewise.
- \* gpg/t-encrypt-sign.c (check\_result): Likewise.
- \* gpgsm/t-sign.c (check\_result): Likewise.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-verify.c (check\_result): Change type of SUMMARY to unsigned int.
- \* gpg/t-decrypt-verify.c (check\_verify\_result): Likewise.
- \* gpg/t-keylist-sig.c (keys): Change type of member CLASS to unsigned int.
- \* t-data.c (read\_cb): Change type of AMOUNT to unsigned int.
- \* t-version.c (version): Remove unused variable.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (AM\_CPPFLAGS): New variable.  
(LDADD): Add @GPG\_ERROR\_LIBS@.
- \* gpg/Makefile.am (AM\_CPPFLAGS): New variable.  
(LDADD): Add @GPG\_ERROR\_LIBS@.
- \* gpgsm/Makefile.am (AM\_CPPFLAGS): New variable.  
(LDADD): Add @GPG\_ERROR\_LIBS@.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

- \* gpg/Makefile.am (noinst\_HEADERS): New variable.
- \* gpg/t-support.h: New file.
- \* gpgsm/Makefile.am (noinst\_HEADERS): New variable.
- \* gpgsm/t-support.h: New file.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-encrypt-sym.c (main): Adapt to new syntax.
- \* gpg/t-encrypt.c (main): Likewise.
- \* gpg/t-eventloop.c (main): Likewise.
- \* gpg/t-encrypt-sign.c (main): Likewise.
- \* gpgsm/t-export.c (main): Likewise.
- \* gpgsm/t-encrypt.c (main): Likewise.

2003-05-28 Marcus  
Brinkmann <marcus@g10code.de>

- \* gpg/t-eventloop.c (main): Rewrite recipient management.
- \* gpg/t-encrypt-sign.c (main): Likewise.
- \* gpg/t-encrypt.c (main): Likewise.
- \* gpg/t-export.c (main): Likewise.
- \* gpgsm/t-encrypt.c (main): Likewise.
- \* gpgsm/t-export.c (main): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/Makefile.am (TESTS): Order t-keylist and t-keylist-sig after t-import.
- \* gpg/t-edit.c (edit\_fnc): Fix primary UID for keylisting tests.
- \* gpg/t-keylist.c: Change order of user IDs.
- \* gpg/t-keylist-sig.c: Likewise.
- \* gpg/t-import.c: Add support for gpg in CVS.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

- \* t-data.c: Remove TEST\_OUT\_CB.  
(main): Likewise.
- \* gpg/t-trustlist.c (main): Access ITEM directly.
- \* (t-decrypt-verify.c, t-decrypt.c, t-edit.c, t-encrypt-sign.c, t-encrypt-sym.c, t-sign.c, t-signers.c): Include <unistd.h>.  
(passphrase\_cb): Rewritten.
- \* t-edit.c (edit\_fnc): Rewritten.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

\*

gpg/t-keylist-sig.c (main): Remove timestamp check.

\* gpgsm/t-keylist.c: Add check for timestamp.

\* gpg/Makefile.am (TESTS): Add t-keylist-sig.

\* gpg/t-keylist-sig.c: New file.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-eventloop.c (main): Do not call print\_op\_info.

(print\_op\_info): Function removed.

\* gpg/t-keylist.c: Rewritten.

\* gpgsm/t-keylist.c (main): Rewritten.

\* gpg/t-edit.c (main): Do not use gpgme\_key\_get\_as\_xml. Use gpgme\_key\_unref instead gpgme\_key\_release.

\* gpg/t-signers.c (main): Use gpgme\_key\_unref instead gpgme\_key\_release.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-trustlist.c: Rewritten.

\* gpg/t-verify.c (main): Rewritten.

\* gpg/t-decrypt-verify.c: Rewritten.

\* gpgsm/t-verify.c (main): Rewritten.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-decrypt.c (main): Rewritten.

\* gpg/t-decrypt.c: Rewritten.

\* gpg/t-signers.c: Rewritten.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

\*

gpg/t-encrypt-sign.c (check\_result): Rewritten.

\* gpg/t-sign.c: Rewritten.

\* gpgsm/t-sign.c: Rewritten.

\* gpg/t-encrypt.c: Check for invalid recipients.

\* gpgsm/t-encrypt.c: Likewise.

\* gpg/t-import.c (check\_result): Really use FPR.

\* gpgsm/t-import.c (check\_result): Rewritten.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-import.c: Rewritten.
- \* gpgsm/t-genkey.c: Rewritten.
- \* gpgsm/Makefile.am (noinst\_PROGRAMS): Add t-genkey.
- \* gpg/t-genkey.c: Include <stdlib.h>.
- (main): Check result->fpr before checking its length.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-genkey.c: Rewritten to match new semantics.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-decrypt.c (passphrase\_cb): Fix to new prototype.
- \* gpg/t-decrypt-verify.c (passphrase\_cb): Likewise.
- \* gpg/t-edit.c (passphrase\_cb): Likewise.
- \* gpg/t-encrypt-sign.c (passphrase\_cb): Likewise.
- \* gpg/t-encrypt-sym.c (passphrase\_cb): Likewise.
- \* gpg/t-sign.c (passphrase\_cb): Likewise.
- \*
- gpg/t-signers.c (passphrase\_cb): Likewise.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

- \* t-engine-info.c: Use file\_name instead path throughout.
- \* Makefile.am (TESTS): Add t-engine-info.
- \* t-engine-info.c: New file.
- \* gpg/t-encrypt.c (main): Don't print engine info.
- \* gpg/t-eventloop.c (main): Likewise.
- \* gpg/t-encrypt-sign.c (main): Likewise.
- \* gpgsm/t-encrypt.c (main): Likewise.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

- \* gpgsm/t-verify.c (main): Adjust caller of gpgme\_op\_verify.
- \* gpg/t-verify.c (main): Likewise.
- \* gpg/t-decrypt-verify.c (main): Likewise for gpgme\_op\_decrypt\_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

- \* gpgsm/Makefile.am (./gpgsm.conf): Add a faked system time to avoid certification's expiry.
- \* gpgsm/t-encrypt.c (main): Use the short certification name.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-genkey.c (main): Add missing argument to gpgme\_op\_genkey invocation.

2002-10-09 Marcus Brinkmann

<marcus@g10code.de>

\* gpg/t-decrypt.c (print\_data): Update to new gpgme\_data\_read interface, and use gpgme\_engine\_check\_version instead gpgme\_check\_version.

\* gpg/t-decrypt-verify.c (print\_data): Likewise.

\* gpg/t-edit.c (main): Likewise.

\* gpg/t-encrypt.c (print\_data): Likewise.

\* gpg/t-encrypt-sign.c (print\_data): Likewise.

\* gpg/t-encrypt-sym.c (print\_data): Likewise.

\* gpg/t-eventloop.c (print\_data): Likewise.

\* gpg/t-export.c (print\_data): Likewise.

\* gpg/t-sign.c (print\_data): Likewise.

\* gpg/t-signers.c (print\_data): Likewise.

\* gpgsm/t-decrypt.c (print\_data): Likewise.

\* gpgsm/t-encrypt.c (print\_data): Likewise.

\* gpgsm/t-export.c (print\_data): Likewise.

\* gpgsm/t-sign.c (print\_data): Likewise.

\* gpg/t-verify.c (main): Likewise for gpgme\_op\_verify.

\* gpgsm/t-verify.c (main): Likewise for gpgme\_op\_verify.

\* t-data.c (read\_once\_test): Likewise.

(write\_test): Update for new behaviour of data objects.

(main): Remove type test.

2002-09-30 Werner Koch <wk@gnupg.org>

\*

gpgsm/t-keylist.c (doit): Add arg SECRET.

(main): Add option --secret.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

\* t-version.c: Include <string.h>. Reported by Stphane Corthsy.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-keylist.c (main): Test PATTERN for NULL before printing.

Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-08-01 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-edit.c: Also add a test for the expire command (testing

the passphrase callback).

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-edit.c: New file.
- \* gpg/Makefile (TESTS): Add t-edit.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-encrypt-sym.c (main): Change type of I to size\_t and rename to LEN.
- \* gpg/t-verify.c (main): Likewise. Submitted by Stphane Corthsy.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-eventloop.c: New file.
- \* gpg/Makefile (TESTS): Add t-eventloop.

2002-06-26 Werner Koch <wk@gnupg.org>

- \*
- gpgsm/t-import.c (print\_op\_info): New.
- (main): Print operation info.

2002-06-25 Werner Koch <wk@gnupg.org>

- \* gpgsm/Makefile.am (DISTCLEANFILES): new.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

- \* gpgsm/Makefile.am (TESTS): Add t-export.
- gpgsm/t-export.c: New file.

2002-06-20 Werner Koch <wk@gnupg.org>

- \* gpgsm/t-sign.c (main): Also test a normal signature.
- \* gpg/Makefile (TESTS\_ENVIRONMENT): Set GPG\_AGENT\_INFO empty.
- \* gpg/t-signers.c, gpg/t-sign.c, gpg/t-encrypt-sym.c
- \* gpg/t-encrypt-sign.c, gpg/t-decrypt.c
- \* gpg/t-decrypt-verify.c (main): Changed the GPG\_AGENT\_INFO check to match the one in ../../gpgme/runpg.c.

2002-06-12 Werner Koch <wk@gnupg.org>

- \* gpgsm/t-keylist.c (doit): Print operation info if available.



2002-06-10 Werner Koch <wk@gnupg.org>

\* gpgsm/t-verify.c (print\_sig\_stat): Print the error token.

2002-06-04 Werner Koch <wk@gnupg.org>

\* gpgsm/t-encrypt.c (main): Add a simple option parser and allow to specify an encryption key.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (all-local): Remove dependency on ./secreting.gpg.  
(./secreting.gpg): Remove target, and move all rules for this target to ...  
(./pubring.gpg): ... here. This was necessary because GnuPG 1.0.7 does create an empty secreting.gpg file when importing public keys.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (validity\_string): New.  
(print\_sig\_stat): Print expire time and validity.  
(status\_string): Add new expired stati.

2002-05-03 Werner Koch <wk@gnupg.org>

\* gpg/t-verify.c (validity\_string): New.  
(print\_sig\_stat): Print expire time and validity.  
(status\_string): Add new expired stati.

2002-04-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (./trustlist.txt): Put more into this file to prevent use of gpg-agent.  
(./gpg-agent.conf): Remove target.  
(all-local): Remove ./gpg-agent.conf.

2002-04-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c  
(main): Use gpgme\_engine\_check\_version instead  
gpgme\_check\_engine.  
\* gpgsm/t-encrypt.c (main): Likewise.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-encrypt-sym.c: New file.  
\* gpg/Makefile.am (TESTS): Add t-encrypt-sym.

2002-03-05 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (CLEANFILES): Remove random\_seed, which is now in DISTCLEANFILES.

2002-03-04 Werner Koch <wk@gnupg.org>

\* gpg/Makefile.am (DISTCLEANFILES): Added.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-verify.c (main): Add a few more sanity checks, and a check for normal signatures.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-encrypt-sign.c: New file.

\* gpg/Makefile.am (TESTS): Add t-encrypt-sign.

2002-02-13 Werner Koch <wk@gnupg.org>

\* gpgsm/Makefile.am (private-keys-v1.d): Don't fail when the directory already exists.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (CLEANFILES): New target.

(distclean-local): Rename to

...

(clean-local): ... this.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (./private-keys-v1.d/\$(key\_id).key): Fix rule.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-genkey.c: New file (not added to Makefile.am because of gpg-agent bug).

2002-02-08 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (key\_id): Update value.

(all-local): Add .key to keyid filename.

(./private-keys-v1.d/\$(key\_id)): Renamed to ...

(./private-keys-v1.d/\$(key\_id).key): ... this.

(all-local): Add ./gpgsm.conf, ./trustlist.txt.

(./gpgsm.conf, ./trustlist.txt): New target.

\* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Renamed to ...

\* gpgsm/32100C27173EF6E9C4E9A25D3D69F86D37A4F939: ... this.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-import.c (print\_op\_info): New function.

(main): Use it.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-signers.c (passphrase\_cb): Change type of r\_hd to void\*\*.

\* gpg/t-sign.c (passphrase\_cb):

Likewise.

\* gpg/t-decrypt-verify.c (passphrase\_cb): Likewise.

\* gpg/t-decrypt.c (passphrase\_cb): Likewise.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-decrypt-verify.c: Don't include `mcheck.h'. Reported by  
Stphane Corthisy.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (EXTRA\_DIST): Add missing line continuation.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (EXTRA\_DIST): Add \$(key\_id).

2001-12-16 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile: Rename `pubcerts.kbx' to `pubring.kbx'.

2001-12-15 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (check\_two\_contexts): Set protocols.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-sign.c: New file.

\* gpgsm/Makefile.am (TESTS): Add t-sign.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-decrypt.c: New file.

\* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Likewise.

\* gpgsm/Makefile.am (TESTS): Add

t-decrypt.  
(key\_id): New variable.  
(all-local): New target ./private-keys-v1.d/\$(key\_id) added.  
(./private-keys-v1.d/\$(key\_id)): New target.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c: New file.  
\* gpgsm/Makefile.am (TESTS): Add t-verify.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (GPG): Set to @GPG\_PATH@.  
(./pubring.gpg): Use \$(GPG) instead gpg.  
(./secring.gpg): Likewise.

\* gpgsm/t-import.c (main): Remove third test case.  
\* gpgsm/Makefile.am (GPGSM): Set to @GPGSM@.  
(all-local): New target.  
(./pubcerts.kbx): Likewise.  
\* gpgsm/t-encrypt.c: New file.  
\* gpgsm/Makefile.am (TESTS): Add t-encrypt.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c: New file.  
\* gpgsm/Makefile.am (TESTS): Add t-keylist.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/cert\_dfn\_pca01.der: New file.  
\* gpgsm/cert\_dfn\_pca15.der: Likewise.  
\* gpgsm/cert\_g10code\_test1.der: Likewise.  
\* gpgsm/t-import.c: Likewise.  
\*  
gpgsm/Makefile.am (EXTRADIST): Add new files.  
(TESTS): Add t-import.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* gpg/: New directory.  
\* Makefile.am, t-verify.c, t-encrypt.c, t-signers.c, t-trustlist.c,  
t-sign.c, t-keylist.c, t-import.c, t-genkey.c, t-export.c,  
t-decrypt-verify.c, t-decrypt.c, t-version.c, t-data.c, mkdemodirs.  
cipher-1.asc, cipher-2.asc, geheim.txt, pubdemo.asc, pubkey-1.asc,  
secdemo.asc, seckey-1.asc): Move to sub directory gpg/.  
\* gpg/Makefile.am (INCLUDES): Include gpgme/, not include/ and

intl/.

(LDD): Correct relative path to gpgme library.

(TESTS): Remove t-version and t-data.

\* gpg/t-verify.c, gpg/t-encrypt.c, gpg/t-signers.c, gpg/t-trustlist.c,  
gpg/t-sign.c, gpg/t-keylist.c, gpg/t-import.c, gpg/t-genkey.c,  
gpg/t-export.c, gpg/t-decrypt-verify.c, gpg/t-decrypt.c,  
t-version.c, t-data.c): Include gpgme.h, not "../gpgme/gpgme.h".

\* Makefile.am: New file.

\* gpgsm/: New directory.

\* gpgsm/Makefile.am: New file.

2001-11-16 Marcus

Brinkmann <marcus@g10code.de>

\* Makefile.am (TESTS): Add t-decrypt-verify.

\* t-decrypt-verify.c: New file.

\* cipher-2.asc: Likewise.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

\* t-data.c: Include stddef.h.

(read\_once\_test): Change type of READ to size\_t.

(read\_test): Likewise.

(write\_test): Likewise.

2001-10-29 Marcus Brinkmann <marcus@g10code.de>

\* t-signers.c: New file.

\* Makefile.am (TESTS): Add t-signers.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (TEST\_ENVIRONMENT): Revert last change.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (TEST\_ENVIRONMENT): Set environment to \$(srcdir),  
not current directory.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* t-data.c (write\_test): New function.

(main): Invoke write\_test for all rounds except TEST\_OUT\_CB.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (INCLUDES): Remove spurious duplicate to silence

automake.

2001-10-16 Marcus Brinkmann <marcus@g10code.de>

\*

t-version.c: New file.

\* t-data.c: Likewise.

\* t-data-1.txt: Likewise.

\* t-data-2.txt: Likewise.

\* Makefile.am (TESTS): Add t-version, t-data.

2001-09-17 Werner Koch <wk@gnupg.org>

\* t-keylist.c (check\_two\_contexts): New.

2001-09-03 Werner Koch <wk@gnupg.org>

\* t-encrypt.c (print\_op\_info): New and use it after each operation.

2001-08-28 Werner Koch <wk@gnupg.org>

\* t-sign.c (print\_op\_info): New and use it after each operation.

2001-03-15 Werner Koch <wk@gnupg.org>

\* t-keylist.c (doit): List subkeys too, show caps.

2001-02-13 Werner Koch <wk@gnupg.org>

\* t-verify.c (print\_sig\_stat): Repaled along by unsigned long because we don't use the config stuff here.

2001-02-12 Werner Koch <wk@gnupg.org>

\* tests/t-verify.c (print\_sig\_stat): Print info about the keys.

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```

(11:private-key(3:dsa(1:p129:eC_L&$2,6tx.gh1VirIqI9
,^g3.$DveUvX1'oIj)(1:q21: #UfK2z(tuVG)(1:g128:zu^Rab;qeQQA B?/6/aspfE/
gx!Mr0YY*oMrJc2xWG:.r6)(1:y128:Ufj^@oEn4j#QrRq" RcEa E/}4C[3A
5+~~.#!+
)W&5d)ij)(1:x21:`)))
libgpgme.vers - List of symbols to export.
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#
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#-----
Please remember to add new functions also to gpgme.def
#-----

GPGME_1.1 {
global:
 gpgme_set_engine_info;

 gpgme_ctx_get_engine_info;
 gpgme_ctx_set_engine_info;

 gpgme_data_set_file_name;
 gpgme_data_get_file_name;
 gpgme_data_identify;

 gpgme_sig_notation_clear;
 gpgme_sig_notation_add;
 gpgme_sig_notation_get;

 gpgme_free;

 gpgme_op_getauditlog_start;
 gpgme_op_getauditlog;

 gpgme_conf_release;

```

gpgme\_conf\_arg\_new;  
gpgme\_conf\_arg\_release;  
gpgme\_conf\_opt\_change;  
gpgme\_op\_conf\_load;  
gpgme\_op\_conf\_save;  
gpgme\_op\_conf\_dir;

gpgme\_cancel\_async;

gpgme\_op\_assuan\_result;  
gpgme\_op\_assuan\_transact;  
gpgme\_op\_assuan\_transact\_start;

gpgme\_check\_version\_internal;

gpgme\_io\_read;  
gpgme\_io\_write;

gpgme\_result\_ref;  
gpgme\_result\_unref;

gpgme\_op\_import\_keys;  
gpgme\_op\_import\_keys\_start;  
gpgme\_op\_export\_keys;  
gpgme\_op\_export\_keys\_start;

gpgme\_op\_assuan\_transact\_ext;

gpgme\_wait\_ext;

gpgme\_op\_vfs\_mount\_result;  
gpgme\_op\_vfs\_mount;  
gpgme\_op\_vfs\_create;

gpgme\_key\_from\_uid;  
gpgme\_set\_sub\_protocol;  
gpgme\_get\_sub\_protocol;

gpgme\_op\_passwd\_start;  
gpgme\_op\_passwd;

gpgme\_set\_global\_flag;

gpgme\_io\_writen;

gpgme\_set\_pinentry\_mode;  
gpgme\_get\_pinentry\_mode;



```
gpgme_get_dirinfo;

gpgme_op_spawn_start;
gpgme_op_spawn;

gpgme_set_offline;
gpgme_get_offline;

gpgme_set_status_cb;
gpgme_get_status_cb;

gpgme_pubkey_algo_string;
gpgme_set_ctx_flag;
gpgme_get_ctx_flag;
gpgme_data_set_flag;

gpgme_op_createkey_start;
gpgme_op_createkey;
gpgme_op_createsubkey_start;
gpgme_op_createsubkey;
gpgme_op_adduid_start;
gpgme_op_adduid;
gpgme_op_revuid_start;
gpgme_op_revuid;
gpgme_op_keysign_start;
gpgme_op_keysign;
gpgme_op_tofu_policy_start;
gpgme_op_tofu_policy;
gpgme_op_interact_start;
gpgme_op_interact;

gpgme_addrspec_from_uid;

gpgme_set_sender;
gpgme_get_sender;

gpgme_op_query_swdb;
gpgme_op_query_swdb_result;

gpgme_op_set_uid_flag_start;
gpgme_op_set_uid_flag;

gpgme_op_decrypt_ext;
gpgme_op_decrypt_ext_start;

gpgme_data_new_from_istream;

};
```

```
GPGME_1.0 {
 global:
 gpgme_check_version;
 gpgme_get_engine_info;
 gpgme_engine_check_version;

 gpgme_err_code_from_errno;
 gpgme_err_code_to_errno;
 gpgme_err_make_from_errno;
 gpgme_error_from_errno;
 gpgme_strerror;
 gpgme_strerror_r;
 gpgme_strsource;

 gpgme_data_get_encoding;
 gpgme_data_new;
 gpgme_data_new_from_cbs;
 gpgme_data_new_from_fd;
 gpgme_data_new_from_file;
 gpgme_data_new_from_filepart;
 gpgme_data_new_from_mem;
 gpgme_data_new_from_stream;
 gpgme_data_read;
 gpgme_data_release;
 gpgme_data_release_and_get_mem;
 gpgme_data_seek;
 gpgme_data_set_encoding;
 gpgme_data_write;

 gpgme_get_protocol_name;
 gpgme_hash_algo_name;
 gpgme_pubkey_algo_name;

 gpgme_new;
 gpgme_get_armor;
 gpgme_get_include_certs;
 gpgme_get_io_cbs;
 gpgme_get_keylist_mode;
 gpgme_get_passphrase_cb;
 gpgme_get_progress_cb;
 gpgme_get_protocol;
 gpgme_get_textmode;
 gpgme_release;
 gpgme_set_armor;
 gpgme_set_include_certs;
 gpgme_set_io_cbs;
```

gpgme\_set\_keylist\_mode;  
gpgme\_set\_locale;  
gpgme\_set\_passphrase\_cb;  
gpgme\_set\_progress\_cb;  
gpgme\_set\_protocol;  
gpgme\_set\_textmode;  
gpgme\_signers\_add;  
gpgme\_signers\_clear;  
gpgme\_signers\_count;  
gpgme\_signers\_enum;

gpgme\_key\_ref;  
gpgme\_key\_unref;  
gpgme\_key\_release;

gpgme\_trust\_item\_ref;  
gpgme\_trust\_item\_unref;

gpgme\_cancel;  
gpgme\_op\_card\_edit;  
gpgme\_op\_card\_edit\_start;  
gpgme\_op\_decrypt;  
gpgme\_op\_decrypt\_result;  
gpgme\_op\_decrypt\_start;  
gpgme\_op\_decrypt\_verify;  
gpgme\_op\_decrypt\_verify\_start;  
gpgme\_op\_delete;  
gpgme\_op\_delete\_start;  
gpgme\_op\_delete\_ext;  
gpgme\_op\_delete\_ext\_start;  
gpgme\_op\_edit;  
gpgme\_op\_edit\_start;  
gpgme\_op\_encrypt;  
gpgme\_op\_encrypt\_start;  
gpgme\_op\_encrypt\_ext;  
gpgme\_op\_encrypt\_ext\_start;  
gpgme\_op\_encrypt\_sign;  
gpgme\_op\_encrypt\_sign\_ext;  
gpgme\_op\_encrypt\_sign\_start;  
gpgme\_op\_encrypt\_sign\_ext\_start;  
gpgme\_op\_encrypt\_result;

gpgme\_op\_export;  
gpgme\_op\_export\_ext;  
gpgme\_op\_export\_ext\_start;  
gpgme\_op\_export\_start;  
gpgme\_op\_genkey;  
gpgme\_op\_genkey\_result;

gpgme\_op\_genkey\_start;  
gpgme\_get\_key;  
gpgme\_op\_import;  
gpgme\_op\_import\_result;  
gpgme\_op\_import\_start;  
gpgme\_op\_keylist\_end;  
gpgme\_op\_keylist\_ext\_start;  
gpgme\_op\_keylist\_from\_data\_start;  
gpgme\_op\_keylist\_next;  
gpgme\_op\_keylist\_result;  
gpgme\_op\_keylist\_start;  
gpgme\_op\_sign;  
gpgme\_op\_sign\_result;  
gpgme\_op\_sign\_start;  
gpgme\_op\_trustlist\_end;  
gpgme\_op\_trustlist\_next;  
gpgme\_op\_trustlist\_start;  
gpgme\_op\_verify;  
gpgme\_op\_verify\_result;  
gpgme\_op\_verify\_start;  
gpgme\_wait;

gpgme\_data\_new\_with\_read\_cb;  
gpgme\_data\_rewind;  
gpgme\_get\_sig\_status;  
gpgme\_get\_sig\_string\_attr;  
gpgme\_get\_sig\_ulong\_attr;  
gpgme\_get\_sig\_key;  
gpgme\_key\_get\_string\_attr;  
gpgme\_key\_get\_ulong\_attr;  
gpgme\_key\_sig\_get\_string\_attr;  
gpgme\_key\_sig\_get\_ulong\_attr;  
gpgme\_op\_import\_ext;  
gpgme\_trust\_item\_get\_int\_attr;  
gpgme\_trust\_item\_get\_string\_attr;  
gpgme\_trust\_item\_release;

gpgme\_err\_code\_from\_syserror;  
gpgme\_err\_set\_errno;

gpgme\_op\_setexpire;  
gpgme\_op\_setexpire\_start;

gpgme\_op\_revsign;  
gpgme\_op\_revsign\_start;

local:

\*;

```

};
-*- mode: org -*-
#+TITLE: What's New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

```

\* What's New

```

:PROPERTIES:
:CUSTOM_ID: new-stuff
:END:

```

```

| Version: | 0.0.1 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |

```

Last time the most obviously new thing was adding the /What's New/ section to the HOWTO. Now it's moving it out of the HOWTO.

\*\* New in GPGME 1130

```

:PROPERTIES:
:CUSTOM_ID: new-stuff-1-13-0
:END:

```

Additions since GPGME 1.12.0 include:

- Moving the /What's New/ section out of the basic [\[\[file:pgpme-python-howto.org\]\]](http://file:pgpme-python-howto.org) [HOWTO] document and into its own file so as to more readily include other documents beyond that HOWTO.
- Moving the preceding, archival, segments into [\[\[file:what-was-new.org\]\]](http://file:what-was-new.org) [another file].
- Added `=gpg.version.versionintlist=` to make it easier for Python developers to check for a specific version number, even with beta versions (it will drop the "-betaN" part).
- Added expanded detail on issues pertaining to installing for Windows users.
- Bindings enter [\[\[file:maintenance-mode\]\]](http://file:maintenance-mode) [maintenance mode] from January, 2019.
- Added documentation on maintenance mode and what changes can be made

to the code when in that status. Essentially that boils down to bug fixes only and no feature requests.

- The import-keys-hkp.py example script, which uses the =hkp4py= module to search the SKS servers for a key, has been tightened up to search for both hexadecimal key IDs and user ID strings with reduced chance of unnecessary repetition. There may still be some repetition if a key includes a user ID matching the hexadecimal value of a key ID.

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Version 2.1, February 1999

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to most

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Ty Coon, President of Vice

That's all there is to it!

1603972630

##Sketch 1 2

document()

layout('A4',1)

fp((0,0,0))

ft(1)

Fn('Helvetica-Bold')

Fs(18)

dstyle('Text')

fp((0,1,0.498))

ft(1)

lp((0,0,0))

lw(0.283465)

lc(1)

lj(0)

ld(0)

la1(0)

la2(0)

dstyle('Application Box')

layer('Layer 1',1,1,0,0,(0,0,0))

lw(1)

r(0,0,0,0,688.145,44.1554)

lw(1)

r(0,0,0,0,682.363,85.0359)

lp((0.392,0.584,0.929))

lw(4.25197)

b(0)

bs(605.383,329.758,0)

bs(605.383,230.546,0)

lw(1)

r(0,0,0,0,807.414,53.6148)

lp((0.392,0.584,0.929))

lw(4.25)  
b()  
bs(480.134,240.945,0)  
bs(480.358,325.277,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(474.803,432.284,0)  
bs(475.334,360.243,0)  
lw(3.25)  
ld((1, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(354.331,432.284,0)  
bs(352.806,361.417,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(212.598,432.284,0)  
bs(212.598,361.417,0)  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5968,0,0,-56.6929,191.608,488.976,0.0603744,0.151107)  
lw(1)  
r(0,0,0,0,88.5492,390.805)  
lp((0.392,0.584,0.929))  
lw(4.25197)  
b()  
bs(226.772,524.409,0)  
bs(226.772,488.976,0)  
lp((0.392,0.584,0.929))  
lw(4.25)  
b()  
bs(403.937,528.718,0)  
bs(403.937,488.976,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1,  
1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(240.945,432.284,0)  
bs(240.574,394.994,0)  
bs(595.276,396.85,0)

bs(595.276,361.417,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1, 1))  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(333.071,432.284,0)  
bs(333.07,425.196,0)  
bs(333.07,382.677,0)  
bs(240.945,382.677,0)  
bs(240.945,361.417,0)  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.347,318.897,354.331,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica-Bold')  
Fs(10)  
txt('GPG',(1,0,0,0.905764,344.004,335.686))  
G\_()  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.3464,446.763,354.33,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('GpgConf',(0.552654,0,0,0.500564,481.802,340.184),1,1)  
G\_()  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.347,191.338,354.331,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('GpgSM',(0.552654,0,0,0.500574,226.376,340.185),1,1)  
G\_()  
lp((0.392,0.584,0.929))  
lw(4.25)

b()  
bs(347.244,325.984,0)  
bs(347.244,325.984,0)  
bs(347.244,255.118,0)  
bs(304.724,255.118,0)  
bs(304.724,226.771,0)  
lp((0.392,0.584,0.929))  
lw(4.25)  
b()  
bs(233.858,325.984,0)  
bs(233.858,255.118,0)  
bs(276.378,255.118,0)  
bs(276.378,226.771,0)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Palatino-Roman')  
txt('2008-07-17',(0.608301,0,0,0.608301,708.661,65.8308))  
lw(1)  
r(0,0,0,0,750.427,153.265)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1,  
1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(219.685,325.984,0)  
bs(219.685,198.425,0)  
bs(219.685,162.992,0)  
G()  
fp((1,1,1))  
lw(0.283465)  
r(113.386,0,0,-42.5196,35.4333,162.992,0.0670228,0.151107)  
fp((0,0,0))  
lw(0.283465)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('LDAP  
Server',(0.552654,0,0,0.552654,92.1261,148.819),1,1)  
fp((0,0,0))  
lw(0.283465)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')

Fs(18)  
txt('(CRLs, Certificates)',(0.552654,0,0,0.552654,92.1261,134.646),1,1)  
G\_  
G()  
fp((1,1,1))  
lw(0.283465)  
r(113.386,0,0,-42.5196,35.4331,99.2125,0.0670228,0.151107)  
fp((0,0,0))  
lw(0.283465)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('HTTP Server',(0.552654,0,0,0.552654,92.1259,85.0394),1,1)  
fp((0,0,0))  
lw(0.283465)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('(CRLs)',(0.552654,0,0,0.552654,92.1259,70.8662),1,1)  
G\_  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.866,0,0,-31.2962,191.338,158.855,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('DirMgr',(0.552654,0,0,0.552654,224.02,142.978),1,1)  
G\_  
lw(2)  
ld((1, 1))  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
b()  
bs(219.15,126.18,0)  
bs(219.685,77.9528,0)  
bs(155.906,77.9528,0)  
lp((0.392,0.584,0.929))  
lw(3)  
b()  
bs(233.858,127.559,0)  
bs(233.858,99.2125,0)

bs(276.378,99.2125,0)  
bs(276.378,85.0393,0)  
lp((0.392,0.584,0.929))  
lw(3)  
b()  
bs(248.031,127.559,0)  
bs(248.031,113.386,0)  
bs(375.59,113.386,0)  
bs(375.59,85.0393,0)  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(99.2124,0,0,-28.3464,333.07,85.0393,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Certificate  
Cache',(0.552654,0,0,0.552654,382.606,69.8548),1,1)  
fp((1,0.647,0.31))  
lw(0.283465)  
r(70.5589,0,0,-28.3464,248.031,85.0393,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('CRL Cache',(0.552654,0,0,0.552654,284.147,70.6936),1,1)  
G\_  
lw(1)  
la2((( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
b()  
bs(503.149,240.945,0)  
bs(503.149,283.464,0)  
bs(588.189,283.465,0)  
bs(588.189,325.984,0)  
lw(1)  
la2((( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
b()  
bs(503.149,283.464,0)  
bs(503.149,283.464,0)  
bs(361.417,283.464,0)  
bs(361.417,325.984,0)

lw(1)  
la2([( (-4.0,  
3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(361.417,283.464,0)  
bs(205.512,283.465,0)  
bs(205.512,325.984,0)  
lw(1)  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(574.015,85.0393,0)  
bs(574.015,141.732,0)  
bs(262.204,141.732,0)  
lw(1)  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(602.361,85.0393,0)  
bs(602.361,170.079,0)  
bs(439.37,170.079,0)  
bs(439.37,311.811,0)  
bs(460.629,311.811,0)  
bs(460.629,325.984,0)  
lw(1)  
ld((5, 1))  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(389.763,240.945,0)  
bs(389.763,269.291,0)  
bs(290.551,269.291,0)  
bs(290.551,340.157,0)  
bs(262.204,340.157,0)  
lw(1)  
ld((5, 1))  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(389.763,269.291,0)  
bs(559.843,269.291,0)  
bs(559.843,333.071,0)  
bs(574.016,333.071,0)  
lw(1)  
ld((5, 1))  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(488.976,85.0393,0)  
bs(488.976,127.559,0)  
bs(389.763,127.559,0)  
bs(389.763,212.598,0)  
lw(2)

ld((1,  
1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(205.512,127.559,0)  
bs(205.512,113.386,0)  
bs(170.079,113.386,0)  
bs(170.079,141.732,0)  
bs(155.906,141.732,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(622.961,356.76,0)  
bs(622.961,518.503,0)  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.3459,573.199,354.33,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('GpgAgent',(0.552654,0,0,0.500554,608.238,340.185),1,1)  
G\_  
lp((0.392,0.584,0.929))  
lw(4.25)  
b()  
bs(721.712,467.717,0)  
bs(721.712,297.838,0)  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.3464,686.278,297.637,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('SCdaemon',(0.552654,0,0,0.500564,721.316,283.492),1,1)  
G\_  
fp((1,0.647,0.31))  
lw(0.283465)  
lj(1)



r(86.162,0,0,-117.493,679.192,566.929,0.181818,0.333333)  
G()  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Smartcard',(0.552654,0,0,0.552654,698.127,491.036))  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-31.2962,686.279,557.593,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('Card  
Reader',(0.552654,0,0,0.552654,721.318,541.975),1,1)  
G\_  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(73.6353,0,0,-41.2944,587.066,565.703,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('PIN Entry',(0.57675,0,0,0.729211,623.632,545.097),1,1)  
G\_  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1, 1))  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
b()  
bs(643.758,340.157,0)  
bs(643.758,340.157,0)  
bs(707.539,340.158,0)  
bs(707.539,304.724,0)  
lw(1)  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
b()  
bs(574.016,283.465,0)  
bs(587.066,283.464,0)  
bs(686.278,283.464,0)  
G()

lp((0.392,0.584,0.929))  
lw(4.25197)  
b()  
bs(98.9053,325.985,0)  
bs(98.9053,240.945,0)  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.3464,63.7795,354.331,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('WatchGnuPG',(0.552654,0,0,0.552654,98.8185,338.713),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(70.5589,0,0,-28.1194,63.7795,240.718,0.0670228,0.168178)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('Log  
Socket',(0.552654,0,0,0.552654,98.8175,225.1),1,1)  
G\_()  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(85.0392,0,0,-28.3464,446.457,240.945,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Config Files',(0.552654,0,0,0.552654,485.621,226.772),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)

r(85.0392,0,0,-28.3464,545.669,85.0394,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Config Files',(0.552654,0,0,0.552654,584.834,70.8662),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(84.6546,0,0,-27.3609,347.245,239.959,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Help  
Files',(0.552654,0,0,0.552654,388.252,224.705),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(84.6546,0,0,-27.3609,446.457,85.0394,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Help Files',(0.552654,0,0,0.552654,487.464,69.7854),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(85.0392,0,0,-28.3464,248.032,240.945,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')

Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Keybox Files',(0.552654,0,0,0.552654,289.59,226.322),1,1)  
G\_  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(70.866,0,0,-28.3464,574.016,240.945,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Private Keys',(0.552654,0,0,0.552654,609.449,226.772),1,1)  
G\_  
G()  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(24)  
txt('Scute',(0.552654,0,0,0.599958,224.978,465.775),1,1)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Times-Roman')  
Fs(10)  
txt('(pkcs#11)',(1,0,0,1.08559,206.081,445.011))  
G\_  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(198.827,0,0,-56.6929,304.322,488.976,0.0603744,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')

```

Fs(36)
txt('GPGME
Library',(0.552654,0,0,0.552654,404.952,457.853),1,1)
G_()
G()
lw(1)
style('Application Box')
r(197.598,0,0,-42.5187,304.724,566.928,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('GPGME aware Application',(0.98062,0,0,0.937018,334.892,540.985))
G_()
G()
lw(1)
style('Application Box')
r(127.829,0,0,-41.7496,162.992,566.159,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('Legacy Application',(174.688,540.01))
G_()
G()
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(749.296,162.296,0)
bs(705.89,162.296,0)
lw(3.25)
ld((1, 1))
la2((([-4.0, 3.0], (2.0, 0.0), (-4.0,
-3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,100.083,0)
bs(744.472,100.083,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2((([-4.0, 3.0], (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,131.189,0)
bs(744.472,131.189,0)
fp((0,0,0))
le()
lw(1)

```

```

Fn('Helvetica')
Fs(14)
style('Text')
txt('execute/access',(0.31891,0,0,0.280771,726.951,87.3768),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('closely linked',(0.31891,0,0,0.280771,724.715,149.589),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Assuan protocol',(0.31891,0,0,0.280771,728.535,118.483),1,1)
G_()
lw(1)
r(56.6929,0,0,-92.126,701.575,170.079)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(248.031,325.984,0)
bs(248.031,297.638,0)
bs(538.583,297.638,0)
bs(538.583,340.157,0)
bs(566.929,340.157,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(375.591,325.984,0)
bs(375.591,304.724,0)
bs(531.496,304.724,0)
bs(531.496,347.244,0)
bs(566.929,347.244,0)
guidelayer('Guide
Lines',1,0,0,1,(0,0,1))
grid((0,0,7.08661,7.08661),1,(0,0,1),'Grid')
00~0
*H
0k10 UDE10U

```

Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10  
011203093638Z  
021203093638Z0k10 UDE10U  
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 100  
\*H  
0l+Pu.\-ZT\$e'nE&h4<}BePm[%j-/-7PcHKi@FKy~npcd\${}K~Q00U37Tq8\_eK40U#037Tq8\_eK4om0k10 UDE10U  
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10U00  
\*H  
l8gD Z  
wYL,M'j  
pk2pf[L ;Rl}#h\$~O!9;3e\A'v&P^\$'Oc.-TS~A>:fQY<  
# \*- mode: org \*-  
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)  
#+AUTHOR: Ben McGinnes  
#+LATEX\_COMPILER: xelatex  
#+LATEX\_CLASS: article  
#+LATEX\_CLASS\_OPTIONS: [12pt]  
#+LATEX\_HEADER: \usepackage{xltextra}  
#+LATEX\_HEADER: \usepackage[margin=1in]{geometry}  
#+LATEX\_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}  
#+LATEX\_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

\* Introduction  
:PROPERTIES:  
:CUSTOM\_ID: intro  
:END:

Version:	0.1.5
GPGME Version:	1.13.0
Author:	Ben McGinnes <ben@gnupg.org>
Author GPG Key:	DB4724E6FA4286C92B4E55C4321E4E2373590E5D
Language:	Australian English, British English
Language codes:	en-AU, en-GB, en

This document provides basic instruction in how to use the GPGME  
Python bindings to programmatically leverage the GPGME library.

\*\* Python 2 versus Python  
3  
:PROPERTIES:

:CUSTOM\_ID: py2-vs-py3

:END:

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

\*\* Examples

:PROPERTIES:

:CUSTOM\_ID: howto-python3-examples

:END:

All of the examples found in this document can be found as Python 3 scripts in the =lang/python/examples/howto= directory.

\*\* Unofficial Drafts

:PROPERTIES:

:CUSTOM\_ID: unofficial-drafts

:END:

In addition to shipping with each release of GPGME, there is a section on locations to read or download [\[#draft-editions\]\[draft editions\]](#) of this document from at the end of it. These are unofficial versions produced in between major releases.

\*\* What's New

:PROPERTIES:

:CUSTOM\_ID: new-stuff



:END:

Full details of what is new are now available in the [\[\[file:what-is-new.org\]\]](file:what-is-new.org) [\[What's New\]](#) file and archives of the preceding /What's New/ sections are available in the [\[\[file:what-was-new\]\]](file:what-was-new) [\[What Was New\]](#) file.

\*\*\* New in GPGME 1130

:PROPERTIES:

:CUSTOM\_ID:

new-stuff-1-13-0

:END:

See the [\[\[file:what-is-new#new-stuff-1-13-0\]\]](file:what-is-new#new-stuff-1-13-0) [\[What's New\]](#) document for what is new in version 1.13.0.

\*\*\* New in GPGME 1120

:PROPERTIES:

:CUSTOM\_ID: new-stuff-1-12-0

:END:

See the [\[\[file:what-was-new#new-stuff-1-12-0\]\]](file:what-was-new#new-stuff-1-12-0) [\[What Was New\]](#) document for what was new in version 1.12.0.

\* GPGME Concepts

:PROPERTIES:

:CUSTOM\_ID: gpgme-concepts

:END:

\*\* A C API

:PROPERTIES:

:CUSTOM\_ID: gpgme-c-api

:END:

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `=gpgme.h=` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some

means of providing an interface to those languages. This is where the need for bindings in various languages stems.

```
** Python bindings
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings
:END:
```

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of `=gpgme.h=` generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of `=gpgme.h=`.

```
** Difference between the Python bindings and other GnuPG Python packages
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings-diffs
:END:
```

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

```
*** The python-gnupg package maintained
by Vinay Sajip
:PROPERTIES:
:CUSTOM_ID: diffs-python-gnupg
:END:
```

This is arguably the most popular means of integrating GPG with Python. The package utilises the `=subprocess=` module to implement wrappers for the `=gpg=` and `=gpg2=` executables normally invoked on the command line (`=gpg.exe=` and `=gpg2.exe=` on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the `=subprocess=` calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope

of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

```
*** The gnupg package created
and maintained by Isis Lovecruft
:PROPERTIES:
:CUSTOM_ID: diffs-isis-gnupg
:END:
```

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the python-gnupg package as just gnupg. This new package also relied on subprocess to call the =gpg= or =gpg2= binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original python-gnupg and since its functions were called in a different manner to python-gnupg, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License version 3.0 (or any later version).

```
*** The PyME package maintained by Martin Albrecht
:PROPERTIES:
:CUSTOM_ID: diffs-pyme
:END:
```

This package is the origin of these bindings, though they are somewhat different now.

For details of when and how the PyME package was folded back into GPGME itself see the [\[\[file:short-history.org\]\]](http://file:short-history.org) [Short History] document.<sup>[fn:1]</sup>

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the =python-gnupg= or =gnupg= packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

\* GPGME Python bindings installation

:PROPERTIES:

:CUSTOM\_ID: gpgme-python-install

:END:

\*\* No PyPI

:PROPERTIES:

:CUSTOM\_ID: do-not-use-pypi

:END:

Most

third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against `gpgme.h` and `gpgme.h` is generated from `gpgme.h.in` at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding `[[#snafu-ffi][CFFI and SWIG]]` at the end of this section for further details.

\*\* Requirements

:PROPERTIES:

:CUSTOM\_ID: gpgme-python-requirements

:END:

The GPGME Python bindings only have three requirements:

1. A suitable version of Python 2 or Python 3. With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.
2. [\[\[https://www.swig.org\]\[SWIG\]\]](https://www.swig.org).
3. GPGME itself. Which also means that all of GPGME's dependencies

must be installed too.

### \*\*\* Recommended Additions

```
:PROPERTIES:
:CUSTOM_ID: gpgme-python-recommendations
:END:
```

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

1. If possible, use Python 3 instead of 2.
2. Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.
3. If possible add the following Python modules which are not part of the standard library: [\[\[http://docs.python-requests.org/en/latest/index.html\]\]](http://docs.python-requests.org/en/latest/index.html)[\[\[Requests\]\]](#), [\[\[https://cython.org/\]\]](https://cython.org/)[\[\[Cython\]\]](#), [\[\[https://pendulum.eustace.io/\]\]](https://pendulum.eustace.io/)[\[\[Pendulum\]\]](#) and [\[\[https://github.com/Selfnet/hkp4py\]\]](https://github.com/Selfnet/hkp4py)[\[\[hkp4py\]\]](#).

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

### \*\* Installation

```
:PROPERTIES:
:CUSTOM_ID: installation
:END:
```

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your `=$PATH=`.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python

3 it detects in `=$PATH=`. It specifically checks for the `=python=` and `=python3=` executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: `=python=`, `=python2=` and `=python2.7=`.

For Python 3 it checks for these executables in this order: `=python3=`, `=python3.7=`, `=python3.6=`, `=python3.5=` and `=python3.4=`.<sup>[fn:2]</sup>

On systems where `=python=` is actually `=python3=` and not `=python2=` it may be possible that `=python2=` may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred Python versions has been changed to move Python 3.7 ahead of Python 3.6.

```
*** Installing GPGME
:PROPERTIES:
:CUSTOM_ID: install-gpgme
:END:
```

See the GPGME `=README=` file for details of how to install GPGME from source.

```
** Known Issues
:PROPERTIES:
:CUSTOM_ID: snafu
:END:
```

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should they be encountered.

```
*** Breaking Builds
:PROPERTIES:
:CUSTOM_ID: snafu-a-swig-of-this-builds-character
:END:
```

Occasionally when installing GPGME with the Python bindings included it may be observed that the `=make=` portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with `=make check=` and `=make install=` appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce `=lang/python/python2-gpg/=` and `=lang/python/python3-gpg/=` directories. These should contain the build output generated during compilation, including the complete bindings and module installed into `=site-packages=`.

Occasionally the errors in the early part or some other conflict (e.g. not installing as `*/root/*` or `*/su/*`) may result in nothing being installed to the relevant `=site-packages=` directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the `*root*` user or prepended with `=sudo -H=[fn:3]` in the `=lang/python/=` directory:

```
#+BEGIN_SRC shell
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py install
#+END_SRC
```

Yes, the build command does need to be run twice. Yes, you still need to run the potentially failing or incomplete steps during the `=configure=`, `=make=` and `=make install=` steps with installing GPGME. This is because those steps generate a lot of essential files needed, both by and in order to create, the bindings (including both the `=setup.py=` and `=gpgme.h=` files).

```
**** IMPORTANT Note
:PROPERTIES:
:CUSTOM_ID: snafu-swig-build-note
:END:
```

If specifying a selected number of languages to create bindings for, try to leave Python last. Currently the majority of the other language bindings are also preceding Python of either version when

listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative `=configure=` steps for GPGME using the `--enable-languages=$LANGUAGE=` option.

Alternatively

`=make=` (or `=gmake=`, depending on your platform) may be run with the `=-k=` option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

\*\*\* Reinstalling Responsibly

```
:PROPERTIES:
:CUSTOM_ID: snafu-lessons-for-the-lazy
:END:
```

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant `site-packages` directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing

the previous version(s) is simply a matter of changing to the relevant `site-packages=` directory for the version of Python in question and removing the `=gpg/=` directory and any accompanying `egg-info` files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

\*\*\* Multiple installations

```
:PROPERTIES:
:CUSTOM_ID: snafu-the-full-monty
```



:END:

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings *\*must\** match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME [<https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e>][1.12.1]] the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, and so on up until the current dev branch that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the `=PATH=` when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

\*\*\* Won't Work With Windows

```
:PROPERTIES:
:CUSTOM_ID: snafu-runtime-not-funtime
:END:
```

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the [<https://python.org>][Python website]] (i.e. mostly MSI installers, sometimes self-extracting `.exe` files).

The Windows versions of Python are not built using Cygwin, MinGW or

Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is /considerably/ more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

1. Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

2. Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

Do *\*not\** use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following

table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released [<https://www.python.org/downloads/windows/>][for Windows]:

CPython	Microsoft product name	runtime filename	
2.7.6	Visual Studio 2008	MSVCR90.DLL	
3.4.0	Visual Studio 2010	MSVCR100.DLL	
3.5.0	Visual Studio 2015	*see below*	
3.6.0	Visual Studio 2015	*see below*	
3.7.0	Visual Studio 2017*	*see below*	

It is important to note that MingW and Msys2 ship with the Visual C

runtime from Microsoft Visual Studio 2005 and are thus *\*incompatible\** with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds

of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [\[\[https://matthew-brett.github.io/pydagogue/python\\_msvc.html\]\]](https://matthew-brett.github.io/pydagogue/python_msvc.html) [\[\[Using Microsoft Visual C with Python\]\]](#). It is also worth reading the

Microsoft Developer Network blog post on [\[\[http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx\]\]](http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx) [\[\[the universal CRT\]\]](#) and Steve

Dower's blog posts on Python extensions ([\[\[http://stevedower.id.au/blog/building-for-python-3-5\]\]](http://stevedower.id.au/blog/building-for-python-3-5) [\[\[part 1\]\]](#) and [\[\[http://stevedower.id.au/blog/building-for-python-3-5-part-two\]\]](http://stevedower.id.au/blog/building-for-python-3-5-part-two) [\[\[part 2\]\]](#)).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [\[\[https://wiki.python.org/moin/WindowsCompilers\]\]](https://wiki.python.org/moin/WindowsCompilers) [\[\[Windows compilers\]\]](#) wiki page on the

CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare *\*minimum\**, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from `=python.org=` the advanced options available which utilise `[[#cython]][Cython]` will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

1. Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.
2. Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).
3. Compile both CPython and GPGME with these bindings using the tools selected in step 2.
4. Ignore MingW, Msys2 and the official CPython binary installers.
5. Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

```
*** CFFI is the Best and GPGME should use it instead of SWIG
:PROPERTIES:
:CUSTOM_ID: snafu-cffi
:END:
```

There are many reasons for favouring `[[https://cffi.readthedocs.io/en/latest/overview.html]][CFFI]` and proponents of it are

quite happy to repeat these things as if all it would take to switch from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the bindings to Python using the `=gpgme.h=` file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable codebase. If there were some means of applying SWIG's dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in

at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the `=gpgme-tool.c=` file in the GPGME `=src/=` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

\*\*\*

Virtualised Environments

:PROPERTIES:

:CUSTOM\_ID: snafu-venv

:END:

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with `virtualenv`, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like `=usr/local=` or `=opt/local=` then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a `=sites.pth=` file in the `=site-packages/=` directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. [\[\[https://docs.pytest.org/en/latest/index.html\]\]](https://docs.pytest.org/en/latest/index.html)`[[pytest]]`) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. [\[\[https://www.virtualbox.org/\]\]](https://www.virtualbox.org/)`[[VirtualBox]]`), a hardware emulation layer (e.g. [\[\[https://www.qemu.org/\]\]](https://www.qemu.org/)`[[QEMU]]`) or an application container (e.g. [\[\[https://www.docker.com/why-docker\]\]](https://www.docker.com/why-docker)`[[Docker]]`).

Finally it should be noted that the limited tests conducted thus far have been using the `=virtualenv=` command in a new directory to create the virtual python environment. As opposed to the standard `=python3 -m venv=` and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command `=python3 -m virtualenv /path/to/install/virtual/thingy=` instead.

```
*** Post installation
:PROPERTIES:
:CUSTOM_ID: snafu-docs
:END:
```

Following installation it is recommended to move the `=post_installer.py=` script from the `=lang/python/examples/howto/=` directory to the `=lang/python/=` directory and run it. This will fix

or restore files needed by Sphinx which may be removed during a distribution build for release. It will also generate reST files from Org mode files with Pandoc and generate Texinfo files from Org mode files with GNU Emacs and Org mode (in batch mode). Additionally it will fix the UTF-8 declaration line in the Texinfo files (Emacs expects "UTF-8" to be "utf-8").

\* Fundamentals

:PROPERTIES:

:CUSTOM\_ID: howto-fund-a-mental

:END:

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

\*\* No REST

:PROPERTIES:

:CUSTOM\_ID: no-rest-for-the-wicked

:END:

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is *not* a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

\*\* Context

:PROPERTIES:

:CUSTOM\_ID: howto-get-context

:END:

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

```
* Working with keys
:PROPERTIES:
:CUSTOM_ID: howto-keys
:END:
```

```
** Key selection
:PROPERTIES:
:CUSTOM_ID: howto-keys-selection
:END:
```

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:



```
#+BEGIN_SRC python -i
import gpg
```

```
k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

This is passable and very likely to be common:

```
#+BEGIN_SRC python -i
import gpg
```

```
k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

And this is a really bad idea:

```
#+BEGIN_SRC python -i
import gpg
```

```
k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
#+END_SRC
```

Alternatively it may be that the intention is to create a list of keys which all match a particular search string. For instance all the addresses at a particular domain, like this:

```
#+BEGIN_SRC python -i
import gpg
```

```
ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
#+END_SRC
```

```
*** Counting keys
:PROPERTIES:
:CUSTOM_ID: howto-keys-counting
:END:
```

Counting the number of keys in your public keybox (=pubring.kbx=), the format which has superseded the old keyring format (=pubring.gpg= and =secring.gpg=), or the number of secret keys is a very simple task.

```
#+BEGIN_SRC python -i
```

```

import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
Number of secret keys: {0}
Number of public keys: {1}
""".format(secnum, pubnum))
#+END_SRC

```

NOTE: The `[[#cython][Cython]]` introduction in the `[[#advanced-use][Advanced and Experimental]]` section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

```

** Get key
:PROPERTIES:
:CUSTOM_ID: howto-get-key
:END:

```

An alternative method of getting a single key via its fingerprint is available directly within a Context with `=Context().get_key=`. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

```

#+BEGIN_SRC python -i
import gpg

```

```
fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
#+END_SRC
```

Whereas this example demonstrates selecting the author's current key with the `=secret=` key word argument set to `=True=`:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
#+END_SRC
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
** Importing keys
:PROPERTIES:
:CUSTOM_ID: howto-import-key
:END:
```

Importing keys is possible with the `=key_import(=` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS key servers via the web using the requests module. Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-key servers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
```

```

result
= c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
 print(result)
elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_sctr = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

 Number of keys revoked: {1}
 Number of new signatures: {2}
 Number of new subkeys: {3}
 Number of new user IDs: {4}
 Number of new secret keys: {5}
 Number of unchanged keys: {6}

The key IDs for all considered keys were:
""").format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_sctr,
 nochange))
 for i in range(num_keys):
 print("{0}\n".format(result.imports[i].fpr))
else:
 pass
#+END_SRC

```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading =0x= indicative of hexadecimal be included. Also note that the old short key IDs (e.g. =0xDEADBEEF=) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal value which may be missing the leading =0x= is a simple matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a ValueError simply results in treating the string as a string. This is the method and logic utilised in the =import-keys-hkp.py= script (see below).

\*\*\* Working with ProtonMail

```
:PROPERTIES:
:CUSTOM_ID: import-protonmail
:END:
```

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

```
#+BEGIN_SRC python -i
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
 keyterm = sys.argv[1]
else:
 keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
 ksearch.append("{0}@protonmail.com".format(keyterm))
 ksearch.append("{0}@protonmail.ch".format(keyterm))
 ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") ==
2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
```

```

 ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
else:
 ksearch.append(keyterm)

for k in ksearch:
 payload = {"op": "get", "search": k}
 try:
 r = requests.get(url, verify=True, params=payload)
 if r.ok is True:
 result = c.key_import(r.content)
 elif r.ok is False:
 result = r.content
 except Exception as e:
 result = None

 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None
and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_s crt = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

```

With UIDs wholly or partially matching the following string:

```
{1}
```

```

Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}

```

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_s crt,
```

```

 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
 elif result is None:
 print(e)
#+END_SRC

```

Both the above example, `[./examples/howto/pmkey-import.py][pmkey-import.py]`, and a version which prompts for an alternative GnuPG home directory, `[./examples/howto/pmkey-import-alt.py][pmkey-import-alt.py]`, are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers, their server is related more to their API and is not feature complete by comparison to the servers in the SKS pool. One notable difference being that the ProtonMail server does not permit non ProtonMail users to update their own keys, which could be a vector for attacking ProtonMail users who may not receive a key's revocation if it had been compromised.

```

*** Importing with HKP for Python
:PROPERTIES:
:CUSTOM_ID: import-hkp4py
:END:

```

Performing the same tasks with the `[https://github.com/Selfnet/hkp4py][hkp4py module]` (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some checks on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The `hkp4py` module permits such checks prior to the importing of the keys found.

```

#+BEGIN_SRC python -i
import gpg
import hkp4py
import sys

c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
 pattern = " ".join(sys.argv[1:])

```

```

elif len(sys.argv) == 2:
 pattern = sys.argv[1]
else:
 pattern = input("Enter the pattern to search for keys or user IDs: ")

if pattern is not None:
 try:
 key = server.search(hex(int(pattern, 16)))
 keyed = True
 except ValueError as ve:
 key = server.search(pattern)
 keyed = False

 if key is not None:
 keys.append(key[0])
 if keyed is True:
 try:
 fob = server.search(pattern)
 except:
 fob = None
 if fob is not
None:
 keys.append(fob[0])
 else:
 pass
 else:
 pass

 for logrus in pattern.split():
 try:
 key = server.search(hex(int(logrus, 16)))
 hexed = True
 except ValueError as ve:
 key = server.search(logrus)
 hexed = False

 if key is not None:
 keys.append(key[0])
 if hexed is True:
 try:
 fob = server.search(logrus)
 except:
 fob = None
 if fob is not None:
 keys.append(fob[0])
 else:
 pass

```



```

else:
 pass

if len(keys) > 0:
 for key in keys:
 import_result = c.key_import(key.key_blob)
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print(result)
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scert = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

Number of keys revoked: {1}
Number of new signatures: {2}
Number of new subkeys: {3}
Number of new user IDs: {4}
Number of new secret keys: {5}
Number of unchanged keys: {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scert,
 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
 else:
 pass
#+END_SRC

```

Since the hkp4py module handles multiple keys just as effectively as one (=keys= is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

\*\*\* Importing from ProtonMail with HKP for Python

```
:PROPERTIES:
:CUSTOM_ID: import-protonmail-hkp4py
:END:
```

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

\*\*\*\* Import from ProtonMail via HKP for Python Example no. 1

```
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm1
:END:
```

The following script is available with the rest of the examples under the somewhat less than original name, =pmkey-import-hkp.py=.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage: pmkey-import-hkp.py [search strings]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
```

```

allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
 keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
 keyterm = sys.argv[1]
 keyterms.append(keyterm)
else:
 key_term = input("Enter the key ID, UID or search string: ")
 keyterms = key_term.split()

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{}@pm.me".format(keyterm[1:]))
 elif keyterm.count("@") == 0:
 ksearch.append("{}@protonmail.com".format(keyterm))
 ksearch.append("{}@protonmail.ch".format(keyterm))
 ksearch.append("{}@pm.me".format(keyterm))
 elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
 ksearch.append("{}@protonmail.ch".format(uid))
 ksearch.append("{}@pm.me".format(uid))
 elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
 ksearch.append("{}@protonmail.ch".format(uid))
 ksearch.append("{}@pm.me".format(uid))
 else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking for key for: {}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:

```

```

 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)
 except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None
except Exception as e:
 import_result = None
results.append(import_result)

```

for result in results:

if result is not None and hasattr(result, "considered") is False:

```
print("{0} for {1}".format(result.decode(), k))
```

elif result is not None and hasattr(result, "considered") is True:

```

num_keys = len(result.imports)
new_revs = result.new_revocations
new_sigs = result.new_signatures
new_subs = result.new_sub_keys
new_uids = result.new_user_ids
new_scr_t = result.secret_imported
nochange = result.unchanged
print("""

```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

Number of keys revoked: {2}

Number of new signatures: {3}

Number of new subkeys: {4}

Number of new user IDs: {5}

Number of new secret keys: {6}

Number of unchanged keys: {7}

The key IDs for all considered keys were:

```

"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scr_t,
nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)
print("")
elif result is None:
 pass
#+END_SRC

```

\*\*\*\* Import from ProtonMail via HKP for Python Example no. 2

```
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm2
:END:
```

Like

its counterpart above, this script can also be found with the rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything passed as a =homedir= which either does not exist or which is not a directory, as also being a possible user ID to check for. It's not guaranteed to pick up on all such cases, but it should cover most of them.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it. Optionally enables specifying a different GnuPG home directory.

Usage: pmkey-import-hkp.py [homedir] [search string]
or: pmkey-import-hkp.py [search string]
""")
```

```
c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None
```

```
if len(sys.argv) > 3:
 homedir = sys.argv[1]
 keyterms = sys.argv[2:]
elif len(sys.argv)
== 3:
 homedir = sys.argv[1]
 keyterm = sys.argv[2]
 keyterms.append(keyterm)
elif len(sys.argv) == 2:
 homedir = ""
```

```

keyterm = sys.argv[1]
keyterms.append(keyterm)
else:
 keyterm = input("Enter the key ID, UID or search string: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
 keyterms.append(keyterm)

if len(homedir) == 0:
 homedir = None
 homeless = False

if homedir is not None:
 if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 if os.path.isdir(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.realpath(os.path.expanduser(homedir))
 else:
 homeless = True
 else:
 homeless = True
 elif os.path.exists(os.path.realpath(homedir)) is True:
 if os.path.isdir(os.path.realpath(homedir)) is True:
 c.home_dir = os.path.realpath(homedir)
 else:
 homeless = True
 else:
 homeless = True

First check to see if the homedir really is a homedir and if not, treat it as
a search string.
if homeless is True:
 keyterms.append(homedir)
 c.home_dir = None
else:
 pass

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{}@pm.me".format(keyterm[1:]))
 elif keyterm.count("@") == 0:
 ksearch.append("{}@protonmail.com".format(keyterm))
 ksearch.append("{}@protonmail.ch".format(keyterm))

```

```

ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")

for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking for key for: {0}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)
 except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None
 except Exception
 as e:
 import_result = None
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scert = result.secret_imported
 nochange = result.unchanged
 print("""

```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

{1}

Number of keys revoked: {2}

Number of new signatures: {3}

Number of new subkeys: {4}

Number of new user IDs: {5}

Number of new secret keys: {6}

Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs,
new_subs, new_uids, new_scart,
nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)
print("")
elif result is None:
 pass
#+END_SRC
```

\*\* Exporting keys

```
:PROPERTIES:
:CUSTOM_ID: howto-export-key
:END:
```

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

\*\*\* Exporting public keys

```
:PROPERTIES:
:CUSTOM_ID: howto-export-public-key
:END:
```

There are two methods of exporting public keys, both of which are very similar to the other. The default method, =key\_export(=, will export a public key or keys matching a specified pattern as normal. The alternative, the =key\_export\_minimal(= method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.



```

#+BEGIN_SRC
python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif
os.path.exists(homedir) is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export(pattern=logrus)
except:
 result = c.key_export(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)

```

```
else:
 pass
#+END_SRC
```

It should be noted that the result will only return =None= when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to =None= this triggers the exporting of the entire public keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus =
= input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif os.path.exists(homedir) is True:
 c.home_dir = homedir
else:
 pass
```

```

try:
 result = c.key_export_minimal(pattern=logrus)
except:
 result = c.key_export_minimal(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
else:
 pass
#+END_SRC

```

```

*** Exporting secret keys
:PROPERTIES:
:CUSTOM_ID: howto-export-secret-key
:END:

```

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of `pinentry` via `gpg-agent` in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```

#+BEGIN_SRC python -i
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

```

```

c = gpg.Context(armor=True)

```

```

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]

```

```

 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_secret(pattern=logrus)
except:
 result = c.key_export_secret(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
 os.chmod(keyfile, 0o600)
else:
 pass
#+END_SRC

```

Alternatively the approach

of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (=gpg=) and ASCII armoured (=asc=) files.

```
#+BEGIN_SRC python -i
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
 gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
 gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
```

```

 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir
 = homedir
else:
 pass

if c.home_dir is not None:
 if c.home_dir.endswith("/"):
 gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
 else:
 gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
 if os.path.exists(os.environ["GNUPGHOME"]) is True:
 hd = os.environ["GNUPGHOME"]
 else:
 try:
 hd = subprocess.getoutput(gpgconfcmd)
 except:
 process = subprocess.Popen(gpgconfcmd.split(),
 stdout=subprocess.PIPE)
 procom = process.communicate()
 if sys.version_info[0] == 2:
 hd = procom[0].strip()
 else:
 hd = procom[0].decode().strip()
 gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
 ascfile = "{0}/{1}.asc".format(hd, keyfile)

```

```

try:
 a_result = a.key_export_secret(pattern=logrus)
 b_result
= b.key_export_secret(pattern=logrus)
except:
 a_result = a.key_export_secret(pattern=None)
 b_result = b.key_export_secret(pattern=None)

if a_result is not None:
 with open(ascfile, "wb") as f:
 f.write(a_result)
 os.chmod(ascfile, 0o600)
else:
 pass

if b_result is not None:
 with open(gpgfile, "wb") as f:
 f.write(b_result)
 os.chmod(gpgfile, 0o600)
else:
 pass
#+END_SRC

```

```

*** Sending public keys to the SKS Keyservers
:PROPERTIES:
:CUSTOM_ID: howto-send-public-key
:END:

```

As with the previous section on importing keys, the `hkp4py` module adds another option with exporting keys in order to send them to the public key servers.

The following example demonstrates how this may be done.

```

#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS key servers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server

```

```

= hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if len(sys.argv) > 2:
 logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
 logrus = sys.argv[1]
else:
 logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
 try:
 export_result = c.key_export(pattern=logrus)
 except Exception as e:
 print(e)
 export_result = None
else:
 export_result = c.key_export(pattern=None)

if export_result is not None:
 try:
 try:
 send_result = server.add(export_result)
 except:
 send_result = server.add(export_result.decode())
 if send_result is not None:
 print(send_result)
 else:
 pass
 except Exception as e:
 print(e)
else:
 pass
#+END_SRC

```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as `=send-key-to-keyserver.py=`.

The `=hkp4py=` module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

```

* Basic Functions
:PROPERTIES:
:CUSTOM_ID: howto-the-basics

```



:END:

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

\*\* Encryption

:PROPERTIES:

:CUSTOM\_ID: howto-basic-encryption

:END:

Encrypting is very straight forward. In the first example below the message, =text=, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

\*\*\* Encrypting to one key

:PROPERTIES:

:CUSTOM\_ID: howto-basic-encryption-single

:END:

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the =gpg.Context().encrypt()= method.

Those keyword arguments are: =recipients=, a list of keys encrypted to (covered in greater detail in the following section); =sign=, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to =True=); =sink=, to write results or partial results to a secure sink instead of returning it (defaults to =None=); =passphrase=, only used when utilising symmetric encryption (defaults to =None=); =always\_trust=, used to override the trust model settings for recipient keys (defaults to =False=); =add\_encrypt\_to=, utilises any preconfigured =encrypt-to= or =default-key= settings in the user's =gpg.conf= file (defaults to =False=); =prepare=, prepare for encryption (defaults to =False=); =expect\_sign=, prepare for signing (defaults to =False=); =compress=, compresses the plaintext prior to encryption (defaults to =True=).

```
#+BEGIN_SRC python -i
```

```
import
```

```
gpg
```

```
a_key = "0x12345678DEADBEEF"
```

```
text = b""Some text to test with.
```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```

```
c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
```

```
 afile.write(ciphertext)
```

```
#+END_SRC
```

Though this is even more likely to be used like this; with the plaintext input read from a file, the recipient keys used for encryption regardless of key trust status and the encrypted output also encrypted to any preconfigured keys set in the =gpg.conf= file:

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
a_key = "0x12345678DEADBEEF"
```

```
with open("secret_plans.txt", "rb") as afile:
```

```
 text = afile.read()
```

```
c = gpg.Context(armor=True)
```

```
rkey = list(c.keylist(pattern=a_key, secret=False))
```

```
ciphertext,
```

```
result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
 always_trust=True,
 add_encrypt_to=True)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
```

```
 afile.write(ciphertext)
```

```
#+END_SRC
```

If the =recipients= parameter is empty then the plaintext is encrypted symmetrically. If no =passphrase= is supplied as a parameter or via a callback registered with the =Context()= then an out-of-band prompt for the passphrase via pinentry will be invoked.

```
*** Encrypting to multiple keys
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: howto-basic-encryption-multiple
```

```
:END:
```

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (=text=) to everyone with an email address on the =gnupg.org= domain,[fn:4] but does /not/ encrypt to a default key or other key which is configured to normally encrypt to.

```
#+BEGIN_SRC python -i
import gpg

text = b"""Oh look, another test message.
```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an input() prompt.

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 sign=False, always_trust=True)

with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
#+END_SRC
```

All it would take to change the above example to sign the message and also encrypt the message to any configured default keys would be to change the =c.encrypt= line to this:

```
#+BEGIN_SRC python -i
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
```

```
 always_trust=True,
 add_encrypt_to=True)
#+END_SRC
```

The only keyword arguments requiring modification are those for which the default values are changing. The default value of `=sign=` is `=True=`, the default of `=always_trust=` is `=False=`, the default of `=add_encrypt_to=` is `=False=`.

If `=always_trust=` is not set to `=True=` and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
#+BEGIN_SRC python -i
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
 text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org",
 secret=False))
logrus = []

for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])

 try:
 ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 add_encrypt_to=True)
 except gpg.errors.InvalidRecipients as e:
 for i in range(len(e.recipients)):
 for n in range(len(logrus)):
 if logrus[n].fpr == e.recipients[i].fpr:
 logrus.remove(logrus[n])
 else:
 pass

 try:
 ciphertext, result, sign_result = c.encrypt(text,
 recipients=logrus,
 add_encrypt_to=True)
 with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
 except:
 pass
#+END_SRC
```

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

\*\* Decryption

```
:PROPERTIES:
:CUSTOM_ID: howto-basic-decryption
:END:
```

Decrypting something encrypted to a key in one's secret keyring is fairly straight forward.

In this example code, however, preconfiguring either `=gpg.Context()=` or `=gpg.core.Context()=` as `=c=` is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to `=c=` simply adds lines for no gain.

```
#+BEGIN_SRC python -i
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
 try:
 plaintext, result, verify_result = gpg.Context().decrypt(cfile)
 except gpg.errors.GPGMEError as e:
 plaintext = None
 print(e)

if plaintext is not None:
 with open(newfile, "wb") as nfile:
 nfile.write(plaintext)

 else:
 pass
#+END_SRC
```

The data available in `=plaintext=` in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in `=result=` and the results of verifying any signatures of the data in `=verify_result=`.

If `=gpg.Context().decrypt(cfile, verify=False)=` is called instead, then `=verify_result=` will be returned as `=None=` and the rest remains

as described here.

**\*\* Signing text and files**

```
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing
:END:
```

The following sections demonstrate how to specify keys to sign with.

**\*\*\* Signing key selection**

```
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-signers
:END:
```

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

```
#+BEGIN_SRC python -i
import gpg

logrus = input("Enter
the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
#+END_SRC
```

The signing examples in the following sections include the explicitly designated `=signers=` parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the `patten` expects a string, bytes or None and not a list. A string with two fingerprints won't match any single key.

**\*\*\* Normal or default signing messages or files**

```
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-normal
:END:
```

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded

and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of `=pgg.Context().armor=`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
 afile.write(signed_data.decode())
#+END_SRC
```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
 text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
```

```
 afile.write(signed_data)
#+END_SRC
```

```
*** Detached signing messages and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-detached
:END:
```

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc",
"wb") as afile:
 afile.write(signed_data.decode())
#+END_SRC
```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
 text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
 afile.write(signed_data)
#+END_SRC
```

```
*** Clearsigning messages or text
:PROPERTIES:
```



```
:CUSTOM_ID: howto-basic-signing-clear
:END:
```

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with
open("/path/to/statement.txt.asc", "w") as afile:
 afile.write(signed_data.decode())
#+END_SRC
```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
 text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
 afile.write(signed_data)
#+END_SRC
```

```
** Signature verification
:PROPERTIES:
:CUSTOM_ID: howto-basic-verification
:END:
```

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use

with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
#+BEGIN_SRC python
-i
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
 data, result = c.verify(open(gpg_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
#+END_SRC
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
```

```

 data, result = c.verify(open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
#+END_SRC

```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `=data=` to see if it matches with something like this:

```

#+BEGIN_SRC python -i
with open(filename, "rb") as afile:
 text = afile.read()

if text == data:
 print("Good signature.")
else:
 pass
#+END_SRC

```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `=c.verify=`. So `=data=` is `=None=` and only the information in `=result=` is available.

```

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

```

```

try:
 data,
 result = c.verify(open(filename), open(sig_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
#+END_SRC

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(filename), open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass

```

```
#+END_SRC
```

```
*
```

```
Creating keys and subkeys
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: key-generation
```

```
:END:
```

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to =SECRET= level clearance, so his keys will be 3072-bit keys.

The pre-configured =gpg.conf= file which sets cipher, digest and other preferences contains the following configuration parameters:

```
#+BEGIN_SRC conf
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128
AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences ZLIB BZIP2 ZIP Uncompressed
#+END_SRC
```

```
** Primary key
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: keygen-primary
```

```
:END:
```

Generating a primary key uses the =create\_key= method in a Context.

It contains multiple arguments and keyword arguments, including:

=userid=, =algorithm=, =expires\_in=, =expires=, =sign=, =encrypt=, =certify=, =authenticate=, =passphrase= and =force=. The defaults for all of those except =userid=, =algorithm=, =expires\_in=, =expires= and =passphrase= is =False=. The defaults for =algorithm= and =passphrase= is =None=. The default for =expires\_in= is =0=. The default for =expires= is =True=. There is no default for =userid=.

If =passphrase= is left as =None= then the key will not be generated with a passphrase, if =passphrase= is set to a string then that will be the passphrase and if =passphrase= is set to =True= then gpg-agent will launch pinentry to prompt for a passphrase. For the sake of convenience, these examples will keep =passphrase= set to =None=.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()

c.home_dir = "~/.gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
 sign=True, certify=True)
#+END_SRC
```

One thing to note here is the use of setting the =c.home\_dir= parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, =~/gnupg=, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The =temp-homedir-config.py= script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned =GenkeyResult= object, which includes the following data:

```
#+BEGIN_SRC python -i
print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}

```

```
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
 dmkey.uid))
#+END_SRC
```

Alternatively the information can be confirmed using the command line program:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
#+END_SRC
```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the =gpg.conf= file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own =gpg.conf= file in order to be able to generate this:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

sec rsa3072/026D2F19E99E63AA
 created: 2018-03-15 expires: 2019-03-15 usage: SC
 trust: ultimate validity: ultimate
[ultimate] (1). Danger Mouse <dm@secret.example.net>

[ultimate] (1). Danger Mouse <dm@secret.example.net>
 Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
IDEA, CAST5, 3DES
 Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
 Compression: ZLIB, BZIP2, ZIP, Uncompressed
 Features: MDC, Keyserver
no-modify

bash-4.4$
#+END_SRC
```

```
** Subkeys
:PROPERTIES:
:CUSTOM_ID: keygen-subkeys
:END:
```

Adding subkeys to a primary key is fairly similar to creating the primary key with the `=create_subkey=` method. Most of the arguments are the same, but not quite all. Instead of the `=userid=` argument there is now a `=key=` argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
 encrypt=True)
#+END_SRC
```

As with the primary key, the results here can be checked with:

```
#+BEGIN_SRC python -i
print("""
Fingerprint: {0}
Primary Key: {1}
 Public Key: {2}
 Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""").format(dmsub.fpr, dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
 dmsub.uid)
#+END_SRC
```

As well as on the command line with:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/gnupg-dm -K
~/gnupg-dm/pubring.kbx

```



```
sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]
```

```
bash-4.4$
#+END_SRC
```

```
** User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids
:END:
```

```
*** Adding User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids-add
:END:
```

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is `=key_add_uid=` and the only arguments it takes are for the `=key=` and the new `=uid=`.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/gnupg-dm"

dmfpr
= "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
#+END_SRC
```

Unsurprisingly the result of this is:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <danger.mouse@secret.example.net>
```

```
uid [ultimate] Danger Mouse <dm@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]
```

```
bash-4.4$
#+END_SRC
```

```
*** Revoking User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids-revoke
:END:
```

Revoking a user ID is a fairly similar process, except that it uses the `=key_revoke_uid=` method.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
= "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
#+END_SRC
```

```
** Key certification
:PROPERTIES:
:CUSTOM_ID: key-sign
:END:
```

Since key certification is more frequently referred to as key signing, the method used to perform this function is `=key_sign=`.

The `=key_sign=` method takes four arguments: `=key=`, `=uids=`, `=expires_in=` and `=local=`. The default value of `=uids=` is `=None=` and which results in all user IDs being selected. The default value of both `=expires_in=` and `=local=` is `=False=`; which results in the signature never expiring and being able to be exported.

The `=key=` is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the `=uids=` value is not `=None=` then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
#+END_SRC
```

```
*** Verifying key certifications
:PROPERTIES:
:CUSTOM_ID: key-sign-verify
:END:
```

```
#+BEGIN_SRC python -i
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
#+END_SRC
```

Which for Danger Mouse displays the following:

```
#+BEGIN_EXAMPLE
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@adversary.org>
#+END_EXAMPLE
```

The two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year. Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```
#+BEGIN_SRC python -i
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys
= list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
#+END_SRC
```

Note that this final code block includes the use of a module which is /not/ part of Python's standard library, the [\[\[https://pendulum.eustace.io/\]\[pendulum module\]\]](https://pendulum.eustace.io/). Unlike the standard datetime module, pendulum makes working with dates and times significantly easier in Python; just as the requests module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using the GPGME Python bindings, they are both highly recommended more generally.

\* Advanced or Experimental Use Cases

:PROPERTIES:

:CUSTOM\_ID: advanced-use

:END:

\*\* C plus Python plus SWIG plus Cython

:PROPERTIES:

:CUSTOM\_ID: cython

:END:

In

spite of the apparent incongruence of using Python bindings to a C interface only to generate more C from the Python; it is in fact quite possible to use the GPGME bindings with [\[\[http://docs.cython.org/en/latest/index.html\]\]](http://docs.cython.org/en/latest/index.html)[[Cython]]. Though in many cases

the benefits may not be obvious since the most computationally intensive work never leaves the level of the C code with which GPGME itself is interacting with.

Nevertheless, there are some situations where the benefits are demonstrable. One of the better and easier examples being the one of the early examples in this HOWTO, the [\[\[#howto-keys-counting\]\]](#)[[key counting]] code. Running that example as an executable Python script, `=keycount.py=` (available in the `=examples/howto/=` directory), will take a noticeable amount of time to run on most systems where the public keybox or keyring contains a few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that script on my laptop; as I tend to do periodically and timed it using `=time=` utility, with the following results:

```
#+BEGIN_SRC shell
```

```
bash-4.4$ time keycount.py
```

```
Number of secret keys: 23
```

```
Number of public keys: 12112
```

```
real 11m52.945s
```

```
user 0m0.913s
```

```
sys 0m0.752s
```

```
bash-4.4$
```

```
#+END_SRC
```

Sometime after that I imported another key and followed it with a little test of Cython. This test was kept fairly basic, essentially lifting the material from the [\[\[http://docs.cython.org/en/latest/src/tutorial/cython\\_tutorial.html\]\]](http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html) [Cython Basic Tutorial]] to demonstrate compiling Python code to C. The first step was to take the example key counting code quoted previously, essentially from the importing of the `=gpg=` module to the end of the script:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
 Number of secret keys: {0}
 Number
of public keys: {1}

""").format(secnum, pubnum)
#+END_SRC
```

Save that into a file called `=keycount.pyx=` and then create a `=setup.py=` file which contains this:

```
#+BEGIN_SRC python -i
from distutils.core import setup
from Cython.Build import cythonize

setup(
 ext_modules = cythonize("keycount.pyx")
)
#+END_SRC
```

Compile it:

```
#+BEGIN_SRC shell
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
#+END_SRC
```

Then run it in a similar manner to `=keycount.py=`:

```
#+BEGIN_SRC shell
bash-4.4$ time python3.7 -c "import keycount"
```

```
Number of secret keys: 23
Number of public keys: 12113
```

```
real 6m47.905s
user 0m0.785s
sys 0m0.331s
```

```
bash-4.4$
#+END_SRC
```

Cython turned `=keycount.pyx=` into an 81KB `=keycount.o=` file in the `=build/=` directory, a 24KB `=keycount.cpython-37m-darwin.so=` file to be imported into Python 3.7 and a 113KB `=keycount.c=` generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the `=keycount.pyx=` file or the full 1,452 bytes of the full executable `=keycount.py=` example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The `=keycount.pyx=` and `=setup.py=` files used to generate this example have been added to the `=examples/howto/advanced/cython/=` directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the [\[\[http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd\]\]](http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd) [Magic Attributes] section of the Cython documentation.

```
* Miscellaneous extras and work-arounds
:PROPERTIES:
:CUSTOM_ID: cheats-and-hacks
:END:
```

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with [\[\[#group-lines\]\[group lines\]\]](#).

```
** Group lines
:PROPERTIES:
:CUSTOM_ID: group-lines
:END:
```

There is not yet an easy way to access groups configured in the `gpg.conf` file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
#+BEGIN_SRC python -i
import subprocess
import sys

if sys.platform == "win32":
 gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
 gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
 lines = procom[0].splitlines()
else:
 lines = procom[0].decode().splitlines()

for line in lines:
 if line.startswith("group") is True:
 break

groups = line.split(":-")[1].replace("'",
 "").split(',')

group_lines = []
group_lists = []

for group in groups:
 group_lines.append(group.split("="))
 group_lists.append(group.split("="))

for glist in group_lists:
 glist[1] = glist[1].split()
```



```
#+END_SRC
```

The result of that code is that `=group_lines=` is a list of lists where `=group_lines[i][0]=` is the name of the group and `=group_lines[i][1]=` is the key IDs of the group as a string.

The `=group_lists=` result is very similar in that it is a list of lists. The first part, `=group_lists[i][0]=` matches `=group_lines[i][0]=` as the name of the group, but `=group_lists[i][1]=` is the key IDs of the group as a list.

A demonstration of using the `=groups.py=` module is also available in the form of the executable `=mutt-groups.py=` script. This second script reads all the group entries in a user's `=gpg.conf=` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

```
** Keyserver access for Python
:PROPERTIES:
:CUSTOM_ID:
hkp4py
:END:
```

The [\[\[https://github.com/Selfnet/hkp4py\]\[hkp4py\]\]](https://github.com/Selfnet/hkp4py) module by Marcel Fest was originally a port of the old [\[\[https://github.com/dgladkov/python-hkp\]\[python-hkp\]\]](https://github.com/dgladkov/python-hkp) module from Python 2 to Python 3 and updated to use the [\[\[http://docs.python-requests.org/en/latest/index.html\]\[requests\]\]](http://docs.python-requests.org/en/latest/index.html) module instead. It has since been modified to provide support for Python 2.7 as well and is available via PyPI.

Since it rewrites the `=hkp=` protocol prefix as `=http=` and `=hkps=` as `=https=`, the module is able to be used even with servers which do not support the full scope of keyserver functions.<sup>[fn:5]</sup> It also works quite readily when incorporated into a [\[\[#cython\]\[Cython\]\]](#) generated and compiled version of any code.

```
*** Key import format
:PROPERTIES:
:CUSTOM_ID: hkp4py-strings
:END:
```

The `hkp4py` module returns key data via requests as string literals (`=r.text=`) instead of byte literals (`=r.content=`). This means that the returned key data must be encoded to UTF-8 when importing that key material using a `=gpg.Context().key_import()=` method.

For this reason an alternative method has been added to the `=search=` function of `=hkp4py.KeyServer()=` which returns the key in the correct format as expected by `=key_import=`. When importing using this module, it is now possible to import with this:

```
#+BEGIN_SRC python -i
for key in keys:
 if key.revoked is False:
 gpg.Context().key_import(key.key_blob)
 else:
 pass
#+END_SRC
```

Without that recent addition it would have been necessary to encode the contents of each `=hkp4py.KeyServer().search()[i].key=` in `=hkp4py.KeyServer().search()=` before trying to import it.

An example of this is included in the `[[#howto-import-key][Importing Keys]]` section of this HOWTO and the corresponding executable version of that example is available in the `=lang/python/examples/howto=` directory as normal; the executable version is the `=import-keys-hkp.py=` file.

```
** GPGME version checking
:PROPERTIES:
:CUSTOM_ID: gpgme-version-check
:END:
```

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the `=gpg.version.versionstr=` and `=gpg.version.versionlist=` methods have been quite sufficient. The former returns the same string as `=gpgme-config --version=`, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed `libgpgme` version, this check can be performed:

```
#+BEGIN_SRC python -i
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
 stdout=subprocess.PIPE,
 stderr=subprocess.PIPE)
```

```

gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
 gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0]
 >= 3:
 gpgme_version = gpgme_version_str[0].decode().strip()
else:
 gpgme_version = None

if gpgme_version is not None:
 if gpgme_version == gpg.version.versionstr:
 print("The GPGME Python bindings match libgpgme.")
 else:
 print("The GPGME Python bindings do NOT match libgpgme.")
else:
 print("Upgrade Python and reinstall the GPGME Python bindings.")
#+END_SRC

```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the `=gpg.version.versionintlist=` method (added in version `=1.12.1-beta79=`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```

#+BEGIN_SRC python -i
import gpg

try:
 if gpg.version.is_beta is True:
 print("The installed GPGME Python bindings were built from beta code.")
 else:
 print("The installed GPGME Python bindings are a released version.")
except Exception as e:
 print(e)

try:
 if gpg.version.versionintlist[0] == 1:
 if gpg.version.versionintlist[1] == 12:
 if gpg.version.versionintlist[2] == 1:
 print("This is the minimum version for using versionintlist.")
 elif gpg.version.versionintlist[2] > 1:
 print("The versionintlist method is available.")
 else:
 pass

```

```

elif gpg.version.versionintlist[1] > 12:
 print("The versionintlist method is available.")
else:
 pass
elif gpg.version.versionintlist[0] > 1:
 print("The versionintlist method is available.")
else:
 pass
except Exception as e:
 print(e)
#+END_SRC

```

The points where `=pass=` is used in the above example will most likely also produce an `=Exception=` error since those results should only occur in versions which do not have the `=gpgme.version.is_beta=` and `=gpgme.version.versionintlist=` methods available.

```

* Copyright and Licensing
:PROPERTIES:
:CUSTOM_ID: copyright-and-license
:END:

```

```

** Copyright
:PROPERTIES:
:CUSTOM_ID: copyright
:END:

```

Copyright The GnuPG Project, 2018.

```

** Draft Editions of this HOWTO
:PROPERTIES:
:CUSTOM_ID: draft-editions
:END:

```

Draft editions of this HOWTO may be periodically available directly from the author at any of the following URLs:

- [[<https://files.au.adversary.org/crypto/gpgme-python-howto.html>][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]
- [[<http://files.au.adversary.org/crypto/gpgme-python-howto.html>][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]
- [[<https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html>][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 SSL)]]
- [[<http://files.au.adversary.org/crypto/gpgme-python-howto/index.html>][GPGME Python Bindings HOWTO draft

(HTML  
multiple files, AWS S3 no SSL))

These draft versions have been generated from this document via GNU Emacs [\[Org mode\]](https://orgmode.org/) to `=.texi=` and [\[GNU Texinfo\]](https://www.gnu.org/software/texinfo/) to HTML. Though it is likely that the specific [\[file\]](https://files.au.adversary.org/crypto/gpgme-python-howto/) [\[version\]](http://files.au.adversary.org/crypto/gpgme-python-howto.org/) used will be on the same server with the generated output formats. Occasionally I may include the Org mode generated XHTML versions:

- [\[GPGME Python Bindings HOWTO draft \(HTML single file, AWS S3 SSL\)\]](https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml/)
- [\[GPGME Python Bindings HOWTO draft \(HTML single file, AWS S3 no SSL\)\]](http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml/)

That XHTML version, however, is exported in a way which inherits a colour scheme from [\[the author's Emacs theme\]](https://github.com/holomorph/emacs-zenburn/) (which is a higher contrast version of [\[Zenburn\]](http://kippura.org/zenburnpage/) ported by [\[Holomorph\]](https://github.com/holomorph/)). So it's fine for people who prefer dark themed web pages, but not so great for everyone else.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

```
#+BEGIN_SRC shell
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
#+END_SRC
```

The reStructuredText format is also generated from the Org mode source file, except it is generated using [\[Pandoc\]](https://pandoc.org/) with either of the following commands (depending on the filename):

```
#+BEGIN_SRC shell
pandoc -f org -t rst+smart -o gpgme-python-howto.rst
gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
#+END_SRC
```

Note that the Org mode source files are identified as such via a mode line at the top of each file and have had their `=.org=` file extensions

dropped in order to make scripted generation of output formats easier and not require renaming files post-conversion.

Due to a bug in Org mode's texinfo conversion method, the recommended steps for generating the Texinfo files for all the files in the =lang/python/doc/src/= directory are as follows:

```
#+BEGIN_SRC shell
for x in * ; do
 emacs $x --batch -f org-texinfo-export-to-texinfo --kill
 cat $x.texi | sed -e 's/@documentencoding UTF-8/@documentencoding utf-8/g' > ../texinfo/$x.texi
 pandoc -f org -t rst+smart -o ../rst/$x.rst $x
done ;
rm -fv *.texi
cd ../texinfo
mkdir info
mkdir html
for x in *.texi ; do
 makeinfo -v $x
 makeinfo --html --no-split $x
done ;
mv *.info info/
mv
*.html html/
#+END_SRC
```

This code snippet includes the generation of the reStructuredText files and would be expected to be run from the =doc/src/= directory containing the Org mode source files. It also assumes that the commands are being run on POSIX compliant systems with basic tools like sed, the Bourne shell and GNU Emacs[fn:6] available. The code snippet also includes the steps for generating the Emacs Info files and HTML files from the Texinfo files. Using reStructuredText files with Sphinx is best left for the documentation of that project.

In addition to these there is a significantly less frequently updated version as a HTML [[<https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html>][WebHelp site]] (AWS S3 SSL); generated from DITA XML source files, which can be found in [[<https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/>][an alternative branch]] of the GPGME git repository.

Various generated output formats may occasionally be found in subdirectories of the [[<https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python>][gpgme-python]] directory. In particular within the [[<https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita>][DITA]], [[<https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst>][reStructuredText]] and

[[<https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo>][Texinfo]] subdirectories. The directory contains output files generated with Sphinx and may include a considerable number of its possible output formats, but there are no guarantees as to how recent these are or even if they are present.

These draft editions are not official documents and the version of documentation in the master branch or which ships with released versions is the only official documentation. Nevertheless, these draft editions may occasionally be of use by providing more accessible web versions which are updated between releases. They are provided on the understanding that they may contain errors or may contain content subject to change prior to an official release.

```
** License GPL compatible
:PROPERTIES:
:CUSTOM_ID: license
:END:
```

This file is free software; as a special exception the author gives unlimited permission to copy and/or distribute it, with or without modifications, as long as this notice is preserved.

This file is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY, to the extent permitted by law; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

\* Footnotes

[fn:1] =short-history= and/or =short-history.html=.

[fn:2] With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported minor release is quite possible too.

[fn:3] Yes, even if you use virtualenv with everything you do in Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the /entire/ GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are

circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it).

[fn:4] You probably don't really want to do this. Searching the key servers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.

[fn:5] Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as HKP or HKPS within the Python Code. The `=hkp4py=` module will rewrite these appropriately when the connection is made to the server.

[fn:6] Okay, Emacs might not necessarily qualify as a basic tool, but it is common enough that having it installed on a system isn't too great an expectation, nor is it difficult to add to most POSIX systems, even if the users of those systems do not personally use it.  
2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

- \* Makefile.am: Remove build rules for libgpgme-pth.
- \* gpgme.m4: Remove support for libgpgme-pth.

2011-05-26 Marcus Brinkmann <marcus@g10code.com>

- \* `decrypt.c` (`gpgme_op_decrypt_start`, `gpgme_op_decrypt`): Check CTX.
- \* `decrypt-verify.c` (`gpgme_op_decrypt_verify_start`)  
(`gpgme_op_decrypt_verify`): Likewise.
- \* `delete.c` (`gpgme_op_delete_start`, `gpgme_op_delete`): Likewise.
- \* `edit.c` (`gpgme_op_edit_start`, `gpgme_op_edit`)  
(`gpgme_op_card_edit_start`, `gpgme_op_card_edit`): Likewise.
- \* `encrypt.c` (`gpgme_op_encrypt_start`, `gpgme_op_encrypt`): Likewise.
- \* `encrypt-sign.c` (`gpgme_op_encrypt_sign_start`)  
(`gpgme_op_encrypt_sign`): Likewise.
- \* `export.c` (`gpgme_op_export_start`,  
`gpgme_op_export`)  
(`gpgme_op_export_ext_start`, `gpgme_op_export_ext`)  
(`gpgme_op_export_keys_start`, `gpgme_op_export_keys`): Likewise.
- \* `genkey.c` (`gpgme_op_genkey_start`, `gpgme_op_genkey`): Likewise.
- \* `getauditlog.c` (`gpgme_op_getauditlog_start`)



(gpgme\_op\_getauditlog): Likewise.  
\* gpgconf.c (gpgme\_op\_conf\_load, gpgme\_op\_conf\_save): Likewise.  
\* import.c (gpgme\_op\_import\_start, gpgme\_op\_import\_keys\_start)  
(gpgme\_op\_import\_keys, gpgme\_op\_import): Likewise.  
\* keylist.c (gpgme\_op\_keylist\_start, gpgme\_op\_keylist\_ext\_start):  
Likewise.  
\* opassuan.c (gpgme\_op\_assuan\_transact\_start)  
(gpgme\_op\_assuan\_transact\_ext): Likewise.  
\* passwd.c (gpgme\_op\_passwd\_start, gpgme\_op\_passwd): Likewise.  
\* sign.c (gpgme\_op\_sign\_start, gpgme\_op\_sign): Likewise.  
\* trustlist.c (gpgme\_op\_trustlist\_start)  
(gpgme\_op\_trustlist\_next): Likewise.  
\* verify.c (gpgme\_op\_verify\_start, gpgme\_get\_sig\_key): Likewise.  
\* op-support.c (\_gpgme\_op\_data\_lookup): Likewise.  
\* vfs-create.c (gpgme\_op\_vfs\_transact, gpgme\_op\_vfs\_create):  
Likewise.  
\* vfs-mount.c (gpgme\_op\_vfs\_mount, gpgme\_op\_vfs\_transact): Likewise.  
\* gpgme.c (gpgme\_set\_protocol)  
(gpgme\_set\_sub\_protocol)  
(gpgme\_set\_armor, gpgme\_set\_include\_certs)  
(gpgme\_set\_keylist\_mode, gpgme\_set\_passphrase\_cb)  
(gpgme\_set\_progress\_cb, gpgme\_set\_io\_cbs, gpgme\_set\_locale)  
(gpgme\_ctx\_set\_engine\_info, gpgme\_sig\_notation\_clear): Likewise.  
\* gpgme.c (gpgme\_new): Check for valid R\_CTX.  
(gpgme\_cancel, gpgme\_cancel\_async, gpgme\_release): Likewise.

2011-04-06 Werner Koch <wk@g10code.com>

\* gpgme-config.in: Add option --host. Change options --cflags and  
--libs to collapse duplicate include and lib dirs. Try to put  
extra libs at the end.

\* gpgme.h.in: Use INSERT\_\_TYPEDEFS\_FOR\_GPGME\_H to include platform  
specific typedefs.

2011-02-03 Werner Koch <wk@g10code.com>

\* extra-stati.h: New.  
\* mkstatus: Extend to also process extra-stati.h  
\* Makefile.am (main\_sources): Add extra-stati.h  
(status-table.h): Depend on extra-stati.h and adjust rule.

2011-02-03

Marcus Brinkmann <marcus@g10code.com>

\* w32-io.c (\_gpgme\_io\_socket): Return fd, not res.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

\* assuan-support.c (my\_socket, my\_connect): New functions.  
(\_gpgme\_assuan\_system\_hooks): Add my\_Socket, my\_connect.  
\* priv-io.h (\_gpgme\_io\_socket): New prototype.  
\* w32-io.c (pid\_to\_handle, handle\_to\_oid, fd\_to\_handle): Remove macros.  
(is\_socket): Remove function.  
(\_gpgme\_io\_spawn) [HAVE\_W32CE\_SYSTEM]: Remove some dead code.  
(\_gpgme\_io\_spawn): Translate handles before DuplicateHandle them.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

\* w32-util.c (mkstemp): Don't use CreateFile instead of open (the function is not used on Windows CE, and the callers were not adjusted).

2011-01-21 Marcus Brinkmann <mb@g10code.com>

\* engine-gpgconf.c (\_gpgme\_conf\_opt\_change): Fix the case that is not self-assignment.

2010-12-08 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (strcpy\_escaped\_plus): New.  
(DIM, xtoi\_1, xtoi\_2): New.  
(cmd\_keylist):  
Allow for multiple patterns.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

\* w32-io.c (create\_reader, create\_writer): Use small stack size on Windows CE.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

\* gpgme.h.in (gpgme\_conf\_arg\_new): Make VALUE arg const void \*.  
\* gpgconf.c (\_gpgme\_conf\_arg\_new): Likewise.  
(gpgme\_conf\_arg\_new): Likewise.  
\* engine-gpgconf.c (\_gpgme\_conf\_arg\_new): Likewise.  
(gpgconf\_write): Remove debug hack.

2010-11-19 Marcus Brinkmann <mb@g10code.com>

\* engine-gpgconf.c (\_gpgme\_conf\_opt\_change): Support self-assignment. Requested by Marc Mutz.

2010-11-17 Marcus Brinkmann <mb@g10code.com>

\* vasprintf.c (int\_vasprintf) [HAVE\_W32CE\_SYSTEM]: Just use a

fixed size buffer, as va\_copy is not easy to fake.

2010-11-15 Marcus Brinkmann <mb@g10code.com>

\* w32-ce.h (strcasecmp, strdup) [\_MSC\_VER]: Define.

\* genkey.c, passphrase.c: Include util.h.

\* w32-util.c (\_gpgme\_w32ce\_get\_debug\_envvar): Fix return value.

2010-11-15 Werner Koch <wk@g10code.com>

\*

data-compat.c (gpgme\_data\_new\_from\_filepart)

(gpgme\_data\_new\_from\_file) [W32CE && \_MSC\_VER]: Return not  
GPG\_ERR\_NOT\_IMPLEMENTED.

\* w32-ce.h (HKEY\_PERFORMANCE\_DATA, HKEY\_CURRENT\_CONFIG, \_IOLBF)  
(abort) [\_MSC\_VER]: Provide these macros.

\* ath.h [W32CE && \_MSC\_VER]: Include winsock2.h.

\* ath.c (ath\_read, ath\_write) [W32CE && \_MSC\_VER]: Do not call  
non-available functions.

2010-11-04 Werner Koch <wk@g10code.com>

\* w32-ce.h [\_MSC\_VER && W32CE]: Undef leave.

\* export.c: Include util.h so that we get the above undef.

\* memrchr.c: Remove. Used to be a replacement function required  
by the formerly included assuan code.

2010-11-03 Werner Koch <wk@g10code.com>

\* debug.c (\_gpgme\_debug) [W32CE]: Replace localtime by GetLocalTime.

\* signers.c (gpgme\_signers\_clear): Remove useless return.  
Reported by Patrick Spendrin.

\* w32-util.c: s/\_\_\_inline\_\_\_/GPG\_ERR\_INLINE/

\* setenv.c: Include string.h due to our strerror replacement.

\* w32-ce.h (access, bsearch):

New macros.

\* w32-ce.c (\_gpgme\_wince\_access): New.

(RegQueryValueExA): Change DATA to a void\*.

(\_gpgme\_wince\_bsearch): New. Taken from glibc 2.6.

Guard include of sys/stat.h and sys/types.h.

2010-11-02 Werner Koch <wk@g10code.com>

\* data-fd.c (read, write, lseek) [W32CE && !\_\_MINGW32CE\_\_]: New.  
Taken from Pedro Alves Public Domain code.

\* w32-ce.h (SHGetSpecialFolderPath): Remove our defines and  
prototypes. We use the system provided prototypes now.

\* w32-ce.c: Include shlobj.h

(\_WIN32\_IE): Define to 0x0400

(CreateFileA): New.

\* w32-util.c: Explicitly include windows headers before util.h.

(\_gpgme\_w32ce\_get\_debug\_envvar): Do not use wchar\_t strings for  
read\_w32\_registry\_string.

(mkstemp): Use CreateFile instead of open.

\* w32-io.c (handle\_to\_fd, fd\_tohandle): Add. We need them for W32.

\* w32-util.c (\_WIN32\_IE): Define to 0x0400.

\* util.h [W32]: Include windows.h.

\* w32-sema.c: Do not include windows.h directly.

\* ath.c (ssize\_t, pid\_t)[\_MSC\_VER]: Add new  
types.

\* gpgme.c (gpgme\_result\_ref, gpgme\_result\_unref): Do not use a  
void pointer in pointer arithmetic.

\* w32-util.c: Include util.h prior to ath.h. Don't include  
windows.h directly.

(F\_OK): Define if not defined.

\* w32-ce.c: Include string.h.

(RegQueryValueExA): Use WINAPI modifier to match the declaration.

\* vfs-create.c: Include string.h because under W32CE with MSC we  
get a warning related to our strerror replacement.

\* encrypt-sign.c: Include stdlib.h, string.h and errno.h.

\* priv-io.h [W32CE]: Include w32-ce.h

\* w32-ce.h: Include winsock2.h and ws2tcpip.h.

(\_MSV\_VER): Remove useless macro.

(pid\_t): Add typedef.

Guard all includes of unistd.h and sys/time.h.

2010-10-28 Marcus Brinkmann <marcus@g10code.com>

\* opassuan.c (gpgme\_op\_assuan\_transact\_ext): Fix uninitialized  
value use. Reported by Marc Mutz.

2010-10-07 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (ARGP\_ERR\_UNKNOWN): Use EDEADLK if available.

\* w32-util.c (\_gpgme\_w32ce\_get\_debug\_envvar) [W32CE]:  
New.

\* debug.c (debug\_init) [W32CE]: Use new function.

2010-09-16 Werner Koch <wk@g10code.com>

\* import.c: Include "util.h".

(parse\_import): Return GPG\_ERR\_MISSING\_ISSUER\_CERT.

\* util.h: Add fallback define for GPG\_ERR\_MISSING\_ISSUER\_CERT.

\* op-support.c: Include "util.h".

(\_gpgme\_parse\_inv\_recp): Handle new code 12.

2010-09-02 Marcus Brinkmann <marcus@g10code.de>

\* error.c (gpgme\_err\_code\_to\_errno): Fix cut and paste bug (thanks  
to Marc Mutz).

2010-09-01 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c: Revert change from 2009-06-18, as it created a race  
condition.

2010-08-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.def: Add gpgme\_err\_code\_from\_syserror and gpgme\_err\_set\_errno.

\* libgpgme.vers: Likewise.

\* gpgme.h.in (gpgme\_error\_from\_errno): Fix return type to  
gpgme\_error\_t.

(gpgme\_err\_code\_from\_syserror, gpgme\_err\_set\_errno): New prototype.

(gpgme\_error\_from\_syserror): New inline function (why are  
gpgme\_err\_make\_from\_errno and gpgme\_error\_from\_errno  
not inline  
functions?).

\* error.c (gpgme\_error\_from\_errno): Fix return type to gpgme\_error\_t.

(gpgme\_err\_set\_errno, gpgme\_err\_code\_from\_syserror): New functions.

2010-08-03 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (result\_encrypt\_to\_xml, result\_sign\_to\_xml)

(result\_verify\_to\_xml, result\_import\_to\_xml)

(result\_genkey\_to\_xml): Check vigorously for null pointers.

\* w32-io.c (GPGCEDEV\_IOCTL\_ASSIGN\_RVID): New macro.

(\_gpgme\_io\_spawn): Use ASSIGN\_RVID.

2010-06-11 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (\_gpgme\_io\_spawn): Remove debug printf.

2010-06-10 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (gpgme\_server): Use special hack for Windows CE to get at stdin and stdout.

\* engine-gpgsm.c (gpgsm\_new): Translate returned achild\_fds back to child\_fds.

\* debug.h (TRACE\_SUC6): New macro.

\* w32-io.c (MAX\_SLAFD): New macro.

(fd\_table): New static variable.

(new\_fd, release\_fd): New functions.

(fd\_to\_handle, handle\_to\_fd, handle\_to\_socket):

Remove macros.

(MAX\_READERS, MAX\_WRITERS): Increase to 64.

(notify\_table): Increase to MAX\_SLAFD.

(struct reader\_context\_s, struct writer\_context\_s): Add member file\_sock.

(reader, writer): Use file\_hd vs file\_sock to decide if socket operations to use. Remove auto-detect mode.

(create\_reader, create\_writer): Set file\_sock. Unblock pending thread only if this is a pipe fd.

(\_gpgme\_io\_pipe): Allocate fds from table and return slot indices instead of windows handles. This allows to properly handle RVIDs.

(\_gpgme\_io\_close): Handle dup'ed file descriptors.

(build\_commandline) [HAVE\_W32\_SYSTEM]: Use RVID from fd table now.

(\_gpgme\_io\_spawn): Use fd table now.

(\_gpgme\_io\_fd2str): Use RVID from fd table now.

(\_gpgme\_io\_dup): Implement using fd table.

(\_gpgme\_io\_socket): Allocate fds from table.

(\_gpgme\_io\_connect): Use fd from table.

\* w32-glib-io.c (find\_channel): Check that the slot is used.

2010-06-09 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c [HAVE\_W32CE\_SYSTEM]:

Include assuan.h and winioctl.h.

(GPGCEDEV\_IOCTL\_UNBLOCK) [HAVE\_W32CE\_SYSTEM]: Define.

(set\_synchronize) [HAVE\_W32CE\_SYSTEM]: Stub it out.

(is\_socket): Allow to return -1 for auto-detect (old behaviour).

(is\_socket) [HAVE\_W32CE\_SYSTEM]: Return -1.

(reader): Handle auto-detect case. Handle ctx->stop\_me before

checking for EOF.

(destroy\_reader) [HAVE\_W32CE\_SYSTEM]: Unblock a pending reader.

(writer): Handle auto-detect case. Handle ctx->stop\_me with  
ERROR\_BUSY.

(destroy\_writer) [HAVE\_W32CE\_SYSTEM]: Unblock a pending writer.

(\_gpgme\_io\_pipe) [HAVE\_W32CE\_SYSTEM]: Implement in terms of a  
half-pipe.

(build\_commandline) [HAVE\_W32CE\_SYSTEM]: New function.

(\_gpgme\_io\_spawn) [HAVE\_W32CE\_SYSTEM]: Implement it differently  
for this platform.

(\_gpgme\_io\_fd2str) [HAVE\_W32CE\_SYSTEM]: Implement it for RVIDs.

(\_gpgme\_io\_dup) [HAVE\_W32CE\_SYSTEM]: Stub it out.

\* gpgme-tool.c (result\_add\_timestamp): Add missing NULL argument.

(result\_sign\_to\_xml): Protect against NULL  
fingerprint.

(struct server): New members input\_fd, input\_filename,  
input\_stream output\_fd, output\_filename, output\_stream,  
message\_filename, message\_stream.

(server\_reset\_fds): Deallocate those.

(server\_parse\_fd): New function.

(server\_data\_obj): Take optional filename argument and direction  
argument. Also take new argument to return a filestream that  
needs to be closed after destroying the data object.

Change all callers, too.

(input\_notify, output\_notify): Removed.

(cmd\_input, cmd\_output): New functions.

(gpgme\_server): Do not register input and output notifier.

(register\_commands): Use cmd\_input and cmd\_output.

(cmd\_message): Rewritten to use server\_parse\_fd.

(cmd\_delete, cmd\_keylist): Fix inverted option check.

(main) [HAVE\_W32CE\_SYSTEM]: Sleep a bit to work around bug in ssh.

\* genkey.c (gpgme\_op\_genkey): Return err with TRACE\_ERR.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c (\_gpgme\_timegm) [HAVE\_W32\_SYSTEM]: New static  
function.

(\_gpgme\_parse\_timestamp)

[HAVE\_W32\_SYSTEM]: Use it.

\* gpgme-tool.c (main): Protect call to setlocale with  
HAVE\_SETLOCALE.

\* Makefile.am (system\_components): Remove custom cppflags from  
RCCOMPILER (because gpg-error adds -idirafter that makes RC bail.

[HAVE\_W32CE\_SYSTEM]: Add w32-ce.h and w32-ce.c, clear

libexec\_PROGRAMS.

\* w32-ce.h, w32-ce.c: New files.

\* priv-io.h: Include <sys/types.h>

\* util.h: Likewise.

2010-05-11 Marcus Brinkmann <marcus@g10code.de>

\* w32-util.c: Include ath.h

(HAVE\_ALLOW\_SET\_FOREGROUND\_WINDOW) [!HAVE\_W32CE\_SYSTEM]: Define it.

(RTLD\_LAZY, dlopen, dlsym,

dlclose) [!HAVE\_ALLOW\_SET\_FORGROUND\_WINDOW]: Don't define anymore.

(\_gpgme\_allow\_set\_foreground\_window) [!HAVE\_ALLOW\_SET\_FOREGROUND\_WINDOW]:

Make it a stub.

(read\_w32\_registry\_string): Use FooA variants of Windows functions instead of Foo (which dispatches depending on UNICODE).

[!HAVE\_W32CE\_SYSTEM]: Don't check environment.

(w32\_shgetfolderpath): Remove.

(find\_program\_at\_standard\_place): Call

SHGetSpecialFolderPath

(which is available on all Windows systems

and also Windows CE).

(mkstemp): Use ath\_self instead of getpid.

(\_gpgme\_mkstemp): Use GetTempPathA instead of GetTempPath.

\* gpgme.h.in: Use \_WIN32 instead of \_MSC\_VER. Include time.h for time\_t.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

\* engine-g13.c, gpgme.c, engine-gpgsm.c, engine-gpg.c, op-support.c, engine-assuan.c, gpgme-tool.c: Include <locale.h> only if available with HAVE\_LOCALE\_H and conditionalize use of LC\_CTYPE on its definition.

\* engine-gpgconf.c: Do not include <locale.h>.

\* engine-gpgsm.c (gpgsm\_new, start): Cast between int and assuan\_fd\_t.

\* assuan-support.c (my\_pipe, my\_close, my\_read, my\_write): Likewise.

\* gpgme-tool.c (server\_data\_obj, server\_reset\_fds, gpgme\_server), (my\_recvmsg, my\_sendmsg, my\_spawn): Likewise.

\* engine-assuan.c (start): Likewise.

\* engine-g13.c (start): Likewise.

2010-05-06 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c, w32-io.c, w32-qt-io.cpp,



w32-sema.c, w32-util.c:  
Do not include <signal.h>.

\* sign.c, data-user.c, conversion.c, debug.c, verify.c, data.c,  
decrypt.c, delete.c, assuan-support.c, import.c, engine-gpgsm.c,  
data-mem.c, op-support.c, w32-io.c, w32-util.c, data-compat.c: Use  
gpg\_error\_from\_syserror instead gpg\_error\_from\_errno, and use  
gpg\_err\_set\_errno to set error number.  
\* setenv.c: Include <gpg-error.h> and define \_\_set\_errno to use  
gpg\_err\_set\_errno.  
\* gpgme-tool.c (ARGP\_ERR\_UNKNOWN): Define to EDEADLOCK (which is  
mapped in Windows CE) instead of E2BIG (which is not).  
(gt\_import\_keys): Initialize err.

2010-04-19 Marcus Brinkmann <marcus@g10code.de>

\* assuan-support.c (my\_spawn): Cast to avoid warning.  
\* engine-g13.c (g13\_new): Make ARGV array of pointer to const  
char.  
(g13\_assuan\_simple\_command) [!USE\_DESCRIPTOR\_FUNCTION]: Don't define.  
\* ops.h (\_gpgme\_key\_append\_name): Same in prototype.  
\* key.c (\_gpgme\_key\_append\_name): Make SRC argument pointer to  
const char.  
\* posix-util.c  
(\_gpgme\_get\_uiserver\_socket\_path): Make HOMEDIR  
const.  
\* vfs-mount.c (gpgme\_op\_vfs\_transact\_start): Never define this  
potentially useful but currently unused function.  
\* vfs-create.c (gpgme\_op\_vfs\_transact\_start): Likewise.

2010-04-16 Werner Koch <wk@g10code.com>

\* w32-io.c (is\_socket): New.  
(reader, writer): Use it to figure out the API to use.

2010-03-15 Werner Koch <wk@g10code.com>

\* gpgme.h.in: Add autoconf template to set generated file to  
read-only in an emacs buffer.

2010-03-12 Werner Koch <wk@g10code.com>

\* gpgme.h.in (GPGME\_STATUS\_SUCCESS): Use the right file for the  
change; see below.

\* passwd.c (op\_data\_t): New.  
(passwd\_start): Setup OPD.  
(passwd\_status\_handler): Return GPG\_ERR\_NOT\_SUPPORTED if needed.

\* context.h (OPDATA\_PASSWD): New.  
\* gpgme.h (GPGME\_STATUS\_SUCCESS): New.

2010-03-09 Werner Koch <wk@g10code.com>

\* engine-gpgsm.c (gpgsm\_keylist): Try to start the agent.

2010-02-17 Werner Koch <wk@g10code.com>

\* posix-io.c (notify\_table):  
Change implementation.  
(notify\_table\_item\_t, notify\_table\_size, notify\_table\_lock): New.  
(\_gpgme\_io\_close, \_gpgme\_io\_set\_close\_notify): Adjust for new  
implementation.

2010-02-16 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (spacep, has\_option, skip\_options): New.  
(cmd\_export): Implement option --minimal.

\* gpgme.h.in (GPGME\_EXPORT\_MODE\_MINIMAL): New.  
\* export.c (export\_start, export\_ext\_start): Implement it.  
\* engine-gpg.c (export\_common): Ditto.

2010-01-25 Werner Koch <wk@g10code.com>

\* w32-io.c (\_gpgme\_io\_connect): Fix return code check to make it work.

\* version.c (do\_subsystem\_inits): Remove superfluous second  
WSAStartup.

2010-01-22 Werner Koch <wk@g10code.com>

\* w32-io.c (writer): Try to use send first.  
(reader): Try to use recv first.

2010-01-08 Werner Koch <wk@g10code.com>

\* engine-gpg.c (gpg\_passwd): New.  
(\_gpgme\_engine\_ops\_gpg): Register.  
\* passwd.c (parse\_error): New.  
(passwd\_status\_handler): Use it.

2010-01-07 Marcus Brinkmann <marcus@g10code.de>

\*  
gpgme-tool.c (result\_xml\_write\_cb\_t, struct result\_xml\_state):  
New types.

(MAX\_TAGS): New macro.  
(result\_init, result\_xml\_indent, result\_xml\_tag\_start)  
(result\_xml\_tag\_data, result\_xml\_tag\_end, result\_add\_error)  
(result\_add\_pubkey\_algo, result\_add\_hash\_algo, result\_add\_keyid)  
(result\_add\_fpr, result\_add\_timestamp, result\_add\_sig\_mode)  
(result\_add\_value, result\_add\_string, result\_encrypt\_to\_xml)  
(result\_decrypt\_to\_xml, result\_sign\_to\_xml)  
(result\_verify\_to\_xml, result\_import\_to\_xml)  
(result\_genkey\_to\_xml, result\_keylist\_to\_xml)  
(result\_vfs\_mount\_to\_xml): New functions.  
(gt\_result): Rewritten.

2010-01-05 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (gt\_passwd, cmd\_passwd): New.  
(register\_commands): Register.  
  
\* gpgme.h.in (gpgme\_op\_passwd\_start, gpgme\_op\_passwd): New.  
\* libgpgme.vers, gpgme.def: Add new functions.  
\* passwd.c: New.  
\* Makefile.am (main\_sources): Add passwd.c  
\* engine.c, engine.h (\_gpgme\_engine\_op\_passwd): New.  
\* engine-backend.h (struct engine\_ops): Add PASSWD.  
\* engine-gpgsm.c (gpgsm\_passwd): New.  
(\_gpgme\_engine\_ops\_gpgsm): Register.  
(gpgsm\_reset): Reset only if we have a connection.  
  
\* gpgme.h.in (GPGME\_PK\_ECDSA, GPGME\_PK\_ECDH): New.  
\* gpgme.c (gpgme\_pubkey\_algo\_name): Add them.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

\* debug.c: Test for TLS, not \_\_GNU\_\_

2009-12-15 Marcus Brinkmann <marcus@g10code.de>

\* assuan-support.c (my\_spawn): Calloc, not malloc, the fd\_items.

2009-12-10 Werner Koch <wk@g10code.com>

\* debug.c (debug\_init): Test on sgid process.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (LTRCCOMPILER): Refactor with ...  
(RCCOMPILER): ... this new macro.  
(SUFFIXES): Add .lo.

(gpgme\_res\_ldflag): Removed.  
(gpgme\_res): Use libtool object file name here.  
(libgpgme\_la\_LDFLAGS): Remove gpgme\_res\_ldflag usage.  
(libgpgme\_la\_LIBADD): Add gpgme\_res.

\* ath.c (ath\_self) [HAVE\_W32\_SYSTEM]: Fix typo.

2009-12-02 Werner Koch <wk@g10code.com>

\* gpgconf.c (gpgme\_conf\_arg\_release):  
No return in a function  
returning void. Reported by Wyllys Ingersoll.

2009-12-01 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (cmd\_getauditlog): Add flag --html.  
(hlp\_getauditlog): New.

\* gpgme-tool.c (GT\_GCC\_A\_SENTINEL, GT\_GCC\_A\_PRINTF): New.  
(gt\_write\_status): Use sentinel.  
(argp\_error, log\_error): Use printf attribute.  
(argp\_parse): Remove extra argument to argp\_error.  
(\_gt\_progress\_cb, gt\_get\_engine\_info, gt\_get\_keylist\_mode)  
(gt\_result): Add NULL arg.

2009-11-26 Marcus Brinkmann <marcus@g10code.de>

\* opassuan.c (opassuan\_start): Allocate result structure before  
beginning operation.

2009-11-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (gpgme\_server): Use assuan\_fd\_t and assuan\_fdopen  
on fds.

2009-11-13 <wk@g10code.com>

\* sign.c (\_gpgme\_sign\_status\_handler): Handle SIG\_CREATED\_SEEN.  
\* engine-uiserver.c (uiserver\_sign): Make sending SENDER optional.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

\* op-support.c (\_gpgme\_op\_reset):  
Instead of last change, only set  
sub protocol if it is not the default.

2009-11-10 Werner Koch <wk@g10code.com>

\* op-support.c (\_gpgme\_op\_reset): Ignore GPG\_ERR\_NOT\_IMPLEMENTED while setting the sub protocol.

\* engine-uiserver.c (uiserver\_new): Pass fdpassing flag to assuan\_socket\_connect.  
(set\_recipients): Replace fingerprint by user id.

\* engine-gpgsm.c (set\_recipients): Fix non-terminating loop in case of a missing key.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_new): Set default sub protocol.  
\* gpgme-tool.c: Implement get sub protocol.

\* gpgme.h.in (gpgme\_get\_sub\_protocol): Add prototype.  
\* gpgme.def, libgpgme.vers: Add gpgme\_get\_sub\_protocol.  
\* context.h (struct gpgme\_context): New member sub\_protocol.  
\* gpgme.c (gpgme\_set\_sub\_protocol): Set CTX->sub\_protocol.  
(gpgme\_get\_sub\_protocol): New function.  
\* op-support.c (\_gpgme\_op\_reset): Set sub protocol.

\* Makefile.am (uiserver\_components): New variable.  
(main\_sources):

Add it.

\* ops.h, key.c (\_gpgme\_key\_append\_name): Take CONVERT argument, implement it. Adjust callers.

(gpgme\_key\_from\_uid): New function.

\* gpgme.h.in (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_DEFAULT.

(gpgme\_encrypt\_flags\_t): Add GPGME\_ENCRYPT\_PREPARE,  
GPGME\_ENCRYPT\_EXPECT\_SIGN.

(gpgme\_set\_sub\_protocol, gpgme\_key\_from\_uid): New functions.

\* libgpgme.vers, gpgme.def: Add new functions.

\* gpgme.c (gpgme\_set\_protocol): Add UIServer protocol.

(gpgme\_set\_sub\_protocol): New function.

(gpgme\_get\_protocol\_name): Add UIServer and default protocol.

\* assuan-support.c: Return correct error values, implement socketpair for POSIX.

\* priv-io.h, posix-io.c, w32-io.c, w32-glib-io.c,

w32-qt-io.cpp (\_gpgme\_io\_spawn): Add ATFORK and ATFORKVALUE arguments. Implement it for POSIX. Adjust all callers.

\* engine.h, engine-backend.h (\_gpgme\_engine\_set\_protocol)

(\_gpgme\_engine\_op\_decrypt\_verify): New prototypes. Adjust all users.

\* engine.c (engine\_ops, gpgme\_get\_engine\_info): Add UIServer engine.

(\_gpgme\_engine\_set\_protocol,

\_gpgme\_engine\_op\_decrypt\_verify): New function.  
\* decrypt-verify.c (decrypt\_verify\_start): Call \_gpgme\_engine\_op\_decrypt\_verify.  
\* util.h, posix-util.c, w32-util.c (\_gpgme\_get\_uiserver\_socket\_path): New function.  
\* engine-gpgsm.c (gpgsm\_set\_fd): Fix \_gpgme\_io\_pipe invocation.  
\* gpgme-tool.c: Some support for UIServer protocol.  
\* engine-uiserver.c: New file.

2009-11-09 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Close server side FDs.

2009-11-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (struct gpgme\_tool): New members write\_data and write\_data\_hook.  
(gt\_write\_data): New function.  
(gt\_result): Output vfs\_mount result.  
(server\_write\_data): New function.  
(gpgme\_server): Initialize write\_data members.

2009-11-05 Marcus Brinkmann <marcus@g10code.de>

\* engine-g13.c (struct engine\_g13): Remove members RESULT\_CB and RESULT\_CB\_VALUE.  
(g13\_assuan\_simple\_command, status\_handler): Don't use those anymore.  
(g13\_transact): Remove them from argument list, too.  
\* vfs-mount.c (\_gpgme\_vfs\_mount\_status\_handler): New function.  
(\_gpgme\_op\_vfs\_mount): Pass it to transact.

\* engine-assuan.c (lass\_new): Update use of assuan\_socket\_connect.  
\* engine-gpgsm.c (gpgsm\_new): Update use of assuan\_pipe\_connect.  
\* engine-g13.c (g13\_new): Likewise.

\* priv-io.h (IOspawn\_FLAG\_NOCLOSE): New flag.  
\* w32-io.c (\_gpgme\_io\_spawn): Implement this flag.  
\* posix-io.c (\_gpgme\_io\_spawn): Likewise.  
\* w32-glib-io.c (\_gpgme\_io\_spawn): Likewise.  
\* assuan-support.c (my\_spawn): Set this flag.

\* decrypt.c (gpgme\_op\_decrypt\_start): Fix use of debug macro.  
\* decrypt-verify.c (gpgme\_op\_decrypt\_verify\_start): Likewise.  
\* delete.c (gpgme\_op\_delete\_start): Likewise.  
\* edit.c (gpgme\_op\_edit\_start, gpgme\_op\_card\_edit\_start): Likewise.

- \* encrypt.c (gpgme\_op\_encrypt\_start): Likewise.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* export.c (gpgme\_op\_export\_start, gpgme\_op\_export\_ext\_start)  
(gpgme\_op\_export\_keys\_start,  
gpgme\_op\_export\_keys): Likewise.
- \* genkey.c (gpgme\_op\_genkey\_start): Likewise.
- \* getauditlog.c (gpgme\_op\_getauditlog\_start): Likewise.
- \* import.c (gpgme\_op\_import\_start, gpgme\_op\_import\_keys\_start):  
Likewise.
- \* opassuan.c (gpgme\_op\_assuan\_transact\_start): Likewise.
- \* sign.c (gpgme\_op\_sign\_start): Likewise.
- \* verify.c (gpgme\_op\_verify\_start): Likewise.
- \* vfs-create.c (gpgme\_op\_vfs\_create): Likewise.
- \* vfs-mount.c (gpgme\_op\_vfs\_mount): Likewise.

2009-11-04 Marcus Brinkmann <marcus@g10code.de>

- \* ath.h (ath\_self): New prototype. Include <stdint.h>
- \* ath.c, ath-pth.c, ath-pthread.c (ath\_self): New function.
- \* debug.h: Rewrite most macros to beautify debug output.  
(\_gpgme\_debug\_buffer): Remove tagname and tag argument.  
(\_gpgme\_debug\_frame\_begin, \_gpgme\_debug\_frame\_end): New prototypes.
- \* debug.c: Include <time.h>. Don't include assuan.h.  
(frame\_nr, FRAME\_NR): New thread-specific variable and macro.  
(debug\_init): Do not initialize assuan.  
Call \_gpgme\_debug after  
initialization instead using printf directly.  
(\_gpgme\_debug): Do not call debug\_init (we now ensure proper  
initialization by user). Add timestamp and thread/process ID.  
(\_gpgme\_debug\_buffer): Do not take tagname and tag argument.  
(\_gpgme\_debug\_frame\_begin, \_gpgme\_debug\_frame\_end): New functions.
- \* version.c (gpgme\_check\_version\_internal, gpgme\_check\_version):  
Fix debug string. Do not initialize assuan.
- \* posix-io.c (get\_max\_fds): Use 0 not NULL (nicer debug output).

2009-11-04 Werner Koch <wk@g10code.com>

- \* gpgme-tool.c (register\_commands): Add HELP feature.

2009-11-03 Werner Koch <wk@g10code.com>

- \* gpgme.h.in (GPGME\_PROTOCOL\_UISERVER): New.

2009-11-03 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (main\_sources): Change g13.c to vfs-mount.c. Add  
vfs-create.c
- \* vfs-create.c: New file.

- \* g13.c: Renamed to ...
- \* vfs-mount.c: ... this new file.
- \* gpgme.h.in (gpgme\_op\_vfs\_create): New prototype.
- \* gpgme.def, libgpgme.vers: Add gpgme\_op\_vfs\_create.
- \*
- gpgme-tool.c (gt\_vfs\_create, cmd\_vfs\_create): New functions.
- (register\_commands): Add VFS\_CREATE and CREAET.

2009-11-02 Marcus Brinkmann <marcus@g10code.de>

- \* debug.h (\_gpgme\_debug\_buffer): Make TAG argument const const.
- \* debug.c (\_gpgme\_debug\_buffer): Likewise.
- \* gpgme-tool.c (input\_notify, output\_notify): Adjust type to new assuan interface.
- \* decrypt.c (gpgme\_op\_decrypt\_result): Remove unused variable.
- \* opassuan.c (gpgme\_op\_assuan\_transact): Fix return value.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (noinst\_PROGRAMS): New target gpgme-tool.
- (gpgme\_tool\_LDADD): New variable.
- \* gpgme-tool.c: New file.
- \* ops.h (\_gpgme\_sig\_notation\_clearm \_gpgme\_signers\_clear): New prototypes.
- \* gpgme.c (gpgme\_set\_protocol): Allow GPGME\_PROTOCOL\_GPGCONF (when had that gone missing?).
- (\_gpgme\_sig\_notation\_clear): New function without debug output.
- (gpgme\_release): Call it and \_gpgme\_signers\_clear.
- \* signers.c (\_gpgme\_signers\_clear): New function without debug output.
- \* g13.c (gpgme\_op\_vfs\_mount): Add debug output.
- \* assuan-support.c (my\_spawn): Allow fd\_child\_list to be NULL.
- \* conversion.c (\_gpgme\_encode\_percent\_string): Fix infinite loop.
- \* debug.h: Put tag in front of debug lines, should make for nicer output.
- \* engine-assuan.c (lass\_new): Use our new system hooks for libassuan.
- \* engine-g13.c (g13\_new): Remove redundant assuan context allocation.
- \* version.c (gpgme\_check\_version\_internal): Delay debug output until after gpgme\_check\_version was called.

2009-10-28 Marcus Brinkmann <marcus@g10code.de>

- \* signers.c, encrypt-sign.c, encrypt.c, delete.c, keylist.c, edit.c, import.c, export.c: Fix last change in debug output.

2009-10-27 Marcus Brinkmann <marcus@g10code.de>

- \* edit.c (gpgme\_op\_edit\_start, gpgme\_op\_edit)



(gpgme\_op\_card\_edit\_start, gpgme\_op\_card\_edit): Add debug output.  
 \* encrypt-sign.c (gpgme\_op\_encrypt\_sign\_start)  
 (gpgme\_op\_encrypt\_sign): Likewise.  
 \* encrypt.c (gpgme\_op\_encrypt\_start,  
 gpgme\_op\_encrypt)  
 (gpgme\_op\_encrypt\_result): Likewise.  
 \* export.c (gpgme\_op\_export\_start, gpgme\_op\_export)  
 (gpgme\_op\_export\_ext\_start, gpgme\_op\_export\_ext)  
 (gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): Likewise.  
 \* genkey.c (gpgme\_op\_genkey\_start, gpgme\_op\_genkey)  
 (gpgme\_op\_genkey\_result): Likewise.  
 \* getauditlog.c (gpgme\_op\_getauditlog\_start)  
 (gpgme\_op\_getauditlog): Likewise.  
 \* import.c (gpgme\_op\_import\_result, gpgme\_op\_import\_start)  
 (gpgme\_op\_import): Likewise.  
 \* keylist.c (gpgme\_op\_keylist\_result, keylist\_colon\_handler)  
 (gpgme\_op\_keylist\_start, gpgme\_op\_keylist\_ext\_start)  
 (gpgme\_op\_keylist\_next, gpgme\_op\_keylist\_end, gpgme\_get\_key): Likewise.  
 \* opassuan.c (gpgme\_op\_assuan\_transact\_start)  
 (gpgme\_op\_assuan\_transact\_ext, gpgme\_op\_assuan\_result)  
 (gpgme\_op\_assuan\_transact): Likewise.  
 \* signers.c (gpgme\_signers\_add, gpgme\_signers\_clear): Likewise.  
 \* trustlist.c (gpgme\_op\_trustlist\_start)  
 (gpgme\_op\_trustlist\_next, gpgme\_op\_trustlist\_end): Likewise.  
 \* verify.c (gpgme\_op\_verify\_start,  
 gpgme\_op\_verify)  
 (gpgme\_op\_verify\_result): Likewise.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in (struct gpgme\_io\_event\_done\_data)  
 (gpgme\_io\_event\_done\_data\_t): New types.  
 (struct \_gpgme\_op\_assuan\_result): Deprecate the err member.  
 (gpgme\_op\_assuan\_result): Deprecate (for now).  
 (gpgme\_op\_assuan\_transact\_ext): New prototype.  
 (gpgme\_op\_assuan\_transact): Deprecate.  
 (struct \_gpgme\_op\_g13\_result): Replace with ...  
 (struct \_gpgme\_op\_vfs\_mount\_result): ... this.  
 (gpgme\_op\_g13\_mount): Replace with ...  
 (gpgme\_op\_vfs\_mount): ... this.  
 \* gpgme.def (gpgme\_op\_assuan\_transact\_ext, gpgme\_wait\_ext)  
 (gpgme\_op\_vfs\_mount\_result, gpgme\_op\_vfs\_mount): New.  
 (gpgme\_op\_g13\_mount): Remove.  
 \* libgpgme.vers: Likewise.  
 \* engine-backend.h (struct engine\_ops): Remove RESULT\_CB and  
 RESULT\_CB\_VALUE args in opassuan\_transact member. Add CANCEL\_OP  
 member.  
 \* ops.h (\_gpgme\_cancel\_with\_err, \_gpgme\_wait\_on\_condition): Add

OP\_ERR argument.  
(\_gpgme\_wait\_one\_ext):  
New prototype.  
\* context.h (ctx\_op\_data\_id\_t): Add OPDATA\_VFS\_MOUNT.  
\* engine-g13.c (g13\_cancel\_op): New function.  
(parse\_status): Remove declaration.  
(g13\_assuan\_simple\_command): Do nothing with status lines for now.  
(status\_handler): Update opaque value access.  
(\_gpgme\_engine\_ops\_g13): Add new cancel\_op member.  
\* gpgme.c (\_gpgme\_cancel\_with\_err): Add new parameter OP\_ERR.  
Handle operational errors.  
(gpgme\_cancel, gpgme\_io\_read, gpgme\_io\_write): Add debug output.  
\* data.c (\_gpgme\_data\_inbound\_handler)  
(\_gpgme\_data\_outbound\_handler): Adjust opaque value access.  
\* engine-gpg.c (command\_handler, status\_handler)  
(colon\_line\_handler): Likewise.  
\* engine-gpgsm.c (status\_handler): Likewise.  
\* engine-gpg.c (\_gpgme\_engine\_ops\_gpg): Add cancel\_op member.  
\* engine-gpgsm.c (\_gpgme\_engine\_ops\_gpgsm): Likewise.  
\* g13.c: Rewritten (and will be rewritten again).  
\* engine.h (\_gpgme\_engine\_op\_assuan\_transact): Remove result\_cb  
and result\_cb\_value parameters from prototype.  
(\_gpgme\_engine\_cancel\_op):  
New prototype.  
\* engine.c (engine\_ops) [! ENABLE\_ASSUAN]: Add missing comma.  
(\_gpgme\_engine\_op\_assuan\_transact): Remove result\_cb and  
result\_cb\_value parameter.  
(\_gpgme\_engine\_cancel\_op): New function.  
\* wait.h (\_gpgme\_run\_io\_cb): Add new argument OP\_ERR.  
(struct io\_cb\_data): New struct to pass opaque data and get a  
op\_err return value. Needed because we can't modify I/O callback  
handler signature because it is exposed to the user.  
\* wait.c (\_gpgme\_run\_io\_cb): Add OP\_ERR parameter. Handle  
operational errors.  
\* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Handle operational  
errors.  
\* wait-private.c (\_gpgme\_wait\_on\_condition): New argument to  
retrieve the operational result. Handle operational errors in  
session based protocols.  
(\_gpgme\_wait\_one\_ext): New function.  
(\_gpgme\_wait\_one): Pass argument in invocation of  
\_gpgme\_wait\_on\_condition.  
\* wait-global.c (struct ctx\_list\_item): Add member OP\_ERR.  
(ctx\_done): New argument OP\_ERR.  
(ctx\_wait): New argument  
OP\_ERR.  
(gpgme\_wait\_ext): New function based on gpgme\_wait but handling  
operational errors.

(gpgme\_wait): Implement in term of gpgme\_wait\_ext.  
 \* keylist.c (gpgme\_op\_keylist\_next): Pass argument in invocation of \_gpgme\_wait\_on\_condition.  
 \* trustlist.c (gpgme\_op\_trustlist\_next): Pass argument in invocation of \_gpgme\_wait\_on\_condition.  
 \* engine-assuan.c (struct engine\_llass): Replace members RESULT\_CB and RESULT\_CB\_VALUE by LAST\_OP\_ERR.  
 (\_gpgme\_engine\_assuan\_last\_op\_err): Add this hack function.  
 (llass\_cancel\_op): New function.  
 (\_gpgme\_engine\_llass\_ops): Add cancel\_op member.  
 (llass\_status\_handler): Update opaque value access.  
 (llass\_transact): Remove RESULT\_CB and RESULT\_CB\_VALUE arguments.  
 \* opassuan.c: Move compat hacks to the end of file.  
 (opassuan\_start): Do not set OPD->result.err.  
 Do not pass RESULT\_Cb and CTX to \_gpgme\_engine\_op\_assuan\_transact.  
 (gpgme\_op\_assuan\_transact\_ext): New function.

\* debug.h (DEBUG\_GLOBAL): New debug level.  
 \* conversion.c (gnupg\_errors, \_gpgme\_map\_gnupg\_error): Removed.  
 \* data-user.c (gpgme\_data\_new\_from\_cbs): Add debug output.  
 \* data-fd.c (gpgme\_data\_new\_from\_fd): Likewise.  
 \* data-stream.c (gpgme\_data\_new\_from\_stream): Likewise.  
 \* decrypt.c (gpgme\_op\_decrypt\_result, gpgme\_op\_decrypt\_start) (gpgme\_op\_decrypt): Likewise.  
 \* delete.c (gpgme\_op\_delete\_start, gpgme\_op\_delete): Likewise.  
 \* decrypt-verify.c (gpgme\_op\_decrypt\_verify\_start) (gpgme\_op\_decrypt\_verify): Likewise.  
 \* sign.c (gpgme\_op\_sign\_result): Fix debug message.  
 \* data-mem.c (gpgme\_data\_new): Improve debug output.  
 \* verify.c (parse\_trust): Use atoi instead of \_gpgme\_map\_gnupg\_error.  
 \* decrypt.c (\_gpgme\_decrypt\_status\_handler): Likewise.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am: Remove @NETLIBS@ from LIBADDs.  
 (g13\_components): New variable.  
 (main\_sources): Add \$(g13\_components).  
 \* g13.c, engine-g13.c: New files.  
 \* engine.c (engine\_ops): Check for assuan for assuan engine, add g13 engine.  
 \* util.h (\_gpgme\_get\_g13\_path, \_gpgme\_encode\_percent\_string): New prototypes.  
 \* conversion.c (\_gpgme\_encode\_percent\_string): New function.  
 \* gpgme.h.in (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_G13.  
 (struct \_gpgme\_op\_g13\_result, gpgme\_g13\_result\_t): New types.

(gpgme\_op\_g13\_mount): New function.  
\* gpgme.def, libgpgme.vers: Add gpgme\_op\_g13\_mount.  
\* gpgme.c (gpgme\_set\_protocol): Allow GPGME\_PROTOCOL\_G13.  
(gpgme\_get\_protocol\_name): Add GPGME\_PROTOCOL\_G13.  
\* posix-util.c (\_gpgme\_get\_g13\_path): New function.  
\* w32-util.c (\_gpgme\_get\_g13\_path): New function.  
\* engine-backend.h (\_gpgme\_engine\_ops\_g13): New declaration.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in (netlibs): Remove.  
(assuan\_cflags, assuan\_libs): Add.  
  
\* Makefile.am (assuan\_cppflags, assuan\_libobjs): Removed.  
(gpgsm\_components): Move engine-assuan.c to ...  
(assuan\_components): ... this new variable.  
(main\_sources): Add this new variable.  
(AM\_CPPFLAGS): Remove \$(assuan\_cppflags).  
(AM\_CFLAGS): Add @LIBASSUAN\_CFLAGS@.  
(libgpgme\_la\_DEPENDENCIES,  
libgpgme\_pth\_la\_DEPENDENCIES)  
(libgpgme\_glib\_la\_DEPENDENCIES, libgpgme\_qt\_la\_DEPENDENCIES)  
(libgpgme\_pthread\_la\_DEPENDENCIES): Remove \$(assuan\_libobjs).  
(libgpgme\_la\_LIBADD, libgpgme\_pth\_la\_LIBADD)  
(libgpgme\_glib\_la\_LIBADD, libgpgme\_qt\_la\_LIBADD))  
(libgpgme\_pthread\_la\_LIBADD): Replace \$(assuan\_libobjs) by  
@LIBASSUAN\_LIBS@.  
\* priv-io.h [!HAVE\_W32\_SYSTEM]: Declare \_gpgme\_io\_recvmg,  
\_gpgme\_io\_sendmsg, \_gpgme\_io\_waitpid.  
\* engine-backend.h: Define with [ENABLE\_ASSUAN] instead  
of [ENABLE\_GPGSM].  
\* posix-io.c (\_gpgme\_io\_waitpid): Make non-static.  
\* util.h (ENABLE\_ASSUAN): Declare \_gpgme\_assuan\_system\_hooks,  
\_gpgme\_assuan\_malloc\_hooks, \_gpgme\_assuan\_log\_cb.  
\* engine-gpgsm.c: Don't map assuan error codes. Use  
assuan\_release instead of assuan\_disconnect.  
(map\_assuan\_error): Remove function.  
(gpgsm\_new): Use new assuan context interface.  
\* engine-assuan.c: Use assuan\_release instead of  
assuan\_disconnect.  
(lass\_new): Use new assuan context  
interface.

2009-10-07 <wk@g10code.com>

\* priv-io.h [W32]: Include windows.h instead of sys/socket.h.

2009-08-06 Werner Koch <wk@g10code.com>

\* op-support.c (`_gpgme_parse_inv_recp`): Allow for no fingerprint.

\* engine-gpgsm.c (`gpgsm_sign`): Hook up the status func for the SIGNER command.

\* gpgme.h.in (`GPGME_STATUS_INV_SGMR`, `GPGME_STATUS_NO_SGMR`): New.

\* sign.c (`op_data_t`): Add fields `IGNORE_INV_RECP` and `INV_SGMR_SEEN`.

(`_gpgme_op_sign_init_result`): Factor code out to ...

(`sign_init_result`): .. new. Init new fields.

(`sign_start`): Use `sign_init_result`.

(`_gpgme_sign_status_handler`): Take care of the new `INV_SGMR`.

Return an error if no signature has been created.

2009-07-07 Werner Koch <wk@g10code.com>

\* engine-gpgsm.c (struct `engine_gpgsm`): Add fields `input_helper_data` and `input_helper_memory`.

(`close_notify_handler`): Release these new fields.

(`gpgsm_import`): Implement the keyarray feature.

\* engine-gpg.c (`gpg_import`): Actually return `GPG_ERR_INV_VALUE`.

\*

engine-gpgsm.c (`gpgsm_import`): Return an error for unknown data encodings.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

\* debug.h: Everywhere, use `%p` instead of `0x%x` to print pointer.

[`HAVE_STDINT_H`]: Include `<stdint.h>`.

(`_TRACE`, `TRACE`, `TRACE0`, `TRACE1`, `TRACE2`, `TRACE3`, `TRACE6`): Cast tag to (`uintptr_t`) before casting it to (`void*`) to silence GCC warning.

\* gpgme.h.in (`_GPGME_DEPRECATED_OUTSIDE_GPGME`): New macro.

\* sign.c (`_GPGME_IN_GPGME`): Define it.

\* keylist.c (`_GPGME_IN_GPGME`): Define it.

\* debug.c (`_gpgme_debug_begin`, `_gpgme_debug_add`): Handle error in `vasprintf` and `asprintf`.

\* priv-io.h: Include `<sys/socket.h>`. Declare `_gpgme_io_connect`.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in (`GPGME_CONF_PATHNAME`): Revert last change, it's back! (GPA still uses it..).

\* gpgme.def: Fix stupid typo.  
\* w32-io.c (\_gpgme\_io\_pipe): Add missing declaration.  
  
\* gpgme.h.in (GPGME\_CONF\_PATHNAME): Remove obsolete macro.

\* w32-io.c (\_gpgme\_io\_pipe): Allocate  
reader/writer thread right  
away.  
(\_gpgme\_io\_read, \_gpgme\_io\_write, \_gpgme\_io\_select)  
(\_gpgme\_io\_dup): Never allocate threads here.  
(find\_writer, find\_reader): Check return value of thread creation  
function.

\* context.h (CTX\_OP\_DATA\_MAGIC): New macro.  
(struct ctx\_op\_data): New member MAGIC.  
\* op-support.c (\_gpgme\_op\_data\_lookup): Initialize magic.  
\* gpgme.c (gpgme\_result\_unref, gpgme\_result\_ref): Check magic.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_result\_unref): Hot fix to release a lock.  
  
\* gpgme.c (result\_ref\_lock): New global variable.  
(gpgme\_result\_ref, gpgme\_result\_unref): use it.

2009-06-16 Werner Koch <wk@g10code.com>

\* version.c: Include stdlib.h.  
  
\* gpgme.h.in (gpgme\_data\_encoding\_t): Add GPGME\_DATA\_ENCODING\_URL,  
GPGME\_DATA\_ENCODING\_URLESC, GPGME\_DATA\_ENCODING\_URL0.  
\* data.c (gpgme\_data\_set\_encoding): Adjust for new values.  
\* engine-gpg.c (string\_from\_data): New.  
(gpg\_import): Implement --fetch-key feature.  
  
\* gpgme.h.in  
(gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): New.  
\* gpgme.def, libgpgme.vers: Add them.  
\* export.c (gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): New.  
(export\_keys\_start): New.  
  
\* gpgme.h.in (gpgme\_export\_mode\_t, GPGME\_EXPORT\_MODE\_EXTERN): New.  
(gpgme\_op\_export\_start, gpgme\_op\_export, gpgme\_op\_export\_ext\_start)  
(gpgme\_op\_export\_ext): Change arg RESERVED to MODE of new  
compatible type.  
\* export.c (gpgme\_export\_ext\_start, gpgme\_op\_export)  
(gpgme\_op\_export\_ext\_start, gpgme\_op\_export\_ext): Ditto.  
(export\_start): Ditto.

- \* engine.c (\_gpgme\_engine\_op\_export): Ditto.
- \* engine-backend.h (struct engine\_ops): Ditto.
- \* engine-gpgsm.c (gpgsm\_export, gpgsm\_export\_ext): Ditto.
- \* engine-gpg.c (gpg\_export, gpg\_export\_ext): Ditto. Implement mode EXTERN.
- (gpg\_export, gpg\_export\_ext): Factor common code out to ..
- (export\_common): .. this.
  
- \* gpgme.h.in (gpgme\_op\_import\_keys\_start, gpgme\_op\_import\_keys): New.
- \* gpgme.def, libgpgme.vers: Add them.
- \* import.c (gpgme\_op\_import\_keys\_start, gpgme\_op\_import\_keys): New.
- (\_gpgme\_op\_import\_keys\_start): New.
- \* engine.c (\_gpgme\_engine\_op\_import): Add arg KEYARRAY.
- \* engine-backend.h (struct engine\_ops): Ditto.
- \* engine-gpgsm.c (gpgsm\_import): Ditto. Not functional.
- \* engine-gpg.c (gpg\_import): Ditto. Implement it.

2009-06-15 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h.in (gpgme\_result\_ref, gpgme\_result\_unref): Add prototypes.
- \* gpgme.def, libgpgme.vers (gpgme\_result\_ref, gpgme\_result\_unref): Add these.
- \* context.h (struct ctx\_op\_data): Add member "references".
- \* gpgme.c (gpgme\_result\_ref, gpgme\_result\_unref): New functions.
- (\_gpgme\_release\_result): Use gpgme\_result\_unref.
- \* op-support.c (\_gpgme\_op\_data\_lookup): Initialize references.

2009-06-12 Werner Koch <wk@g10code.com>

- \* gpgme-w32spawn.c (translate\_get\_from\_file): Parse optional spawn flags. Add new arg R\_FLAGS. Fix segv on file w/o LF.
- (translate\_handles): Add new arg R\_FLAGS. Avoid possible segv.
- (main): Pass flags for my\_spawn.
- (my\_spawn):
- Add arg FLAGS and implement AllowSetForegroundWindow.
  
- \* priv-io.h (IOSPAWN\_FLAG\_ALLOW\_SET\_FG): New.
- \* w32-io.c (\_gpgme\_io\_spawn): Add arg FLAGS and implement it.
- \* w32-glib-io.c (\_gpgme\_io\_spawn): Ditto.
- \* w32-qt-io.cpp (\_gpgme\_io\_spawn): Ditto.
- \* posix-io.c (\_gpgme\_io\_spawn): Add dummy arg FLAGS.
- \* engine-gpg.c (start): Call spawn with new flag.
  
- \* w32-util.c (\_gpgme\_allow\_set\_foreground\_window): Rename to \_gpgme\_allow\_set\_foreground\_window. Change all callers.
- \* posix-util.c (\_gpgme\_allow\_set\_foreground\_window): Ditto.

2009-06-10 Werner Koch <wk@g10code.com>

\* w32-util.c (`_gpgme_allow_set_foreground_window`): Add trace support.

2009-06-09 Werner Koch <wk@g10code.com>

\* engine-gpg.c (`gpg_io_event`): Test for `cmd.fd`.

\* version.c (`gpgme_check_version_internal`): Make result const.

\* gpgme.c: Include `priv-io.h`.

(`gpgme_io_read`, `gpgme_io_write`): New.

\* `libgpgme.vers` (`GPGME_1.1`): Add them.

\* `gpgme.def`: Ditto.

\* `Makefile.am` (`main_sources`): Remove `gpgme.h`.

(`include_HEADERS`):

Rename to `nodist_include_HEADERS` so that a

`VPATH` build won't use the distributed one.

\* `util.h` (`GPG_ERR_NOT_OPERATIONAL`): Define.

2009-05-28 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.h.in` (`gpgme_check_version_internal`): New prototype.

(`gpgme_check_version`): New macro, overriding function of the same name.

\* `libgpgme.vers`, `gpgme.def`: Add `gpgme_check_version_internal.o`

\* `context.h` (`_gpgme_selftest`): New variable declaration.

\* `version.c`: Include "`context.h`".

(`gpgme_check_version`): Set `_gpgme_selftest` on success.

(`gpgme_check_version_internal`): New function.

\* `gpgme.c` (`_gpgme_selftest`): Define it.

(`gpgme_new`): Check the selftest result.

2009-05-18 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.h.in` (`gpgme_encrypt_flags_t`): Add

`GPGME_ENCRYPT_NO_ENCRYPT_TO`.

\* `engine-gpg.c` (`gpg_encrypt`): Pass `--no-encrypt-to` to `gpg` if `GPGME_ENCRYPT_NO_ENCRYPT_TO` flag is set.

2009-05-14 Werner Koch <wk@g10code.com>

\* `gpgme.h.in` (`gpgme_status_code_t`):

Explicitly initialize for

better maintainability and to help debugging.



2009-05-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in: Add compile time check for \_FILE\_OFFSET\_BITS.

2009-04-15 Marcus Brinkmann <marcus@g10code.de>

\* posix-io.c (\_gpgme\_io\_socket, \_gpgme\_io\_connect): New functions.

\* w32-io.c (\_gpgme\_io\_connect): Fix stupid error.

2009-04-08 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (giochannel\_table): New members used, fd, socket.

(find\_channel): Drop CREATE argument.

(new\_dummy\_channel\_from\_fd, new\_channel\_from\_fd)

(new\_channel\_from\_socket): New functions.

(\_gpgm\_io\_fd2str): Implement for sockets.

(\_gpgme\_io\_write, \_gpgme\_io\_read): Translate EAGAIN errors correctly.

(\_gpgme\_io\_pipe): Fix for new channel bookkeeping.

(\_gpgme\_io\_close, \_gpgme\_io\_dup): Likewise.

(wsa2errno, \_gpgme\_io\_socket, \_gpgme\_io\_connect): New.

\* w32-io.c (MAX\_READERS, MAX\_WRITERS): Bump up to 40.

(wsa2errno, \_gpgme\_io\_socket, \_gpgme\_io\_connect): New.

\* w32-qt-io.cpp

(\_gpgme\_io\_socket, \_gpgme\_io\_connect): New stubs.

\* version.c [HAVE\_W32\_SYSTEM]: Include "windows.h.

(do\_subsystem\_inits) [HAVE\_W32\_SYSTEM]: Call WSAStartup.

\* engine-assuan.c (lass\_status\_handler): Ignore EAGAIN errors.

2009-03-18 Werner Koch <wk@g10code.com>

\* gpgme.h.in (GPGME\_KEYLIST\_MODE\_EPHEMERAL): New.

\* engine-gpgsm.c (gpgsm\_keylist): Send new option.

2009-03-13 Werner Koch <wk@g10code.com>

\* gpgme-config.in: Make sure locale is set to C.

2009-02-24 Werner Koch <wk@g10code.com>

\* gpgme.h.in (struct \_gpgme\_op\_assuan\_result): New.

(gpgme\_assuan\_result\_t): New.

(gpgme\_op\_assuan\_result): Change return type.

(struct \_gpgme\_assuan\_sendfnc\_ctx)

(gpgme\_assuan\_sendfnc\_ctx\_t, gpgme\_assuan\_sendfnc\_t): Remove.

(gpgme\_assuan\_inquire\_cb\_t): Changed.

\* opassuan.c (op\_data\_t): Make use of a result structure.

(gpgme\_op\_assuan\_result): Change return type.  
(opassuan\_start): Use result structure.  
(result\_cb): Ditto.  
\* engine-assuan.c (struct \_gpgme\_assuan\_sendfnc\_ctx):  
Remove.  
(inquire\_cb\_sendfnc): Remove.  
(inquire\_cb): Change for new callback scheme. Not yet finished.  
(lass\_status\_handler): Allow sending a CANCEL from the inquire CB.

2009-02-04 Werner Koch <wk@g10code.com>

\* w32-glib-io.c (\_gpgme\_io\_spawn): Make ARGV argument const to  
match prototype.  
\* w32-qt-io.cpp (\_gpgme\_io\_spawn): Ditto.

2009-02-03 Werner Koch <wk@g10code.com>

\* gpgme.h.in (struct \_gpgme\_subkey): Add fields IS\_CARDKEY and  
CARD\_NUMBER..  
\* key.c (gpgme\_key\_unref): Release field CARD\_NUMBER.  
\* keylist.c (keylist\_colon\_handler): Factor common code out to ...  
(parse\_sec\_field15): New. Set card number.

2009-01-26 Werner Koch <wk@g10code.com>

\* opassuan.c, dirinfo.c, engine-assuan.c: New.  
\* Makefile.am: Add them.  
\* engine-backend.h: Add \_gpgme\_engine\_ops\_assuan.  
(struct engine\_ops): Add field OPASSUAN\_TRANSACT. Update all  
engine initializers.  
\* Makefile.am (gpgsm\_components): Add engine-assuan.c.  
\* gpgme.h.in (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_ASSUAN.  
(gpgme\_assuan\_data\_cb\_t,  
gpgme\_assuan\_sendfnc\_ctx\_t)  
(gpgme\_assuan\_inquire\_cb\_t, gpgme\_assuan\_status\_cb\_t): New.  
(gpgme\_op\_assuan\_transact\_start, gpgme\_op\_assuan\_transact): New.  
\* gpgme.c (gpgme\_get\_protocol\_name): Ditto.  
(gpgme\_set\_protocol): Support it.  
\* engine.c (gpgme\_get\_engine\_info): Ditto.  
(engine\_ops): Register it.  
(\_gpgme\_engine\_op\_assuan\_transact): New.  
\* libgpgme.vers (gpgme\_op\_assuan\_transact\_start)  
(gpgme\_op\_assuan\_transact): New.  
\* gpgme.def (gpgme\_op\_assuan\_transact\_start)  
(gpgme\_op\_assuan\_transact): New.  
\* engine-backend.h (struct engine\_ops): Add GET\_HOME\_DIR and  
initialize to NULL for all engines.  
\* engine.c (engine\_get\_home\_dir): New.

(gpgme\_get\_engine\_info): Use it.  
(\_gpgme\_set\_engine\_info): Use it.  
\* engine.h (engine\_assuan\_result\_cb\_t): New.  
\* context.h (ctx\_op\_data\_id\_t): Add OPDATA\_ASSUAN.  
  
\* util.h (GPG\_ERR\_UNFINISHED): Define if not yet defined.  
  
\* version.c (gpgme\_check\_version): Protect trace arg against NULL.

2009-01-19 Werner  
Koch <wk@g10code.com>

\* runpgg.c: Rename to engine-gpg.c  
\* Makefile.am (main\_sources): Ditto.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (status-table.h): Use \$(builddir) to find gpgme.h.

2008-11-18 Werner Koch <wk@g10code.com>

\* version.c (do\_subsystem\_inits): Always initialize I/O  
subsystem. Fixes regression from 2007-08-02.  
  
\* decrypt.c (\_gpgme\_decrypt\_status\_handler): Use  
\_gpgme\_map\_gnupg\_error to parse the error code for decrypt.algorithm.

2008-10-30 Marcus Brinkmann <marcus@g10code.de>

\* wait-private.c (\_gpgme\_wait\_on\_condition): Remove unused  
variable IDX.  
\* wait-global.c: Include ops.h to silence gcc warning.  
(\_gpgme\_wait\_global\_event\_cb): Pass error value directly.  
\* wait-user.c: Include ops.h to silence gcc warning.  
  
\* posix-io.c (\_gpgme\_io\_spawn): Make ARGV argument const to  
silence gcc warning. Cast argument to execv to silence warning.  
\* w32-io.c (\_gpgme\_io\_spawn): Likewise.  
\* priv-io.h (\_gpgme\_io\_spawn): Likewise for  
prototype.

2008-10-24 Werner Koch <wk@g10code.com>

\* runpgg.c (gpg\_keylist\_preprocess): Escape backslashes too.

2008-10-23 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (gpg\_keylist\_preprocess): Convert percent escaped

string to C coded string.

2008-10-20 Werner Koch <wk@g10code.com>

- \* Makefile.am (EXTRA\_DIST): Add gpgme.h.in.
- \* gpgme.h: Rename to gpgme.h.in.
- \* gpgme.h.in (GPGME\_VERSION): Use autoconf substitution.
- \* posix-io.c: Include sys/uio.h. Fixes bug #818.

2008-10-18 Marcus Brinkmann <marcus@g10code.com>

- \* w32-util.c (find\_program\_in\_registry): Don't define. (`_gpgme_get_gpg_path`, `_gpgme_get_gpgsm_path`) (`_gpgme_get_gpgconf_path`): Do not check for fooProgram in the registry anymore. It is now no longer possible to overwrite the default location in that way.

2008-10-17 Werner Koch <wk@g10code.com>

- \* w32-glib-io.c (`_gpgme_io_fd2str`): Use "%d" and not "%ld" to work around a bug in mingw32.

2008-09-23 Marcus Brinkmann <marcus@g10code.com>

- \* gpgme.c (`gpgme_sig_notation_clear`): Clear CTX->sig\_notations. Submitted by "Daniel Mueller" <daniel@danm.de>

2008-09-16 Marcus Brinkmann <marcus@g10code.com>

- \* `runpg.c` (`gpg_new`): Don't use `errno` with `ttyname_r`.

2008-08-11 Marcus Brinkmann <marcus@g10code.com>

- \* `runpg.c` (`gpg_cancel`): Remove `cmd fd` before `status fd`.
- \* `gpgme.c` (`_gpgme_cancel_with_err`): New function. (`gpgme_cancel`): Reimplement in terms of `_gpgme_cancel_with_err`.
- \* `wait-private.c` (`_gpgme_wait_on_condition`): Use `_gpgme_cancel_with_err`.
- \* `wait-user.c` (`_gpgme_user_io_cb_handler`): Likewise.
- \* `wait-global.c` (`_gpgme_wait_global_event_cb`, `gpgme_wait`): Likewise.

2008-08-08 Marcus Brinkmann <marcus@g10code.com>

- \* `runpg.c` (`command_handler`): Remove I/O callback on error, too.

2008-06-29 Marcus Brinkmann <marcus@g10code.com>

\* gpgme.c (gpgme\_cancel\_async): Remove unused variable.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

\* libgpgme.vers: Add gpgme\_cancel\_async.

\* gpgme.def: Likewise.

\* context.h:

Include "sema.h".

(struct gpgme\_context): New members lock and canceled.

\* gpgme.c (gpgme\_new): Initialize lock.

(gpgme\_release): Destroy lock.

(gpgme\_cancel\_async): New function.

\* op-support.c (\_gpgme\_op\_reset): Reset the canceled flag.

\* wait-global.c (gpgme\_wait): Check cancel flag before processing any I/O callbacks.

\* wait-private.c (\_gpgme\_wait\_on\_condition): Likewise.

\* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Likewise.

2008-06-26 Werner Koch <wk@g10code.com>

\* w32-util.c (\_gpgme\_mkstemp): Replace sprint by stpcpy.

(mkstemp): Need to use GetSystemTimeAsFileTime for better compatibility.

2008-06-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-w32spawn.c: New file.

\* Makefile.am (libexec\_PROGRAMS) [HAVE\_W32\_SYSTEM]: New variable with gpgme-w32spawn.

\* engine-gpgsm.c (gpgsm\_new): Use server translated handles.

(gpgsm\_set\_locale): Return early if locale value is NULL.

\* util.h (\_gpgme\_mkstemp)

(\_gpgme\_get\_w32spawn\_path) [HAVE\_W32\_SYSTEM]: New function prototypes.

\*

w32-util.c: Include <stdint.h>, <sys/stat.h> and <unistd.h>.

(letters, mkstemp, \_gpgme\_mkstemp, \_gpgme\_get\_w32spawn\_path): New functions.

\* runpg.c (gpg\_decrypt, gpg\_encrypt, gpg\_encrypt\_sign)

(gpg\_genkey, gpg\_import, gpg\_verify, gpg\_sign): Pass data over special filename FD rather than stdin.

(struct arg\_and\_data\_s): Add member ARG\_LOCP.

(struct fd\_data\_map\_s): Add member ARG\_LOC.

(struct engine\_gpg): Add member ARG\_LOC to status and colon.

(\_add\_arg, add\_arg\_with\_locp): New function.

(add\_arg\_ext): Reimplement in terms of \_add\_arg.  
(gpg\_new): Remember argument location for status FD.  
(build\_argv): Set argument location if requested. Also set argument location of fd\_data\_map for data items.  
(start): Adjust caller of \_gpgme\_io\_spawn.  
\* priv-io.h (struct spawn\_fd\_item\_s): Add members peer\_name and arg\_loc.  
(\_gpgme\_io\_spawn): Remove parent fd list argument.  
\* posix-io.c (get\_max\_fds): New function.  
(\_gpgme\_io\_dup): Add tracing.  
(\_gpgme\_io\_spawn):  
Remove parent fd list. Change meaning of child fd list to contain all child fds that should be inherited. Close all other file descriptors after fork.  
\* w32-io.c, w32-glib-io.c, w32-qt-io.c(\_gpgme\_io\_spawn): Remove parent fd list. Change meaning of child fd list to contain all child fds that should be inherited. Do not inherit any file descriptors, but DuplicateHandle them. Spawn process through wrapper process. Provide wrapper process with a temporary file containing handle translation data. Return translated handle names.  
\* w32-io.c (reader): Add more tracing output.  
(\_gpgme\_io\_read): Likewise.  
\* engine-gpgconf.c (gpgconf\_read): Adjust caller of \_gpgme\_io\_spawn.  
\* version.c (\_gpgme\_get\_program\_version): Likewise.

2008-06-20 Werner Koch <wk@g10code.com>

\* engine-gpgconf.c (gpgconf\_read): Change ARGV initialization for compatibility with old compilers. Fix amount of memmove. Fix CR removal.

2008-06-19 Werner Koch <wk@g10code.com>

\* gpgme.h (GPGME\_CONF\_PATHNAME):  
Replace by GPGME\_CONF\_FILENAME,  
change all callers and provide compatibility macro.  
(gpgme\_conf\_type\_t): Add complex types 34..37.  
\* engine-gpgconf.c (gpgconf\_parse\_option, arg\_to\_data)  
(\_gpgme\_conf\_arg\_new, \_gpgme\_conf\_arg\_release): Add new types.

2008-06-19 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgconf.c (gpgconf\_parse\_option): Fix comma detection.

2008-05-09 Werner Koch <wk@g10code.com>

\* engine-gpgconf.c (gpgconf\_read): Do not pass empty lines to the callback.

2008-05-07 Werner Koch <wk@g10code.com>

\* engine-gpgconf.c (gpgconf\_write): Change argv[0] to a self-explaining string. Needs a proper fix, though.

\* runpgg.c (gpg\_keylist, gpg\_keylist\_ext): Factor common code out to ..

(gpg\_build\_keylist\_options): .. new. Allow combination of extern and intern mode.

(gpg\_new): DFT\_TTYNAME is an array, thus check the first character.

2008-05-06 Werner Koch <wk@g10code.com>

\* version.c (extract\_version\_string): New.

(\_gpgme\_get\_program\_version):

Use it to allow for suffixes in the version line.

2008-04-28 Werner Koch <wk@g10code.com>

\* engine-gpgconf.c (gpgconf\_read): Fixed segv. Avoid memmove for each line.

2008-04-22 Marcus Brinkmann <marcus@g10code.de>

\* w32-qt-io.cpp, kdpipeiodevice.cpp: New versions from Frank Osterfeld, implement blocking select.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

\* data.c (gpgme\_data\_read, gpgme\_data\_write): Retry on EINTR.

2008-03-06 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_add\_sig): Terminate UID in case SRC is NULL. Reported by Marc Mutz.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

\* decrypt.c (release\_op\_data): Release OPD->result.recipients.

\* encrypt.c (release\_op\_data): Release invalid\_recipient.

2008-02-15 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgconf.c (gpgconf\_read): Fix end-of-line handline.

2008-02-14 Werner Koch <wk@g10code.com>

- \* w32-io.c (\_gpgme\_io\_spawn): Add arg R\_PID to return the pid.
- \* posix-io.c
- (\_gpgme\_io\_spawn): Ditto.
- \* w32-glib-io.c (\_gpgme\_io\_spawn): Ditto.
- \* w32-qt-io.cpp (\_gpgme\_io\_spawn): Ditto.
- \* priv-io.h (\_gpgme\_io\_spawn): Adjust prototyp and change all callers.
- \* runpgp.c (start): Call \_gpgme\_allow\_set\_foreground\_window.
  
- \* w32-util.c (\_gpgme\_allow\_set\_foreground\_window): New.
- \* posix-util.c (\_gpgme\_allow\_set\_foreground\_window): New.
- \* engine-gpgsm.c (default\_inq\_cb): New.
- (gpgsm\_new) [W32]: Enable pinentry notifications.
- (status\_handler): Handle inquiries.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

- \* kdpipelinedevice.cpp: New version by Frank Osterfeld, fixes race condition.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c (map\_input\_enc): Rename to ...
- (map\_data\_enc): ... this. Also change all callers.
- (gpgsm\_encrypt, gpgsm\_export, gpgsm\_export\_ext, gpgsm\_genkey)
- (gpgsm\_sign): Set encoding for output.

2008-01-28 Werner Koch <wk@g10code.com>

- \* keylist.c (gpgme\_get\_key): Skip duplicated keys. Fixes bug 876.

2008-01-14

Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgconf.c (gpgconf\_config\_load\_cb): Fix program\_name field.

2008-01-10 Marcus Brinkmann <marcus@g10code.de>

- \* kdpipelinedevice.cpp: New version from Frank Osterfeld.
  
- \* engine-gpgconf.c (gpgconf\_config\_load\_cb2): Handle the flag NO\_ARG\_DESC.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>



\* Makefile.am (gpgconf\_components): New variable.  
(main\_sources): Add gpgconf.c.  
\* gpgme.h (gpgme\_protocol\_t): New protocol GPGME\_PROTOCOL\_GPGCONF.  
(gpgme\_conf\_level\_t, gpgme\_conf\_type\_t, gpgme\_conf\_arg\_t)  
(gpgme\_conf\_opt\_t, gpgme\_conf\_comp\_t, gpgme\_conf\_arg\_new)  
(gpgme\_conf\_arg\_release, gpgme\_conf\_opt\_change)  
(gpgme\_conf\_release, gpgme\_op\_conf\_load, gpgme\_op\_conf\_save): New  
types.  
\* gpgconf.c, engine-gpgconf.c: New files.  
\* engine.h: (\_gpgme\_engine\_op\_conf\_load,  
\_gpgme\_engine\_op\_conf\_save): New prototypes.  
\* op-support.c (\_gpgme\_op\_reset): Ignore not implemented locale  
function.  
\* posix-util.c (\_gpgme\_get\_gpgconf\_path): New  
function.  
\* w32-util.c (\_gpgme\_get\_gpgconf\_path): New function.  
\* engine-gpgsm.c:  
(\_gpgme\_engine\_ops\_gpgsm): Add stubs for conf\_load and conf\_save.  
\* runpgg.c:  
(\_gpgme\_engine\_ops\_gpg): Add stubs for conf\_load and conf\_save.  
\* gpgme.def: Add new gpgconf related interfaces.  
\* libgpgme.vers: Likewise.  
\* util.h (\_gpgme\_get\_gpgconf\_path): New prototype.  
\* gpgme.h (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_GPGCONF.  
\* engine-backend.h (\_gpgme\_engine\_ops\_gpgconf): New prototype.  
(struct engine\_ops): Add members for conf\_load and conf\_save.  
\* engine.c (engine\_ops): Add \_gpgme\_engine\_ops\_gpgconf.  
(\_gpgme\_engine\_op\_conf\_load,  
\_gpgme\_engine\_op\_conf\_save): New functions.  
(gpgme\_get\_engine\_info): Allow protocol GPGME\_PROTOCOL\_GPGCONF.

2007-11-28 Marcus Brinkmann <marcus@g10code.de>

\* w32-util.c (\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path): Search  
for installation directory. Remove old fallback default.  
(find\_program\_in\_inst\_dir): New function.

2007-11-26 Werner Koch <wk@g10code.com>

\*  
engine-gpgsm.c (struct engine\_gpgsm): Add field INLINE\_DATA and  
always reset it before calling start.  
(gpgsm\_new): Clear it.  
(status\_handler): Implement it.  
(gpgsm\_getauditlog) [USE\_DESCRIPTOR\_PASSING]: Use INLINE\_DATA.

2007-11-23 Werner Koch <wk@g10code.com>

- \* op-support.c (\_gpgme\_op\_reset): Implement a no-reset flag.
- \* getauditlog.c (getauditlog\_start): Use that flag.

2007-11-20 Werner Koch <wk@g10code.com>

- \* op-support.c (\_gpgme\_parse\_inv\_recp): Add new reason code 11.

2007-11-22 Werner Koch <wk@g10code.com>

- \* gpgme.h (gpgme\_op\_getauditlog\_start, gpgme\_op\_getauditlog): New.
- \* libgpgme.vers: Ditto.
- \* gpgme.def: Ditto.
- \* getauditlog.c: New.
- \* engine-backend.h (struct engine\_ops): Add member GETAUDITLOG.
- \* engine-gpgsm.c (gpgsm\_getauditlog): New.
- (\_gpgme\_engine\_ops\_gpgsm): Insert new function.
- (gpgsm\_new): Try to enable audit log support.
- \* runpg.c (\_gpgme\_engine\_ops\_gpg): Insert dummy entry.

2007-11-12 Marcus Brinkmann <marcus@g10code.de>

- \*
- kdpipelinedevice.cpp: New version from Frank Osterfeld.

2007-10-11 Marcus Brinkmann <marcus@g10code.de>

- \* kdpipelinedevice.cpp: New version from Frank Osterfeld.

2007-10-09 Marcus Brinkmann <marcus@g10code.de>

- \* kdpipelinedevice.cpp: New version from Frank Osterfeld and Marc Mutz.

2007-10-05 Marcus Brinkmann <marcus@g10code.de>

- \* kdpipelinedevice.cpp, w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-04 Marcus Brinkmann <marcus@g10code.de>

- \* kdpipelinedevice.h, kdpipelinedevice.cpp, kdpipelinedevice.moc, w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-02 Marcus Brinkmann <marcus@g10code.de>

- \* kdpipelinedevice.cpp, kdpipelinedevice.moc: New versions.
- \* w32-qt-io.cpp (\_gpgme\_io\_fd2str): Print actual\_fd if available.
- (\_gpgme\_io\_dup): Only acquire a reference, do not actually dup.

Submitted by Frank Osterfeld.

- \* priv-io.h, engine-gpgsm.c: Add comments.
- \* w32-qt-io.cpp (\_gpgme\_io\_select): Remove code handling frozen FDs.
- \* w32-glib-io.c (\_gpgme\_io\_close):  
Always dereference the channel,  
even if not primary.  
(\_gpgme\_io\_dup): Acquire a reference. Replace unused  
implementation by assertion.

2007-09-28 Werner Koch <wk@g10code.com>

- \* engine-gpgsm.c (iocb\_data\_t): Add SERVER\_FD\_STR.  
(gpgsm\_new): Set it.  
(gpgsm\_set\_fd): Use it.
- \* w32-glib-io.c (find\_channel): Add a new primary flag.  
(\_gpgme\_io\_close): Close channel only if primary.  
(\_gpgme\_io\_dup): Put newfd into the table as shallow copy.
- \* priv-io.h (struct io\_select\_fd\_s): Remove member FROZEN.
- \* w32-io.c (\_gpgme\_io\_select): Ditto.
- \* w32-glib-io.c (\_gpgme\_io\_select): Ditto.
- \* posix-io.c (\_gpgme\_io\_select): Ditto.
- \* runpg.c (read\_status): Ditto.
- \* wait.c (fd\_table\_put): Ditto.
- \* runpg.c (gpg\_io\_event): Add tracing.  
(start): Use gpg\_io\_event for sending the start event.
- \* engine-gpgsm.c (gpgsm\_io\_event): Add tracing.  
(start): Use gpgsm\_io\_event for sending the start event.
- \* wait.c (\_gpgme\_add\_io\_cb, \_gpgme\_run\_io\_cb): Add tracing.

2007-09-28 Marcus Brinkmann  
<marcus@g10code.de>

- \* kdpipelinedevice.moc, w32-qt-io.cpp, kdpipelinedevice.cpp: New  
versions from Frank Osterfeld.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

- \* w32-glib-io.c (\_gpgme\_io\_spawn),  
w32-qt-io.cpp (\_gpgme\_io\_spawn), w32-io.c (\_gpgme\_io\_spawn): Close  
the process handle, return 0.
- \* gpgme.h (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_UNKNOWN.
- \* gpgme.c (gpgme\_get\_protocol\_name): Implement support for

GPGME\_PROTOCOL\_UNKNOWN.

\* kdpipelineio.h: Fix last change.

\* w32-glib-io.c (\_gpgme\_io\_pipe), w32-qt-io.c (\_gpgme\_io\_pipe),  
w32-io.c (\_gpgme\_io\_pipe), posix-io.c (\_gpgme\_io\_pipe): Fix debug  
output.

2007-09-25 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c, keylist.c: Include <sys/types.h>.

\* kdpipelineio.h: Use namespace \_gpgme\_.

\* kdpipelineio.cpp: Use namespace \_gpgme\_.

[Q\_OS\_WIN32 && NOMINMAX]: Do not define NOMINMAX again.

\* w32-qt-io.cpp: Change namespace of KDPipelineIODevice to  
\_gpgme\_::KDPipelineIODevice.

2007-09-17 Werner Koch <wk@g10code.com>

\*

rungpg.c (gpg\_new): Make robust against undefined ttyname or  
ttytype.

2007-09-14 Werner Koch <wk@g10code.com>

\* data-mem.c (gpgme\_data\_release\_and\_get\_mem): Fix tracing bug.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_release): Call gpgme\_sig\_notation\_clear.

2007-09-13 Marcus Brinkmann <marcus@g10code.de>

\* rungpg.c (gpg\_new): Handle return value of \_gpgme\_getenv (fixes  
small memory leak).

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_qt\_la\_SOURCES): Move  
moc\_kdpipelineio.cpp to EXTRA\_DIST, as this is only included by  
another file (it's more like a header file than a cpp file, but  
automake doesn't know that).

\* w32-qt-io.cpp (\_gpgme\_io\_spawn): Fix several cast errors and typos.

\* w32-io.c (\_gpgme\_io\_write): Use TRACE\_SYSRES instead of TRACE\_SYS.  
(libgpgme\_qt\_la\_LIBADD): Add QT4\_CORE\_LIBS, not QT4\_CORE\_LIB.

\* kdpipelineio.h, kdpipelineio.cpp, moc\_kdpipelineio.cpp,  
kdpipelineio.moc, w32-qt-io.c:

New files.

\* Makefile.am (lplib\_gpgme\_extra): Rename to lplib\_gpgme\_glib.

(lplib\_gpgme\_qt): New variable.

(lib\_LTLIBRARIES): Add \$(lplib\_gpgme\_qt).

(libgpgme\_qt\_la\_SOURCES): New variable.

(AM\_CPPFLAGS): Add @QT4\_CORE\_INCLUDES@

(AM\_CFLAGS): Add @QT4\_CORE\_CFLAGS@.

(libgpgme\_qt\_la\_LDFLAGS, libgpgme\_qt\_la\_DEPENDENCIES)

(libgpgme\_qt\_la\_LIBADD): New variables.

\* sema.h (struct critsect\_s): Rename "private" to "priv" to make  
C++ users happy. Change users.

\* posix-sema.c (\_gpgme\_sema\_cs\_enter, \_gpgme\_sema\_cs\_leave)

(\_gpgme\_sema\_cs\_destroy): Likewise.

\* w32-sema.c (critsect\_init, \_gpgme\_sema\_cs\_enter)

(\_gpgme\_sema\_cs\_leave, \_gpgme\_sema\_cs\_destroy): Likewise.

\* w32-glib-io.c (gpgme\_get\_giochannel): Change return type to  
void\*.

(gpgme\_get\_fdptr): New function.

\* w32-io.c (gpgme\_get\_fdptr): New function

\* gpgme.def: Add gpgme\_get\_fdptr.

2007-08-22 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (\_gpgme\_io\_write): Return early if COUNT is zero.

(writer): Remove superfluous

check.

2007-08-20 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Move include of gpg-error.h out of extern "C".

2007-08-07 Werner Koch <wk@g10code.com>

\* gpgme.h (struct \_gpgme\_signature): Add member CHAIN\_MODEL.

\* verify.c (parse\_trust): Set Chain\_MODEL.

2007-08-02 Werner Koch <wk@g10code.com>

\* w32-glib-io.c (\_gpgme\_io\_spawn): Use DETACHED\_PROCESS flag.

\* w32-io.c (\_gpgme\_io\_spawn): Ditto.

(\_gpgme\_io\_write): Map ERROR\_NO\_DATA to EPIPE.

\* debug.c (\_gpgme\_debug): Enable assuan logging.

(\_gpgme\_debug\_subsystem\_init): New.

\* version.c (do\_subsystem\_inits): Disable assuan logging and  
initialize the debug system.

(gpgme\_check\_version): Do not trace before the subsystems are initialized.

2007-07-17 Marcus Brinkmann <marcus@g10code.de>

- \* debug.c: Include <errno.h> and "debug.h".
- (\_gpgme\_debug): Save and restore ERRNO.
- (TOHEX): New macro.
- (\_gpgme\_debug\_buffer): New function.
- \* conversion.c, data-compat.c, data-mem.c, data.c, engine-gpgsm.c, gpgme.c, keylist.c, posix-io.c, runpgg.c, sign.c, version.c, w32-io.c, wait.c: Replace DEBUG macros by TRACE\_\* variants. In most of these files, add many more tracepoints.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c (status\_handler): Do not send BYE here.
- \* w32-io.c (struct reader\_context\_s, struct writer\_context\_s): New members REFCOUNT.
- (create\_reader, create\_writer): Initialize C->refcount to 1.
- (destroy\_reader, destroy\_writer): Only destroy if C->refcount drops to 0.
- (find\_reader, find\_writer, kill\_reader, kill\_writer): Beautify.
- \* priv-io.h (\_gpgme\_io\_dup): New prototype.
- \* posix-io.c (\_gpgme\_io\_dup): New function.
- \* w32-io.c (\_gpgme\_io\_dup): Likewise.
- \* w32-glib-io.c (\_gpgme\_io\_dup): Likewise.
- \* engine-gpgsm.c (start): Reverting to version 2007-07-10.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

- \* data-user.c (user\_read, user\_write, user\_seek): Set errno and return -1 instead returning the error code directly.
- \* data-compat.c (old\_user\_seek): Likewise.
- \* gpgme.c (gpgme\_sig\_notation\_add): Return error properly.
- \* Revert the "close\_notify\_handler" returns int stuff. Always close in the \_gpgme\_io\_close implementations.
- \* engine-gpgsm.c (status\_handler): Try to terminate the connection in case of error.
- \* w32-io.c (\_gpgme\_io\_read): Return C->error\_code in ERRNO.
- (\_gpgme\_io\_write): Likewise.
- \* priv-io.h (\_gpgme\_io\_set\_close\_notify): Change type of HANDLER to \_gpgme\_close\_notify\_handler.

(\_gpgme\_close\_notify\_handler): New type.  
(\_gpgme\_io\_dup): Remove prototype.  
\* posix-io.c (notify\_table, \_gpgme\_io\_set\_close\_notify): Change type of HANDLER to \_gpgme\_close\_notify\_handler\_t.  
(\_gpgme\_io\_close): Do not close the FD if handler returns 0.  
(\_gpgme\_io\_dup): Remove function.  
\* w32-io.c (notify\_table, \_gpgme\_io\_set\_close\_notify, \_gpgme\_io\_close): Change type of HANDLER to \_gpgme\_close\_notify\_handler\_t.  
(\_gpgme\_io\_close): Do not close the FD if handler returns 0.  
(\_gpgme\_io\_dup): Remove function.  
\* w32-glib-io.c  
(\_gpgme\_io\_dup): Remove function.  
(\_gpgme\_io\_set\_close\_notify, notify\_table): Change type of HANDLER to \_gpgme\_close\_notify\_handler\_t.  
(\_gpgme\_io\_close): Do not close the FD if handler returns 0.  
\* runpgp.c (close\_notify\_handler): Change return type to int, return 1.  
\* engine-gpgsm.c (close\_notify\_handler): Change return type to int, return 0 for status FD and 1 for all other FDs.  
(start): Do not duplicate the status FD.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am: Replace implicit rule by suffix rule. Add SUFFIXES for that.

2007-07-12 Werner Koch <wk@g10code.com>

\* version.c (do\_subsystem\_inits) [W32]: Make sure that the socket system has been started.

2007-07-10 Marcus Brinkmann <marcus@g10code.de>

\* priv-io.h (\_gpgme\_io\_dup): New prototype.  
\* posix-io.c (\_gpgme\_io\_dup): New function.  
\* w32-io.c (\_gpgme\_io\_dup): Likewise.  
\* w32-glib-io.c (\_gpgme\_io\_dup): Likewise.  
\* engine-gpgsm.c (start): Use \_gpgme\_dup() instead of dup().

2007-07-08

Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c [HAVE\_W32\_SYSTEM]: Enable the bunch of the file.  
\* funopen.c (funopen): Rename to \_gpgme\_funopen.

2007-04-30 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Fix error handling for ttyname\_r.

\* runpgg.c (gpg\_new): Likewise.

Submitted by Stephen Tether.

2007-02-26 Werner Koch <wk@g10code.com>

\* verify.c (op\_data\_t): New element PLAINTEXT\_SEEN.

(\_gpgme\_verify\_status\_handler): Return an error if more than one plaintext has been seen.

(parse\_error): New arg SET\_STATUS. Also detect it based on an ERROR status (gpg > 1.4.6).

2007-01-26 Werner Koch <wk@g10code.com>

\* w32-io.c (build\_commandline): Fixed stupid quoting bug.

\* w32-glib-io.c (build\_commandline): Ditto.

\* runpgg.c (gpg\_set\_locale): Avoid dangling pointer after free.

\* gpgme-config.in: New options --get-gpg and --get-gpgsm.

2007-01-18 Marcus Brinkmann <marcus@g10code.de>

\* data.h (\_gpgme\_data\_get\_fd): Add prototype.

(gpgme\_data\_get\_fd\_cb):

New type.

(struct \_gpgme\_data\_cbs): New member get\_fd.

\* data.c (\_gpgme\_data\_get\_fd): New function.

\* data-fd.c (fd\_get\_fd): New function.

(fd\_cbs): Add fd\_get\_fd.

\* data-stream.c (stream\_get\_fd): New function.

(stream\_cbs): Add stream\_get\_fd.

\* data-mem.c (mem\_cbs): Add NULL for get\_fd callback.

\* data-user.c (user\_cbs): Likewise.

\* engine-gpgsm.c (gpgsm\_set\_fd) [USE\_DESCRIPTOR\_PASSING]: Try to short-cut by passing the data descriptor directly.

2007-01-17 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (build\_commandline): Quote all command line arguments.

\* w32-glib-io.c (build\_commandline): Likewise.

2007-01-10 Werner Koch <wk@g10code.com>

\* ttyname\_r.c (ttyname\_r) [W32]: Return a dummy name.

2007-01-08 Werner Koch <wk@g10code.com>



\* version.c (do\_subsystem\_inits): Do assuan init only if building with Assuan.  
\* setenv.c: Include assuan-def.h only if building with Assuan support.

\* op-support.c (\_gpgme\_op\_reset): Set LC\_MESSAGES only if defined.

\* engine-gpgsm.c (gpgsm\_set\_locale): Ditto.

\* runpgg.c (gpg\_set\_locale): Ditto.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_set\_protocol): Shut down the engine when switching protocols.

(gpgme\_ctx\_set\_engine\_info): Likewise for engine info.

\* engine.h (\_gpgme\_engine\_reset): New function prototype.

\* engine.c (\_gpgme\_engine\_reset): New function.

\* engine-backend.h (struct engine\_ops): New member RESET.

\* runpgg.c (\_gpgme\_engine\_ops\_gpg): Add NULL for reset function.

\* engine-gpgsm.c (\_gpgme\_engine\_ops\_gpgsm)

[USE\_DESCRIPTOR\_PASSING]: Add gpgsm\_reset for reset.

(\_gpgme\_engine\_ops\_gpgsm) [!USE\_DESCRIPTOR\_PASSING]: Add NULL for reset function.

(gpgsm\_reset) [USE\_DESCRIPTOR\_PASSING]: New function.

\* op-support.c (\_gpgme\_op\_reset): Try to use the engine's reset function if available.

\* engine-gpgsm.c (gpgsm\_new): Move code to dup status\_fd to ...

(start): ... here.

\* posix-io.c (\_gpgme\_io\_recvmsg, \_gpgme\_io\_sendmsg): New functions.

\*

engine.h (\_gpgme\_engine\_new): Remove arguments lc\_ctype and lc\_messages from prototype.

(\_gpgme\_engine\_set\_locale): New prototype.

\* engine.c (\_gpgme\_engine\_set\_locale): New function.

\* op-support.c (\_gpgme\_op\_reset): Call \_gpgme\_engine\_set\_locale.

\* engine-backend.h (struct engine\_ops): Add new member SET\_LOCALE.

Remove arguments lc\_messages and lc\_ctype from member NEW.

\* engine-gpgsm.c (struct engine\_gpgsm): New members lc\_ctype\_set and lc\_messages\_set.

(gpgsm\_new): Remove lc\_messages and lc\_ctype arguments.

(gpgsm\_set\_locale): New function.

(\_gpgme\_engine\_ops\_gpgsm): Add gpgsm\_set\_locale.

\* runpgg.c (struct engine\_gpg): Add new members lc\_messages and lc\_ctype.

(gpg\_release): Release lc\_messages and lc\_ctype if set.

(gpg\_new): Remove lc\_messages and lc\_ctype arguments.  
(gpg\_set\_locale): New function.  
(\_gpgme\_engine\_ops\_gpg): Add gpg\_set\_locale.  
(add\_arg): Implement in terms of:  
(add\_arg\_ext): New function.  
(start): Set lc-messages and lc-ctype arguments here.

2006-12-03

Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (struct engine\_gpgsm): Move members  
input\_fd\_server, output\_fd\_server, message\_fd\_server to ...  
(iocb\_data): ... here (as server\_fd).  
(close\_notify\_handler): Reset tags as well.  
(gpgsm\_new): Implement support for descriptor  
passing.  
(fd\_type\_t): New type.  
(gpgsm\_clear\_fd): New function. Use it instead of \_gpgsm\_io\_close  
for unused communication channels.  
(gpgsm\_set\_fd): Rewritten to support descriptor passing. All  
relevant callers adjusted as well (previously of \_gpgme\_io\_close).

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

\* version.c: Include "assuan.h".  
(do\_subsystem\_inits): Call assuan\_set\_assuan\_err\_source.

2006-12-01 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_real\_la\_SOURCES): Rename to main\_sources.  
(libgpgme\_la\_SOURCES, libgpgme\_thread\_la\_SOURCES,  
libgpgme\_glib\_la\_SOURCES, libgpgme\_pth\_la\_SOURCES): Add  
\$(main\_sources).  
(libgpgme\_la\_DEPENDENCIES, libgpgme\_la\_LIBADD,  
libgpgme\_thread\_la\_DEPENDENCIES,  
libgpgme\_thread\_la\_LIBADD,  
libgpgme\_pth\_la\_DEPENDENCIES, libgpgme\_pth\_la\_LIBADD,  
libgpgme\_glib\_la\_DEPENDENCIES, libgpgme\_glib\_la\_LIBADD): Remove  
libgpgme-real.la.  
(noinst\_LTLIBRARIES): Removed.  
(libgpgme\_glib\_la\_CFLAGS, libgpgme\_pth\_la\_CFLAGS): Removed.  
(AM\_CFLAGS): New variable.

2006-11-30 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Replace AssuanError with gpg\_error\_t and  
ASSUAN\_CONTEXT with assuan\_context\_t.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Check return value of  
assuan\_pipe\_connect.

\* runpg.c: Include <unistd.h>.

(gpg\_new): Support --display, --ttyname, --ttytype, --lc-ctype and  
--lc-messages. Fixes issue 734.

2006-10-24 Marcus Brinkmann <marcus@g10code.de>

\* trustlist.c (gpgme\_op\_trustlist\_next): Return error if OPD is  
NULL.

2006-10-23 Marcus Brinkmann <marcus@g10code.de>

\* wait-global.c (gpgme\_wait): Unlock CTX\_LIST\_LOCK while calling  
\_gpgme\_engine\_io\_event().

\*

keylist.c (gpgme\_op\_keylist\_next): Return error if OPD is NULL.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

\* data-mem.c (gpgme\_data\_release\_and\_get\_mem): Release the data  
object properly.

2006-09-22 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (keylist\_colon\_handler): Move debug output after  
initialising KEY.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in (Options): Add NETLIBS.

\* Makefile.am (libpgpgme\_la\_LIBADD, libpgpgme\_pthread\_la\_LIBADD,  
libpgpgme\_pth\_la\_LIBADD, libpgpgme\_glib\_la\_LIBADD): Add NETLIBS.

\* runpg.c (read\_status): Fix comparison disguising as an  
assignment.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_set\_locale): Remove conditional on  
HAVE\_W32\_SYSTEM, and just check for LC\_MESSAGES.

2006-07-16 Marcus Brinkmann <marcus@g10code.de>

\* `rungpg.c` (`read_status`): Strip potential carriage return.  
\* `genkey.c` (`get_key_parameter`): Skip potential carriage return.  
\* `version.c` (`_gpgme_get_program_version`):  
Strip potential carriage  
return.

\* `data.c` (`gpgme_data_set_file_name`): Allow to clear the file name  
by passing NULL.

2006-06-22 Marcus Brinkmann <marcus@g10code.de>

\* `keylist.c` (`gpgme_get_key`): Also clone the engine info.

2006-03-06 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme-config.in` (`cflags_pth`): Revert accidental removal of  
pthread support with last change.

2006-02-28 Marcus Brinkmann <marcus@g10code.de>

\* `w32-glib-io.c` (`O_BINARY`) [`!O_BINARY`]: New macro.  
(`_gpgme_io_pipe`): Open pipes in binary mode.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

\* `engine.c` (`gpgme_engine_check_version`): Reimplemented to allow  
checking the version correctly even after changing the engine  
information. Bug reported by Stphane Corthsy.

\* `rungpg.c` (`read_colon_line`): Invoke colon preprocess handler if  
it is set.

(`colon_preprocessor_t`): New type.

(`struct engine_gpg`): New member `colon.preprocess_fnc`.

(`gpg_keylist_preprocess`): New function.

\* `keylist.c`

(`keylist_colon_handler`): Allow short key IDs.

2006-02-15 Marcus Brinkmann <marcus@g10code.de>

\* `w32-io.c` (`create_writer`): Make `C->have_data` a manually reset  
event.

(`writer`): Move code from end of if block to beginning, so it  
is also run the first time.

(`_gpgme_io_write`): Move assert check after error check. Reset  
the `is_empty` event, and also do it eagerly.

(`_gpgme_io_select`): Unconditionally wait for the `is_empty` event.

2006-01-26 Werner Koch <wk@g10code.com>

\* w32-util.c (\_gpgme\_get\_conf\_int): New.  
\* posix-util.c (\_gpgme\_get\_conf\_int): New.  
\* w32-io.c (get\_desired\_thread\_priority): New.  
(create\_reader, create\_writer): Use it here.

2006-01-04 Werner Koch <wk@g10code.com>

\* debug.h (\_gpgme\_debug\_srcname): New. Use it with the debug macros.

\* w32-glib-io.c (\_gpgme\_io\_set\_nonblocking): Add debug statements. Disable error return for failed nonblocking call.

2006-01-03 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (\_gpgme\_io\_close): Only close fd if there is no channel for it.

2005-12-31 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (find\_channel): Set channel to unbuffered.  
(\_gpgme\_io\_select): Fix debug output.

2005-12-23 Werner Koch <wk@g10code.com>

\* gpgme.h (struct \_gpgme\_signature): Append field PKA\_ADDRESS.  
\* verify.c (release\_op\_data, \_gpgme\_verify\_status\_handler): Set this field.

2005-12-20 Werner Koch <wk@g10code.com>

\* gpgme.h (gpgme\_status\_code\_t): Added GPGME\_STATUS\_PKA\_TRUST\_BAD and GPGME\_STATUS\_PKA\_TRUST\_GOOD.  
(struct \_gpgme\_signature): New field pka\_trust.  
\* verify.c (\_gpgme\_verify\_status\_handler): Set pka\_trust.

2005-12-06 Werner Koch <wk@g10code.com>

\* keylist.c (keylist\_colon\_handler): Store fingerprints of the subkeys. Reset the secret flag of subkeys for stub secret keys.  
(NR\_FIELDS): Bumped up to 16

2005-11-27 Marcus Brinkmann <marcus@g10code.de>

\* engine.c (\_gpgme\_set\_engine\_info): Use new\_file\_name in engine\_get\_version invocation. Reported by Stphane Corthsy.

2005-11-24

Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (\_gpgme\_io\_fd2str): Remove debug printf.

2005-11-18 Werner Koch <wk@g10code.com>

\* w32-glib-io.c: Include glib.h before windows to avoid a symbol shadowing warning.  
(find\_channel): Better use g\_io\_channel\_win32\_new\_fd instead of the autodetection function g\_io\_channel\_unix\_new.  
(\_gpgme\_io\_select): Rewritten. It is now a fully working select implementation.

2005-11-18 Marcus Brinkmann <marcus@g10code.de>

\* priv-io.h (\_gpgme\_io\_fd2str): New prototype.  
\* posix-io.c (\_gpgme\_io\_fd2str): New function.  
\* w32-io.c (\_gpgme\_io\_fd2str): New function.  
\* runpgg.c: Use this new function.  
\* w32-glib-io.c (\_gpgme\_io\_fd2str): Rewrote the file handle code again. Two's company, three's the musketeers.

\* w32-glib-io.c: Rewrote the file handle code. We don't create system fds for every handle (doesn't work for inherited handles), but we create pseudo fds in a private namespace that designate a handle and potentially a giochannel.

2005-11-18 Werner Koch <wk@g10code.com>

\* versioninfo.rc.in: Set file version to LT-version + Svn-revision.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c: New file.  
\* gpgme.def (gpgme\_get\_giochannel): Add symbol.  
\* Makefile.am (system\_components) [HAVE\_DOSISH\_SYSTEM]: Remove w32-io.c.  
(ltlib\_gpgme\_extra): New variable.  
(lib\_LTLIBRARIES): Add \$(ltlib\_gpgme\_extra).  
(system\_components\_not\_extra): New variable.  
(libgpgme\_la\_SOURCES, libgpgme\_pthread\_la\_SOURCES,  
libgpgme\_pth\_la\_SOURCES): Add \$(system\_components\_not\_extra).  
(libgpgme\_glib\_la\_LDFLAGS, libgpgme\_glib\_la\_DEPENDENCIES,  
libgpgme\_glib\_la\_LIBADD, libgpgme\_glib\_la\_CFLAGS)  
[BUILD\_W32\_GLIB]: New variables.  
\* gpgme-config.in (glib): New option.

\* gpgme.m4 (AM\_PATH\_GPGME\_GLIB): New macro.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

\* priv-io.h (\_gpgme\_io\_waitpid, \_gpgme\_io\_kill): Removed.

\* w32-io.c (\_gpgme\_io\_waitpid, \_gpgme\_io\_kill): Removed.

\* posix-io.c (\_gpgme\_io\_kill):

Removed.

(\_gpgme\_io\_waitpid): Declare static.

2005-10-24 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (\_gpgme\_io\_spawn): Don't minimize window, hide it.

2005-10-21 Werner Koch <wk@g10code.com>

\* Makefile.am: Fixed cut+paste problem

2005-10-20 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am: Build versioninfo.lo, not versioninfo.o. Also, fix the whole mess.

2005-10-16 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (gpg\_edit): Don't add a key argument if in card edit mode.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (gpgme.dll gpgme.dll.a): Use \$(srcdir) for gpgme.def.

\* gpgme.h (gpgme\_free): New prototype.

\* data-mem.c (gpgme\_free): New function.

\* libgpgme.vers (GPGME\_1.1): Add gpgme\_free.

\* gpgme.def: Add gpgme\_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

\* util.h (\_gpgme\_decode\_percent\_string): Add new argument BINARY to prototype.

\* verify.c (parse\_notation): Likewise for invocation.

\* conversion.c (\_gpgme\_decode\_percent\_string):

Likewise to

declaration. If set, do not replace '\0' characters with a printable string.

\* gpgme.h (struct \_gpgme\_key\_sig): New field notations.

\* ops.h (\_gpgme\_parse\_notation): New prototype.  
\* sig-notation.c (\_gpgme\_parse\_notation): New function.  
\* key.c (gpgme\_key\_unref): Free all signature notations.  
\* keylist.c (op\_data\_t): New member tmp\_keysig.  
(finish\_key): Clear OPD->tmp\_keysig.  
\* gpgme.c (gpgme\_set\_keylist\_mode): Remove check.  
\* runpgg.c (gpg\_keylist): Support listing signature notations.  
(gpg\_keylist\_ext): Likewise.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

\* engine.h (\_gpgme\_set\_engine\_info): Add prototype.  
\* engine-backend.h (struct engine\_ops): Change return type of  
get\_file\_name() to const char \* to silence gcc warning.  
\* engine.c (engine\_get\_file\_name): Change return type to const  
char \* to silence gcc warning.  
(gpgme\_get\_engine\_info): Use transitional variable to go from  
const char \* to char \* to silence gcc warning.  
(\_gpgme\_set\_engine\_info):  
Likewise.  
\* engine-gpgsm.c (struct engine\_gpgsm): Change type of LINE to  
char \* to silence gcc warning.  
(gpgsm\_new): Make ARGV a pointer to const char.  
(status\_handler): Change type of SRC, END, DST, ALINE and NEWLINE  
to char \* to silence gcc warning.  
  
\* gpgme.def: Add gpgme\_data\_set\_file\_name,  
gpgme\_data\_get\_file\_name, gpgme\_sig\_notation\_clear,  
gpgme\_sig\_notation\_add and gpgme\_sig\_notation\_get.  
\* libgpgme.vers: Add gpgme\_sig\_notation\_clear,  
gpgme\_sig\_notation\_add and gpgme\_sig\_notation\_get.  
\* Makefile.am (libgpgme\_real\_la\_SOURCES): Add sig-notation.c.  
\* context.h (struct gpgme\_context): New field sig\_notations.  
\* gpgme.h (struct \_gpgme\_sig\_notation): New member value\_len and  
critical.  
(GPGME\_SIG\_NOTATION\_CRITICAL): New symbol.  
(gpgme\_sig\_notation\_flags\_t): New type.  
(gpgme\_sig\_notation\_add, gpgme\_sig\_notation\_clear,  
gpgme\_sig\_notation\_get): New prototypes.  
\* ops.h (\_gpgme\_sig\_notation\_create, \_gpgme\_sig\_notation\_free):  
New prototypes.  
\*  
sig-notation.c (\_gpgme\_sig\_notation\_free): New file.  
\* verify.c (parse\_notation): Use support functions.  
(release\_op\_data): Likewise.  
\* runpgg.c (append\_args\_from\_sig\_notations): New function.  
(gpg\_encrypt\_sign, gpg\_sign): Call it.



2005-09-30 Marcus Brinkmann <marcus@g10code.de>

- \* data.h (struct gpgme\_data): New member file\_name.
- \* data.c (gpgme\_data\_set\_filename): New function.
- (\_gpgme\_data\_release): Free DH->filename if necessary.
- (gpgme\_data\_get\_filename): New function.
- \* runpg.c (gpg\_encrypt): Set filename option.
- (gpg\_encrypt\_sign): Likewise.
- (gpg\_sign): Likewise.
- \* libgpgme.vers (GPGME\_1.1): Add gpgme\_data\_set\_file\_name and gpgme\_data\_get\_file\_name.
  
- \* decrypt.c, verify.c, gpgme.h: Replace plaintext\_filename with file\_name.

2005-09-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (struct \_gpgme\_key): Add field is\_qualified.
- (struct \_gpgme\_subkey): Likewise.
- \* keylist.c (set\_subkey\_capability, set\_mainkey\_capability): Set field is\_qualified.

2005-09-23

Werner Koch <wk@g10code.com>

- \* w32-io.c (\_gpgme\_io\_pipe): Removed use of environment variable again.
- (create\_reader, create\_writer): Set thread priority higher.

2005-09-19 Werner Koch <wk@g10code.com>

- \* w32-io.c (\_gpgme\_io\_pipe): New environment variable to change the size of the pipe buffer.

2005-09-13 Werner Koch <wk@g10code.com>

- \* ath.c: Changes to make it work under W32.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (libgpgme\_la\_SOURCES): Set to ath.h and ath.c.
- (ath\_pth\_src, ath\_pthread\_src): Removed.
- (w32\_o\_files): Replace ath-compat.o with ath.o.
- (libgpgme\_pth\_la\_CFLAGS): New variable.
- \* ath-compat.c, ath-pthread-compat.c, ath-pth-compat.c: Removed.
- \* ath.h (ath\_pthread\_available, ath\_pth\_available): Removed.
- (ath\_init) [!\_ATH\_EXT\_SYM\_PREFIX]: Do not define macro.
- (struct ath\_ops, ath\_init) [\_ATH\_COMPAT]: Removed.

(\_ATH\_COMPAT): Macro removed.

\* posix-sema.c (\_gpgme\_sema\_subsystem\_init): Do not call  
\_gpgme\_ath\_init.

2005-09-12

Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (release\_op\_data): Do not free opd->tmp\_uid.

2005-09-07 Werner Koch <wk@g10code.com>

\* w32-io.c (build\_commandline): Quote argv[0].

2005-08-26 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (command\_handler): Use \_gpgme\_io\_write instead of write.

\* edit.c (command\_handler): Do not depend on PROCESSED being  
available.

\* engine.h (engine\_command\_handler\_t): Add new argument processed.

\* ops.h (\_gpgme\_passphrase\_command\_handler\_internal): Rename  
prototype to ...

(\_gpgme\_passphrase\_command\_handler): ... this one.

\* passphrase.c (\_gpgme\_passphrase\_command\_handler\_internal):  
Rename to ...

(\_gpgme\_passphrase\_command\_handler): ... this one.

\* edit.c (command\_handler): Add new argument processed. Remove  
local variable with the same name. Always return processed as  
true.

\* runpg.c (command\_handler): Send a newline character if the  
handler did not.

2005-08-26 Werner Koch <wk@g10code.com>

\* w32-util.c (read\_w32\_registry\_string):

Updated from code used by

GnuPG. This allows for expanding strings and features the  
implicit fallback key.

(w32\_shgetfolderpath, find\_program\_at\_standard\_place): New.

(\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path): With no registry  
entry, locate the programs at the standard place.

(dlopen, dlsym, dlclose): New, so that we can keep on using what  
we are accustomed to.

\* debug.c (debug\_init): Use PATHSEP\_C so that under W32 a  
semicolon is used which allows us to create files with drive  
letters.

\* w32-io.c (\_gpgme\_io\_read, \_gpgme\_io\_write): Print content in debug mode too.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_status\_code\_t): Add GPGME\_STATUS\_PLAINTEXT.  
(struct \_gpgme\_op\_decrypt\_result): New member plaintext\_filename.  
(struct \_gpgme\_op\_verify\_result): Likewise.  
\* ops.h (\_gpgme\_parse\_plaintext): Add prototype.  
\* op-support.c (\_gpgme\_parse\_plaintext): New function.  
\* decrypt.c (release\_op\_data): Release  
OPD->result.plaintext\_filename.  
(\_gpgme\_decrypt\_status\_handler):  
Handle GPGME\_STATUS\_PLAINTEXT.  
\* verify.c (release\_op\_data): Release  
OPD->result.plaintext\_filename.  
(\_gpgme\_verify\_status\_handler): Handle GPGME\_STATUS\_PLAINTEXT.

2005-08-08 Werner Koch <wk@g10code.com>

\* util.h (stpcpy): Renamed to ..  
(\_gpgme\_stpcpy): .. this and made inline. This avoids duplicate definitions when linking statically.  
\* stpcpy.c: Removed.

2005-08-19 Werner Koch <wk@g10code.com>

\* gpgme.def: New.  
\* versioninfo.rc.in: New.  
\* Makefile.am: Adds support for building a W32 DLL.  
\* ttyname\_r.c (ttyname\_r) [W32]: Return error.  
\* ath-compat.c [W32]: select and co are not yet supported; return error.  
\* data-stream.c (stream\_seek): Use ftell if ftello is not available.

2005-07-26 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (gpgme\_get\_key): Allow key IDs.

2005-06-20 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.m4: Only call GPGME\_CONFIG if found.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

\*

gpgme.h (struct \_gpgme\_signature): New members pubkey\_algo and hash\_algo.  
\* verify.c (parse\_valid\_sig): Parse pubkey and hash algo numbers.  
(parse\_new\_sig): Parse pubkey, hash algo and timestamp for ERRSIG.

(\_gpgme\_decrypt\_status\_handler): Fix last change.

\* gpgme.h (struct \_gpgme\_recipient): New structure.  
(gpgme\_recipient\_t): New type.  
(struct \_gpgme\_op\_decrypt\_result): Add member recipients.  
\* decrypt.c (op\_data\_t): New member last\_recipient\_p.  
(\_gpgme\_op\_decrypt\_init\_result): Initialize last\_recipient\_p.  
(parse\_enc\_to): New function.  
(\_gpgme\_decrypt\_status\_handler): Handle status ENC\_TO and NO\_SECKEY.

\* wait-global.c (gpgme\_wait): Break out of the fd processing loop after an error.  
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-06-02 Marcus Brinkmann <marcus@g10code.de>

\* wait.h (\_gpgme\_run\_io\_cb): New prototype.  
\* wait.c (\_gpgme\_run\_io\_cb): New function.  
\* wait-global.c (gpgme\_wait): Call it.  
\* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Likewise.  
\*  
wait-private.c (\_gpgme\_wait\_on\_condition): Likewise.

2005-06-02 Werner Koch <wk@g10code.com>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Take care of GPGME\_STATUS\_NEED\_PASSPHRASE\_PIN.  
(\_gpgme\_passphrase\_command\_handler\_internal): Also act on the key "passphrase.pin.ask".

\* gpgme.h: Added status codes GPGME\_STATUS\_SIG\_SUBPACKET, GPGME\_STATUS\_NEED\_PASSPHRASE\_PIN, GPGME\_STATUS\_SC\_OP\_FAILURE, GPGME\_STATUS\_SC\_OP\_SUCCESS, GPGME\_STATUS\_CARDCTRL, GPGME\_STATUS\_BACKUP\_KEY\_CREATED.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

\* data-user.c: Include <errno.h>.

2005-05-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_new): Set the CTX->include\_certs default to the

default.

2005-05-11 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (\_gpgme\_io\_select): Fix loop increment.

2005-05-05 Marcus Brinkmann <marcus@g10code.de>

\* data-user.c (user\_release): Only call user hook if provided.

(user\_seek): Return EBADF if no user hook is provided.

(user\_read):

Likewise.

(user\_write): Likewise.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (GPGME\_INCLUDE\_CERTS\_DEFAULT): New macro.

\* engine-gpgsm.c (gpgsm\_sign): Send the include-certs option after the reset, just for cleanliness, and do not send it at all if the default is requested.

\* gpgme.c (gpgme\_set\_include\_certs): Allow to use GPGME\_INCLUDE\_CERTS\_DEFAULT.

2005-04-21 Werner Koch <wk@g10code.com>

\* verify.c (calc\_sig\_summary): Set the key revoked bit.

2005-04-14 Marcus Brinkmann <marcus@g10code.de>

\* wait-global.c (gpgme\_wait): Use LI->ctx when checking a context in the list, not the user-provided CTX.

Reported by Igor Belyi <gpgme@katehok.ac93.org>.

\* wait-global.c (gpgme\_wait): If no context is found, and we should not hang, set \*status to 0 and return NULL.

Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

\* data.h (EOPNOTSUPP) [\_WIN32]: Remove definition.

\* data.c (EOPNOTSUPP) [HAVE\_W32\_SYSTEM]:

Remove definition.

(gpgme\_data\_read, gpgme\_data\_write, gpgme\_data\_seek): Return ENOSYS instead EOPNOTSUPP.

\* data-compat.c (EOPNOTSUPP) [HAVE\_W32\_SYSTEM]: Remove definition.

(gpgme\_error\_to\_errno): Map GPG\_ERR\_NOT\_SUPPORTED to ENOSYS.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

- \* io.h: Rename to ...
- \* priv-io.h: ... this.
- \* Makefile.am (libpgpme\_real\_la\_SOURCES): Change io.h to priv-io.h.
- \* data.c, engine-gpgsm.c, posix-io.c, runpgg.c, version.c, w32-io.c, wait-private.c, wait-global.c, wait-user.c, wait.c: Change all includes of "io.h" to "priv-io.h"

2005-03-09 Werner Koch <wk@g10code.com>

- \* w32-util.c (\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path): Do not cast away type checks.
- \* io.h [W32]: Do not include stdio.h. If it is needed do it at the right place.
- \* data.h [W32]: Removed kludge for EOPNOTSUP.
- \* data.c, data-compat.c [W32]: Explicitly test for it here.

Replaced use of \_WIN32 by HAVE\_W32\_SYSTEM except for public header files.

2005-03-07

Timo Schulz <twoaday@g10code.de>

- \* gpgme.h: [\_WIN32] Removed ssize\_t typedef.
- \* ath.h: [\_WIN32] Added some (dummy) types.
- \* io.h: [\_WIN32] include stdio.h.
- \* data.h: [\_WIN32] Define EOPNOTSUPP.
- \* w32-io.c [\_WIN32] (\_gpgme\_io\_subsystem\_init): New.
- \* gpgme.c [\_WIN32] (gpgme\_set\_locale): Disabled.

2004-12-12 Marcus Brinkmann <marcus@g10code.de>

- \* engine.c (\_gpgme\_set\_engine\_info): Fix assertion.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

- \* util.h [HAVE\_CONFIG\_H && HAVE\_TTYNAME\_R] (ttyname\_r): Define prototype.
- \* ttyname\_r.c: New file.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

- \* putc\_unlocked.c, funopen.c: I just claim copyright on these files and change their license to LGPL, because they are totally trivial wrapper functions.

\* isascii.c: Change copyright notice to the one from ctype/ctype.h in the GNU C Library (CVS Head 2004-10-10), where isascii is defined as a macro doing exactly the same as the function in this file.

\* memrchr.c: Update from the GNU C Library (CVS Head 2001-07-06).

\* stpcpy.c: Update from the GNU C Library (CVS Head 2004-10-10).

\* ath.c, ath-compat.c, ath.h, ath-pth.c, ath-pth-compat.c, ath-pthread.c, ath-pthread-compat.c, context.h, conversion.c, data.c, data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c, data-user.c, debug.c, debug.h, decrypt.c, decrypt-verify.c, delete.c, edit.c, encrypt.c, encrypt-sign.c, engine-backend.h, engine.c, engine-gpgsm.c, engine.h, error.c, export.c, genkey.c, get-env.c, gpgme.c, gpgme.h, import.c, io.h, key.c, keylist.c, mkstatus, Makefile.am, ops.h, op-support.c, passphrase.c, posix-io.c, posix-sema.c, posix-util.c, progress.c, runpgg.c, sema.h, sign.c, signers.c, trust-item.c, trustlist.c, util.h, verify.c, version.c, w32-io.c, w32-sema.c, w32-util.c, wait.c, wait-global.c, wait.h, wait-private.c, wait-user.c: Change license to LGPL.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

\* libgpgme.vers  
(GPGME\_1.1): New version.

\* engine-backend.h (struct engine\_ops): Add argument FILE\_NAME to member get\_version(). Add arguments FILE\_NAME and HOME\_DIR to member new(). Change return type of get\_file\_name and get\_version to char \*.

\* engine-gpgsm.c (gpgsm\_get\_version): Change return type to char pointer. Do not cache result.  
(gpgsm\_new): Add file\_name and home\_dir argument, and use them instead of the defaults, if set.

\* runpgg.c (struct engine\_gpg): New member file\_name.  
(gpg\_get\_version): Change return type to char pointer, and do not cache result.  
(gpg\_release): Free gpg->file\_name.  
(gpg\_new): Take new arguments file\_name and home\_dir. Set the --homedir argument if HOME\_DIR is not NULL. Set gpg->file\_name.  
(start): Use gpg->file\_name instead \_gpgme\_get\_gpg\_path, if set.

\* engine.h (\_gpgme\_engine\_info\_copy, \_gpgme\_engine\_info\_release):  
New prototypes.  
(\_gpgme\_engine\_new): Change first argument to gpgme\_engine\_info\_t info.

\* engine.c: Include <assert.h>.  
(gpgme\_get\_engine\_info):  
Set \*INFO within the lock. Move  
ENGINE\_INFO and ENGINE\_INFO\_LOCK to ....

(engine\_info, engine\_info\_lock): ... here. New static variables.  
(engine\_get\_version): Add file\_name argument to  
get\_version invocation. Change return type to char pointer.  
(gpgme\_engine\_check\_version): Rewritten to free() the return value  
of engine\_get\_version after using it.  
(\_gpgme\_engine\_info\_release): New function.  
(gpgme\_get\_engine\_info): Rewritten.  
(\_gpgme\_engine\_info\_copy): New function.  
(\_gpgme\_set\_engine\_info): New function.  
(gpgme\_set\_engine\_info): New function.  
(\_gpgme\_engine\_new): Change first argument to gpgme\_engine\_info\_t  
info, and use that.  
\* gpgme.h (struct \_gpgme\_engine\_info): Change type of file\_name  
and version to char \* (remove the const). New member home\_dir.  
(gpgme\_set\_engine\_info, gpgme\_ctx\_get\_engine\_info,  
gpgme\_ctx\_set\_engine\_info): New prototypes.  
\* context.h (struct gpgme\_context): New member engine\_info.  
\* gpgme.c (gpgme\_new): Allocate CTX->engine\_info.  
(gpgme\_release):  
Deallocate CTX->engine\_info.  
(gpgme\_ctx\_get\_engine\_info, gpgme\_ctx\_set\_engine\_info): New  
functions.  
\* op-support.c (\_gpgme\_op\_reset): Look for correct engine info and  
pass it to \_gpgme\_engine\_new.  
\* version.c (gpgme\_check\_version): Adjust to  
\_gpgme\_compare\_versions returning an int.  
(\_gpgme\_compare\_versions): Return an int value, not a const char  
pointer.  
\* ops.h (\_gpgme\_compare\_versions): Same for prototype.

2004-10-03 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (parse\_trust): If no reason is provided, set  
SIG->validity\_reason to 0.  
(calc\_sig\_summary): Set GPGME\_SIGSUM\_CRL\_TOO\_OLD if appropriate.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (map\_assuan\_error): Return 0 if ERR is 0.  
(start): Call map\_assuan\_error on return value of  
assuan\_write\_line.

2004-10-05 Marcus Brinkmann <marcus@g10code.de>

\* op-support.c (\_gpgme\_op\_data\_lookup): Use char pointer for  
pointer arithmetic.

2004-09-30 Marcus Brinkmann



<marcus@g10code.de>

\* gpgme.m4: Implement the --api-version check.

\* runpgg.c (read\_status): Move the polling of the output data pipe to just before removing the command fd, from just before adding it. This avoids buffering problems.

\* data.c (\_gpgme\_data\_inbound\_handler): Use \_gpgme\_io\_read, not read, to improve debug output.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (GPGME\_IMPORT\_NEW, GPGME\_IMPORT\_UID, GPGME\_IMPORT\_SIG, GPGME\_IMPORT\_SUBKEY, GPGME\_IMPORT\_SECRET, (GPGME\_KEYLIST\_MODE\_LOCAL, GPGME\_KEYLIST\_MODERN\_EXTERN, GPGME\_KEYLIST\_MODE\_SIGS, GPGME\_KEYLIST\_MODE\_VALIDATE): Change from enum to macros.

(gpgme\_keylist\_mode\_t): Define as unsigned int.

(gpgme\_key\_t): Change type of keylist\_mode to gpgme\_keylist\_mode\_t.

2004-09-23 Marcus Brinkmann <marcus@g10code.de>

\* data.c (\_gpgme\_data\_outbound\_handler): Close the file descriptor if we get an EPIPE.

\* data-stream.c (stream\_seek): Call ftello and return the current offset.

\* data.h (struct gpgme\_data): Change type of data.mem.offset to off\_t.

\* data.c (gpgme\_data\_seek): Check dh->cbs->seek callback, not read callback. If SEEK\_CUR, adjust the offset by the pending buffer size. Clear pending buffer on success.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.m4: Add copyright notice.

2004-08-18 Marcus Brinkmann <marcus@g10code.de>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Always run the status handler.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

\* `runpg.c` (`build_argv`): Use `--no-sk-comment`, not `--no-comment`.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

\* `key.c` (`_gpgme_key_append_name`): Make sure tail points to the byte following the uid.

(`_gpgme_key_add_sig`): Likewise. Don't use `calloc`, but `malloc` and `memset`.

2004-06-02 Marcus Brinkmann <marcus@g10code.de>

\* `libgpgme.vers`: Remove C-style comment, which is not supported by older `binutils`.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme-config.in` (Options):  
Support `--api-version`.

\* `libgpgme.vers`: List all `gpgme` symbols under version `GPGME_1.0`.

\* `decrypt.c` (`_gpgme_decrypt_status_handler`): Fix last change.

\* `verify.c` (`parse_error`): Likewise.

\* `verify.c` (`parse_error`): Do not skip location of where token.

\* `gpgme.h` (`gpgme_status_code_t`): Add `GPGME_STATUS_REVKEYSIG`.

\* `verify.c` (`_gpgme_verify_status_handler`): Add handling of `GPGME_STATUS_REVKEYSIG`.  
(`parse_trust`): Likewise.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.h` (`struct _gpgme_decrypt_result`): New fields `wrong_key_usage` and `_unused`.

\* `decrypt.c` (`_gpgme_decrypt_status_handler`): Don't skip over character after a matched string, as in a protocol error this could skip over the trailing binary zero.  
Handle `decrypt.keyusage` error notifications.

\* `gpgme.h` (`struct _gpgme_key`): New member `keylist_mode`.

\* `keylist.c` (`keylist_colon_handler`): Set the `keylist_mode` of `KEY`.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.h` (`struct _gpgme_signature`):  
Change member `WRONG_KEY_USAGE`  
to unsigned int. Same for member `_unused`.

\* keylist.c (set\_mainkey\_trust\_info): Rewritten.  
(set\_subkey\_capability): Handle 'd' (disabled).  
(set\_mainkey\_capability): Rewritten.

2004-04-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.m4: Quote first argument to AC\_DEFUN.

2004-04-21 Werner Koch <wk@gnupg.org>

\* key.c (gpgme\_key\_unref): Allow passing NULL like free does.  
The rule of least surprise.

2004-04-15 Werner Koch <wk@gnupg.org>

\* verify.c (prepare\_new\_sig, \_gpgme\_verify\_status\_handler): Remove  
unused result.signatures items.

\* keylist.c (gpgme\_get\_key): Return an error if FPR is NULL.

2004-04-08 Werner Koch <wk@gnupg.org>

\* verify.c (\_gpgme\_verify\_status\_handler): Ignore the error status  
if we can't process it.

\* decrypt-verify.c (decrypt\_verify\_status\_handler): Backed out  
yesterday's hack. It is not any longer required.

2004-04-07 Werner Koch <wk@gnupg.org>

\* decrypt-verify.c (decrypt\_verify\_status\_handler):  
Hack to cope  
with meaningless error codes from the verify status function.

2004-04-05 Werner Koch <wk@gnupg.org>

\* gpgme.h: Add GPGME\_STATUS\_NEWSIG.

\* verify.c (parse\_error): Compare only the last part of the where  
token.

(prepare\_new\_sig): New.

(parse\_new\_sig): Use prepare\_new\_sig when required.

(\_gpgme\_verify\_status\_handler): Handle STATUS\_NEWSIG.

\* engine-gpgsm.c (gpgsm\_keylist\_ext): Send with-validation  
option. Fixed pattern construction.

(status\_handler): Add debugging output.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Protect `_only_tty` related code with `isatty()`. Submitted by Bernhard Herzog.

2004-03-11 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Protect all tty related code with `isatty()`.

\* `runpgg.c` (`gpg_cancel`): Set `GPG->fd_data_map` to `NULL` after releasing it.

\* engine-gpgsm.c (`gpgsm_cancel`): Only call `assuan_disconnect` if `GPGSM->assuan_ctx` is not `NULL`. Set it to `NULL` afterwards.

2004-03-07

Marcus Brinkmann <marcus@g10code.de>

\* `gpgme-config.in`: Do not emit `include` and `lib` directory for prefix `"/usr"` or `""`.

2004-03-03 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (`gpgsm_export_ext`): Properly insert a space between patterns.

2004-02-18 Werner Koch <wk@gnupg.org>

\* `gpgme-config.in`: Ignore setting of `--prefix`.

2004-02-25 Marcus Brinkmann <marcus@g10code.de>

\* `runpgg.c` (`gpg_cancel`): New function.

(`gpg_release`): Call it here.

(`_gpgme_engine_ops_gpg`): Add it here.

\* engine-gpgsm.c (`gpgsm_cancel`): Fix last change.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.c` (`gpgme_cancel`): New function.

\* engine-backend.h (struct `engine_ops`): New member `cancel`.

\* engine.h (`_gpgme_engine_cancel`): New prototype.

\* engine.c (`_gpgme_engine_cancel`): New function.

\* engine-gpgsm.c (`_gpgme_engine_ops_gpgsm`): Add new member `cancel`.

(`gpgsm_cancel`): New function.

(`gpgsm_release`): Use it.

\* `runpgg.c` (`_gpgme_engine_ops_gpg`): Add new member `cancel`.

2004-02-17

Werner Koch <wk@gnupg.org>

- \* gpgme.h: Add GPGME\_KEYLIST\_MODE\_VALIDATE.
- \* engine-gpgsm.c (gpgsm\_keylist): Send this to gpgsm.

2004-02-15 Werner Koch <wk@gnupg.org>

- \* memchr.c (memchr): Fixed implementation. Problem pointed out by Adriaan de Groot.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

- \* runpg.c (build\_argv): Use --no-comment, not --comment "".
- \* data-compat.c (gpgme\_data\_new\_from\_filepart): Call fseeko if available.
- \* data-stream.c (stream\_seek): Likewise.

2004-01-16 Werner Koch <wk@gnupg.org>

- \* conversion.c (\_gpgme\_map\_gnupg\_error): Handle numerical codes as used by GnuPG 1.9.x

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (struct \_gpgme\_key\_sig): Fix comment on REVOKED.

2004-01-12 Werner Koch <wk@gnupg.org>

- \* sign.c: Include util.h for prototype of \_gpgme\_parse\_timestamp.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (\_GPGME\_D\_CLASS): Revert this change.
- (struct \_gpgme\_key\_sig): For C++ compilers, rename class member to \_obsolete\_class. Add new member sig\_class.
- (struct \_gpgme\_new\_signature): Same here.
- \* key.c (gpgme\_key\_sig\_get\_ulong\_attr): Use CERTSIG->sig\_class, not CERTSIG->class.
- \* keylist.c (keylist\_colon\_handler): Likewise for KEYSIG, but keep setting KEYSIG->class, too. Rename variable CLASS to SIG\_CLASS.
- \* sign.c (parse\_sig\_created): Set SIG->sig\_class.

2003-12-22 Werner Koch <wk@gnupg.org>

- \* gpgme.h (\_GPGME\_D\_CLASS): Kludge for C++ compatibility without

changing the C API.

2003-11-19 Werner Koch <wk@gnupg.org>

- \* conversion.c (\_gpgme\_parse\_timestamp): New.
- (atoi\_1, atoi\_2, atoi\_4): New.
- \* keylist.c (parse\_timestamp): Removed. Changed all callers to use the new function.
- \* verify.c (parse\_valid\_sig): Ditto. Repalced the errno check.
- \* sign.c (parse\_sig\_created): Ditto.

2003-10-31 Werner Koch <wk@gnupg.org>

- \* keylist.c (parse\_timestamp): Detect ISO 8601 timestamps and try to convert them.

2003-10-10 Marcus Brinkmann <marcus@g10code.de>

- \* genkey.c (get\_key\_parameter): Make a copy of the key parameters. Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

- \* data-compat.c: Include <sys/time.h> before <sys/stat.h> for broken systems.
- \* engine-gpgsm.c (map\_assuan\_error): If ERR is -1, return sensible error.
- \* io.h (\_gpgme\_io\_subsystem\_init): New prototype.
- \* posix-io.c (\_gpgme\_io\_subsystem\_init): Add function.
- (\_gpgme\_io\_spawn): Do not fixup signal handler here.
- \* version.c (do\_subsystem\_inits): Call \_gpgme\_io\_subsystem\_init.
- \* debug.c (debug\_init): Drop const qualifier from E.
- \* ath.h (struct ath\_ops): Make ADDR argument of CONNECT prototype const.
- (ath\_connect): Make ADDR argument const.
- \* ath-pthread.c (ath\_connect): Likewise.
- \* ath-pth.c (ath\_connect): Likewise.
- \* ath-compat.c (ath\_connect): Likewise.
- \* ath.c (ath\_connect): Likewise.
- \* ath.h [HAVE\_SYS\_SELECT\_H]: Include <sys/select.h> for fd\_set.
- [!HAVE\_SYS\_SELECT\_H]: Include <sys/time.h>.

\*  
conversion.c (\_gpgme\_hextobyte): Drop "unsigned" from type of SRC argument.  
\* util.h (\_gpgme\_hextobyte): Likewise for prototype.  
  
\* gpgme.h: Remove trailing comma in enum.  
  
\* runpgg.c: Do not include <time.h>, <sys/time.h>, <sys/types.h>, <signal.h>, <fcntl.h>, or "unistd.h".

2003-10-02 Marcus Brinkmann <marcus@g10code.de>

\* engine-backend.h (struct engine\_ops): Add argument TYPE.  
\* engine.c (\_gpgme\_engine\_op\_edit): Likewise.  
\* engine.h: Likewise.  
\* runpgg.c (gpg\_edit): Likewise. Use it.  
\* edit.c (edit\_start): Likewise. Pass it on.  
(gpgme\_op\_edit\_start, gpgme\_op\_edit): Likewise.  
(gpgme\_op\_card\_edit\_start, gpgme\_op\_card\_edit): New functions.

2003-09-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpg\_strerror\_r): Change prototype to match gpg\_strerror\_r change.  
\* error.c (gpg\_strerror\_r): Likewise, also update implementation.  
  
\* gpgme.c (gpgme\_hash\_algo\_name): Change name of RMD160 to RIPEMD160, name of TIGER to TIGER192, name of CRC32-RFC1510 to CRC32RFC1510,  
and name of CRC24-RFC2440 to CRC24RFC2440.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add prototype for gpgme\_set\_locale.  
  
\* gpgme.h: Define macro \_GPGME\_INLINE depending on the compiler characteristics and use that instead \_\_inline\_\_.  
  
\* context.h (struct gpgme\_context): New members lc\_ctype and lc\_messages.  
\* gpgme.c: Include <locale.h>.  
(def\_lc\_lock, def\_lc\_ctype, def\_lc\_messages): New static variables.  
(gpgme\_set\_locale): New function.  
\* engine.c (\_gpgme\_engine\_new): Add arguments lc\_ctype and lc\_messages.  
\* engine.h (\_gpgme\_engine\_new): Likewise.  
\* engine-gpgsm.c (gpgsm\_new): Likewise.

- \* `rungpg.c` (`gpg_new`): Likewise.
- \* `engine-backend.h` (`struct engine_ops`): Likewise to `NEW`.
- \* `op-support.c` (`_gpgme_op_reset`): Likewise to invocation of `_gpgme_engine_new`.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

- \* `gpgme.h` (`gpgme_strerror_r`): New prototype.
- \* `error.c` (`gpgme_strerror_r`): New function.
  
- \* `get-env.c`: New file.
- \* `util.h` (`_gpgme_getenv`):  
Add prototype.
- \* `Makefile.am` (`libgpgme_real_la_SOURCES`): Add `get-env.c`.
- \* `rungpg.c` (`build_argv`): Use `_gpgme_getenv`.
- \* `debug.c` (`debug_init`): Likewise.
- \* `engine-gpgsm.c` (`gpgsm_new`): Likewise.  
(`gpgsm_new`): Use `ttyname_r`.
- \* `w32-io.c` (`_gpgme_io_spawn`): Disable debugging for now.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

- \* `gpgme-config.in`: Use `$libdir`, not `@libdir@`, for the `echo` command.
  
- \* `gpgme-config.in`: Rewritten.
- \* `gpgme.m4`: Rewritten.

2003-08-19 Marcus Brinkmann <marcus@g10code.de>

The `ath` files (`ath.h`, `ath.c`, `ath-pth.c`, `ath-pthread.c`, `ath-compat.c`, `ath-pth-compat.c` and `ath-pthread-compat.c`) have been updated to have better thread support, and the `Makefile.am` was changed to reflect that.

- \* `util.h` [`!HAVE_FOPENCOOKIE`]: Remove `fopencookie` declaration.
- \* `engine-gpgsm.c` (`gpgsm_assuan_simple_command`): Set `ERR` to return value of `status_fnc`.
- \* `rungpg.c` (`start`): Return `SAVED_ERRNO`, not `errno`.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

- \* `rungpg.c` (`start`):  
Use `saved_errno` instead `errno`.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

- \* `funopen.c`, `putc_unlocked.c`, `isascii.c`, `memrchr.c`: New files.



\* fopencookie.c: File removed.

2003-08-15 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in: Put gpg-error related flags after gpgme's.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_new\_signature): Rename member CLASS to \_OBSOLETE\_CLASS, add member CLASS with type unsigned int.

\* sign.c (parse\_sig\_created): Also set SIG->\_unused\_class for backward compatibility.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (parse\_new\_sig): Fix status parsing case.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_subkey): Add flag CAN\_AUTHENTICATE. Lower \_UNUSED to 23 bits.

(struct \_gpgme\_key): Likewise.

\* keylist.c (set\_mainkey\_capability): Support 'a' and 'A'.

(set\_subkey\_capability): Support 'a'.

\* keylist.c (gpgme\_get\_key): Check if there is more than one key

listed, and return GPG\_ERR\_AMBIGUOUS\_NAME in that case.

\* util.h (\_gpgme\_decode\_c\_string): Change type of LEN argument to size\_t.

(\_gpgme\_decode\_percent\_string): Likewise.

\* conversion.c (\_gpgme\_decode\_c\_string): Likewise.

(\_gpgme\_decode\_percent\_string): Likewise.

(\_gpgme\_map\_gnupg\_error): Change type of I to unsigned int.

\* signers.c (gpgme\_signers\_clear): Likewise.

(gpgme\_signers\_enum): New unsigned variable SEQNO, set to SEQ. Use SEQNO instead SEQ.

\* wait.c (fd\_table\_put): Change type of I and J to unsigned int.

\* wait-global.c (\_gpgme\_wait\_global\_event\_cb): Change type of IDX to unsigned int.

(gpgme\_wait): Change type of I and IDX to unsigned int.

\* wait-private.c (\_gpgme\_wait\_on\_condition): Change type of IDX and I to unsigned int.

\* posix-io.c (\_gpgme\_io\_close): Cast return value of macro DIM to int to suppress gcc warning.

(\_gpgme\_io\_set\_close\_notify): Likewise.

(\_gpgme\_io\_select): Change type of I to unsigned int.

\* engine.c (gpgme\_get\_engine\_info):  
Change type of PROTO to  
unsigned int.  
\* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Change type of IDX and  
I to unsigned int.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

\* decrypt-verify.c (decrypt\_verify\_status\_handler): Expand silly  
and wrong expression.  
\* encrypt-sign.c (encrypt\_sign\_status\_handler): Likewise.  
\* encrypt.c (encrypt\_sym\_status\_handler): Likewise.  
\* sign.c (sign\_status\_handler): Likewise.  
\* verify.c (verify\_status\_handler): Likewise.  
\* decrypt.c (decrypt\_status\_handler): Likewise.

\* engine.c (gpgme\_get\_engine\_info): Initialize NULL.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in (gpg\_error\_libs): Quote GPG\_ERROR\_CFLAGS and  
GPG\_ERROR\_LIBS when setting the corresponding variables.  
Reported by Stphane Corthsy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (set\_recipients): Move declaration of NEWLEN to  
the beginning of the block.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

\* data-mem.c (mem\_write):  
Copy original buffer content.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_user\_ids\_release, gpgme\_user\_ids\_append): Remove  
prototypes.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (AM\_CPPFLAGS): Add @GPG\_ERROR\_CFLAGS@.  
\* gpgme-config.in (gpg\_error\_libs, gpg\_error\_cflags): New variables.  
Print them.

\* op-support.c (\_gpgme\_parse\_inv\_userid): Rename to  
\_gpgme\_parse\_inv\_recip and change to new datatype.

\* ops.h (\_gpgme\_parse\_inv\_key): Fix prototype.

\* gpgme.h (struct \_gpgme\_invalid\_user\_id): Rename to  
\_\_gpgme\_invalid\_key. Rename field ID to KEY.  
(gpgme\_invalid\_user\_id\_t): Rename to gpgme\_invalid\_key\_t.  
(struct \_gpgme\_op\_encrypt\_result): Here, too.  
(struct \_gpgme\_op\_sign\_result): Likewise.  
\* encrypt.c (struct op\_data): Likewise.  
(release\_op\_data): Likewise.  
\* sign.c (struct op\_data): Likewise.  
(release\_op\_data): Likewise.

\* posix-io.c (\_gpgme\_io\_read): Save errno across debug calls.  
(\_gpgme\_io\_write): Likewise.  
(\_gpgme\_io\_pipe):  
Likewise.  
(\_gpgme\_io\_select): Likewise.

\* runpgg.c (struct engine\_gpg): Remove arg\_error.  
(add\_arg): Don't set arg\_error.  
(add\_data): Likewise.  
(start): Don't check arg\_error.  
(gpg\_new): Check return value of add\_arg.  
\* verify.c (parse\_notation): Free allocated memory at error.

2003-06-05 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

\* Makefile.am (EXTRA\_DIST): Remove mkerrors.  
(BUILT\_SOURCES): Remove errors.c.  
(MOSTLYCLEANFILES): Likewise.  
(libgpgme\_la\_SOURCES): Likewise. Add error.c.  
(errors.c): Remove target.  
\* mkerrors: File removed.  
\* error.c: New file.

\* gpgme.h (gpgme\_error\_t): Change to type gpg\_error\_t.  
(gpgme\_err\_code\_t, gpgme\_err\_source\_t): New types.  
(gpgme\_err\_code, gpgme\_err\_source, gpgme\_error, gpgme\_err\_make):  
New static inline functions.  
(gpgme\_strsource, gpgme\_err\_code\_from\_errno,  
gpgme\_err\_code\_to\_errno, gpgme\_err\_make\_from\_errno,  
gpgme\_error\_from\_errno): New prototypes.

2003-05-29 Marcus  
Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_op\_export\_start): Change second arg to const char \*.  
(gpgme\_op\_export): Likewise.

(gpgme\_op\_export\_ext\_start): New prototype.  
(gpgme\_op\_export\_ext): Likewise.  
\* engine.h: Likewise for \_gpgme\_engine\_op\_export and \_gpgme\_engine\_op\_export\_ext.  
\* engine-backend.h (struct engine\_ops): Change second argument of prototype of export to const char \*, and add reserved int as third argument. Add prototype for export\_ext.  
\* engine.c (\_gpgme\_engine\_op\_export\_ext): New function.  
(\_gpgme\_engine\_op\_export): Change second argument of prototype of export to const char \*, and add reserved int as third argument.  
\* runpg.c (gpg\_export): Change second argument of prototype of export to const char \*, and add reserved int as third argument.  
(gpg\_export\_ext): New function.  
(gpg\_keylist\_ext): Break loop at error.  
(\_gpgme\_engine\_ops\_gpg): Add gpg\_export\_ext.  
\* engine-gpgsm.c (gpgsm\_export): Change second argument of prototype of export to const char \*, and add reserved int as third argument.  
(gpgsm\_export\_ext): New function.  
(\_gpgme\_engine\_ops\_gpgsm): Add gpgsm\_export\_ext.  
\* export.c (export\_start): Change second argument of prototype of export to const char \*, and add reserved int as third argument.  
(gpgme\_op\_export\_start): Likewise.  
(export\_ext\_start): New function.  
(gpgme\_op\_export\_ext\_start): Likewise.  
(gpgme\_op\_export\_ext): Likewise.  
  
\* gpgme.h (gpgme\_keylist\_mode\_t): New type for anonymous enum.  
(gpgme\_sigsum\_t): New type for anonymous enum.  
  
\* encrypt-sign.c (encrypt\_sign\_start): Check for errors earlier, and return an error if RECP is not set.  
  
\* Makefile.am (libgpgme\_la\_SOURCES): Remove user-id.c.  
\* user-id.c: Remove file.  
\* ops.h: Remove prototype for \_gpgme\_user\_ids\_all\_valid.  
\* gpgme.h (gpgme\_encrypt\_flags\_t): New type.  
(gpgme\_op\_encrypt\_start): Change second parameter to type gpgme\_key\_t[], and add third parameter.  
(gpgme\_op\_encrypt): Likewise.  
(gpgme\_op\_encrypt\_sign\_start): Likewise.  
(gpgme\_op\_encrypt\_sign): Likewise.  
\* encrypt.c (encrypt\_start): Likewise.  
(gpgme\_op\_encrypt\_start): Likewise.  
(gpgme\_op\_encrypt): Likewise. Pass flags to engine.  
\* encrypt-sign.c (encrypt\_sign\_start): Likewise.

(gpgme\_op\_encrypt\_sign\_start): Likewise.  
(gpgme\_op\_encrypt\_sign): Likewise.  
\* engine-backend.h (struct engine\_ops): Likewise for prototypes of encrypt and encrypt\_sign.  
\* engine.h: Likewise for prototypes of \_gpgme\_engine\_op\_encrypt and \_gpgme\_engine\_op\_encrypt\_sign.  
\* engine.c (\_gpgme\_engine\_op\_encrypt): Likewise.  
(\_gpgme\_engine\_op\_encrypt\_sign): Likewise.  
\* runpgg.c (gpg\_encrypt): Likewise.  
(gpg\_encrypt\_sign): Likewise.  
\* runpgg.c (gpg\_encrypt): Check flags for always trust option.  
\* engine-gpgsm.c (gpgsm\_encrypt): Likewise.  
(set\_recipients): Rewritten to use keys instead user IDs.  
\* runpgg.c (append\_args\_from\_recipients): Rewritten to use keys instead user IDs.  
\* encrypt.c (\_gpgme\_encrypt\_status\_handler): Change errors returned to GPGME\_Invalid\_Key and GPGME\_General\_Error.

2003-05-28

Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Rename GpgsmObject to engine\_gpgsm\_t.  
(struct gpgsm\_object\_s): Rename to struct engine\_gpgsm.  
\* runpgg.c: Rename GpgObject to engine\_gpg\_t.  
(struct gpg\_object\_s): Rename to struct engine\_gpg.  
  
\* context.h (struct gpgme\_context): Change EngineObject to engine\_object\_t.  
(enum ctx\_op\_data\_type): Rename to ctx\_op\_data\_id\_t.  
(ctx\_op\_data\_t): New type.  
(struct gpgme\_context): Use it.  
\* ops.h (\_gpgme\_op\_data\_lookup): Use new type name.  
\* op-support.c (\_gpgme\_op\_data\_lookup): Likewise.  
\* engine.c: Rename EngineObject to engine\_t in the file. Also EngineStatusHandler to engine\_status\_handler\_t, EngineCommandHandler to engine\_command\_handler\_t and EngineColonLineHandler to engine\_colon\_line\_handler.  
\* runpgg.c (start): Likewise.  
\* engine-gpgsm.c: Likewise.  
\* engine-backend.h (struct engine\_ops): Likewise  
\* engine.h (struct engine\_object\_s): Rename to struct engine.  
(EngineObject): Rename to engine\_t. Also everywhere else in the file.  
(EngineStatusHandler): Rename to engine\_status\_handler\_t.  
(EngineColonLineHandler): Rename to engine\_colon\_line\_handler\_t.  
(EngineCommandHandler): Rename to engine\_command\_handler\_t.

\* engine-gpgsm.c (gpgsm\_export): Fix bug in last change.

\* Makefile.am (libgpgme\_la\_SOURCES): Remove recipient.c, add user-id.c.

\* gpgme.h (gpgme\_recipients\_t): Removed.  
(gpgme\_recipients\_new, gpgme\_recipients\_release, gpgme\_recipients\_add\_name, gpgme\_recipients\_add\_name\_with\_validity, gpgme\_recipients\_count, gpgme\_recipients\_enum\_open, gpgme\_recipients\_enum\_read, gpgme\_recipients\_enum\_close): Removed.  
(gpgme\_op\_encrypt, gpgme\_op\_encrypt\_start, gpgme\_op\_encrypt\_sign, gpgme\_op\_encrypt\_sign\_start, gpgme\_op\_export\_start, gpgme\_op\_export): Change second argument to gpgme\_user\_id\_t.  
(gpgme\_user\_ids\_release): New prototype.  
(gpgme\_user\_ids\_append): Likewise.

\* ops.h (\_gpgme\_recipients\_all\_valid): Remove.  
(\_gpgme\_user\_ids\_all\_valid): Add.

\* context.h  
(struct gpgme\_recipients): Removed.

\* user-id.c: New file.

\* recipient.c: Removed file.

\* runpg.c (append\_args\_from\_recipients): Change last arg to gpgme\_user\_id\_t. Reimplement.  
(gpg\_encrypt): Change second arg to gpgme\_user\_id\_t.  
(gpg\_encrypt\_sign): Likewise.  
(gpg\_export): Likewise. Rewrite user ID list code.

\* engine.c (\_gpgme\_engine\_op\_encrypt): Change second arg to gpgme\_user\_id\_t.  
(\_gpgme\_engine\_op\_encrypt\_sign): Likewise.  
(\_gpgme\_engine\_op\_export): Likewise.

\* engine.h (\_gpgme\_engine\_op\_encrypt, \_gpgme\_engine\_op\_encrypt\_sign, \_gpgme\_engine\_op\_export): Likewise.

\* engine-gpgsm.c (set\_recipients): Likewise. Rewrite loop code.  
(gpgsm\_encrypt): Likewise.  
(gpgsm\_export): Likewise.

\* engine-backend.h (struct engine\_ops): Likewise for members ENCRYPT, ENCRYPT\_SIGN and EXPORT.

\* export.c (export\_start, gpgme\_op\_export\_start, gpgme\_op\_export): Likewise.

\* encrypt.c (encrypt\_start): Likewise. Don't check for count of recipients.  
(gpgme\_op\_encrypt\_start): Likewise.  
(gpgme\_op\_encrypt): Likewise.

\* encrypt-sign.c (encrypt\_sign\_start): Likewise.  
(gpgme\_op\_encrypt\_sign): Likewise.  
(gpgme\_op\_encrypt\_sign\_start): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_op\_import\_result): Add skipped\_new\_keys.  
\* import.c (parse\_import\_res): Add skipped\_new\_keys parser.

\* op-support.c (\_gpgme\_parse\_inv\_userid): Add missing break statements.

\* encrypt.c (gpgme\_op\_encrypt): Use gpgme\_error\_t instead of int.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

\* encrypt.c (gpgme\_op\_encrypt\_result): Use intermediate variable HOOK to avoid compiler warning. Don't ask, you don't want to know.

(\_gpgme\_encrypt\_status\_handler): Likewise.

(\_gpgme\_op\_encrypt\_init\_result): Likewise.

\* decrypt.c (gpgme\_op\_decrypt\_result): Likewise.

(\_gpgme\_decrypt\_status\_handler): Likewise.

(\_gpgme\_op\_decrypt\_init\_result): Likewise.

\* verify.c (gpgme\_op\_verify\_result): Likewise.

(\_gpgme\_verify\_status\_handler): Likewise.

(\_gpgme\_op\_verify\_init\_result):

Likewise.

\* edit.c (edit\_status\_handler): Likewise.

(command\_handler): Likewise.

(edit\_start): Likewise.

\* genkey.c (gpgme\_op\_genkey\_result): Likewise.

(genkey\_status\_handler): Likewise.

(genkey\_start): Likewise.

\* import.c (gpgme\_op\_import\_result): Likewise.

(import\_status\_handler): Likewise.

(\_gpgme\_op\_import\_start): Likewise.

\* trustlist.c (gpgme\_op\_trustlist\_next): Likewise.

(\_gpgme\_op\_trustlist\_event\_cb): Likewise.

(gpgme\_op\_trustlist\_start): Likewise.

\* keylist.c (gpgme\_op\_keylist\_result): Likewise.

(keylist\_colon\_handler): Likewise.

(keylist\_status\_handler): Likewise.

(\_gpgme\_op\_keylist\_event\_cb): Likewise.

(gpgme\_op\_keylist\_start): Likewise.

(gpgme\_op\_keylist\_ext\_start): Likewise.

(gpgme\_op\_keylist\_next): Likewise.

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Likewise.

(\_gpgme\_passphrase\_command\_handler\_internal): Likewise.

\* sign.c (gpgme\_op\_sign\_result): Likewise.

(\_gpgme\_sign\_status\_handler): Likewise.

(\_gpgme\_op\_sign\_init\_result):

Likewise.

\* passphrase.c (\_gpgme\_passphrase\_command\_handler\_internal): Fix access to pointer type.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

\* engine.h (EngineCommandHandler): Change last argument to int fd.

\* gpgme.h (gpgme\_passphrase\_cb\_t): Rewritten to take parts of the description and fd.

(gpgme\_edit\_cb\_t): Change last argument to int fd.

\* ops.h (\_gpgme\_passphrase\_command\_handler\_internal): New prototype.

\* passphrase.c: Include <assert.h>.

(op\_data\_t): Rename userid\_hint to uid\_hint, remove last\_pw\_handle.

(release\_op\_data): Check values before calling free.

(\_gpgme\_passphrase\_status\_handler): Likewise.

(\_gpgme\_passphrase\_command\_handler\_internal): New function.

(\_gpgme\_passphrase\_command\_handler): Rewritten.

\* edit.c (edit\_status\_handler): Pass -1 as fd argument.

(command\_handler): Update prototype. New variable processed. Use it to store return value of

\_gpgme\_passphrase\_command\_handler\_internal which is now used instead \_gpgme\_passphrase\_command\_handler.

Use it also to check

if we should call the user's edit function. Pass fd to user's edit function.

\* runpg.c (struct gpg\_object\_s): Change type of cmd.cb\_data to void \*.

(gpg\_release): Check value before calling free. Do not release cmd.cb\_data.

(command\_cb): Function removed.

(command\_handler): New function. Thus we don't use a data object for command handler stuff anymore, but handle it directly. This allows proper error reporting (cancel of passphrase requests, for example). Also all callbacks work via direct writes to the file descriptor (so that passphrases are not kept in insecure memory).

(gpg\_set\_command\_handler): Rewritten to use even more ugly hacks.

(read\_status): Check cmd.keyword before calling free. Install command\_handler as the I/O callback handler with GPG as private data.

\* runpg.c (gpg\_new): Add --enable-progress-filter to gpg invocation.

\* decrypt-verify.c (\_gpgme\_op\_decrypt\_verify\_start): Rename to decrypt\_verify\_start.

(gpgme\_op\_decrypt\_verify\_start):

Call decrypt\_verify\_start.

(gpgme\_op\_decrypt\_verify): Likewise.

\* verify.c (verify\_status\_handler): New function that also calls progress status handler.



(\_gpgme\_op\_verify\_start): Set status handler to verify\_status\_handler.  
Rename to (verify\_start).  
(gpgme\_op\_verify\_start): Call verify\_start.  
(gpgme\_op\_verify): Likewise.  
\* encrypt.c (encrypt\_status\_handler): New function.  
(\_gpgme\_encrypt\_sym\_status\_handler): Call progress status handler.  
Make static. Rename to encrypt\_sym\_status\_handler.  
(encrypt\_start): Set status handler to encrypt\_sym\_status\_handler  
or encrypt\_status\_handler.  
\* sign.c (sign\_status\_handler): New function.  
(sign\_start): Set status handler to sign\_status\_handler.  
\* decrypt.c (decrypt\_status\_handler): New function that also calls  
progress status handler.  
(decrypt\_start): Set status handler to decrypt\_status\_handler.  
\* encrypt-sign.c (encrypt\_sign\_status\_handler): Likewise.  
\* decrypt-verify.c (decrypt\_verify\_status\_handler):  
Call  
\_gpgme\_progress\_status\_handler.  
  
\* conversion.c (\_gpgme\_decode\_c\_string): Add missing break  
statement.  
  
\* recipient.c (gpgme\_recipients\_add\_name\_with\_validity): Add one  
to buffer to allocate.

2003-05-19 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (parse\_new\_sig): Fix ERRSIG case.  
Submitted by Benjamin Lee <benjaminlee@users.sf.net>.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: The following types are renamed. The old name is kept  
as a deprecated typedef.  
(GpgmeCtx): Rename to gpgme\_ctx\_t.  
(GpgmeData): Rename to gpgme\_data\_t.  
(GpgmeRecipients): Rename to gpgme\_recipients\_t.  
(GpgmeError): Rename to gpgme\_error\_t.  
(GpgmeDataEncoding): Rename to gpgme\_data\_encoding\_t.  
(GpgmePubKeyAlgo): Rename to gpgme\_pubkey\_algo\_t.  
(GpgmeHashAlgo): Rename to gpgme\_hash\_algo\_t.  
(GpgmeSigStat): Rename to gpgme\_sig\_stat\_t.  
(GpgmeSigMode): Rename to gpgme\_sig\_mode\_t.  
(GpgmeAttr): Rename to gpgme\_attr\_t.  
(GpgmeValidity): Rename to gpgme\_validity\_t.  
(GpgmeProtocol):  
Rename to gpgme\_protocol\_t.  
(GpgmeStatusCode): Rename to gpgme\_status\_code\_t.

(GpgmeEngineInfo): Rename to gpgme\_engine\_info\_t.  
(GpgmeSubkey): Rename to gpgme\_subkey\_t.  
(GpgmeKeySig): Rename to gpgme\_keysig\_t.  
(GpgmeUserID): Rename to gpgme\_user\_id\_t.  
(GpgmePassphraseCb): Rename to gpgme\_passphrase\_cb\_t.  
(GpgmeProgressCb): Rename to gpgme\_progress\_cb\_t.  
(GpgmeEditCb): Rename to gpgme\_edit\_cb\_t.  
(GpgmeIOCb): Rename to gpgme\_io\_cb\_t.  
(GpgmeRegisterIOCb): Rename to gpgme\_register\_io\_cb\_t.  
(GpgmeRemoveIOCb): Rename to gpgme\_remove\_io\_cb\_t.  
(GpgmeEventIO): Rename to gpgme\_event\_io\_t.  
(GpgmeEventIOCb): Rename to gpgme\_event\_io\_cb\_t.  
(GpgmeIOCbs): Rename to gpgme\_io\_cbs.  
(gpgme\_io\_cbs\_t): New type.  
(GpgmeDataReadCb): Rename to gpgme\_data\_read\_cb\_t.  
(GpgmeDataWriteCb): Rename to gpgme\_data\_write\_cb\_t.  
(GpgmeDataSeekCb): Rename to gpgme\_data\_seek\_cb\_t.  
(GpgmeDataReleaseCb): Rename to gpgme\_data\_release\_cb\_t.  
(GpgmeDataCbs): Rename to gpgme\_data\_cbs.  
(gpgme\_data\_cbs\_t):  
New type.  
(GpgmeInvalidUserID): Rename to gpgme\_invalid\_user\_id\_t.  
(GpgmeEncryptResult): Rename to gpgme\_encrypt\_result\_t.  
(GpgmeDecryptResult): Rename to gpgme\_decrypt\_result\_t.  
(GpgmeNewSignature): Rename to gpgme\_new\_signature\_t.  
(GpgmeSignResult): Rename to gpgme\_sign\_result\_t.  
(GpgmeSigNotation): Rename to gpgme\_sig\_notation\_t.  
(GpgmeSignature): Rename to gpgme\_signature\_t.  
(GpgmeVerifyResult): Rename to gpgme\_verify\_result\_t.  
(GpgmeImportStatus): Rename to gpgme\_import\_status\_t.  
(GpgmeImportResult): Rename to gpgme\_import\_result\_t.  
(GpgmeGenKeyResult): Rename to gpgme\_genkey\_result\_t.  
(GpgmeKeyListResult): Rename to gpgme\_keylist\_result\_t.  
(GpgmeTrustItem): Rename to gpgme\_trust\_item\_t.  
\* gpgme.h (gpgme\_deprecated\_error\_t): New type, swallowing macros  
GPGME\_No\_Recipients, GPGME\_Invalid\_Recipient and  
GPGME\_No\_Passphrase.  
\* data.h (struct gpgme\_data\_s): Rename to struct gpgme\_data.  
\* context.h (struct gpgme\_context\_s): Rename to struct  
gpgme\_context.  
(struct  
gpgme\_recipients\_s): Rename to gpgme\_recipients.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (finish\_key): Clear OPD->tmp\_uid.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (\_gpgme\_verify\_status\_handler): Return GPGME\_No\_Data for NODATA status without signatures.

2003-05-05 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_append\_name): Use decoded string to parse user id.  
(\_gpgme\_key\_add\_sig): Likewise.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

\* context.h (struct gpgme\_context\_s): Remove member op\_info.

\* key.c (\_gpgme\_key\_add\_sig): Initialize SIG->uid.

\* gpgme.h (GpgmeError): Add deprecated values for GPGME\_Invalid\_Type and GPGME\_Invalid\_Mode.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_get\_op\_info): Remove prototype.

\* ops.h (\_gpgme\_set\_op\_info,  
\_gpgme\_data\_release\_and\_return\_string, \_gpgme\_data\_get\_as\_string,  
\_gpgme\_data\_append, \_gpgme\_data\_append\_string,  
\_gpgme\_data\_append\_string\_for\_xml,  
\_gpgme\_data\_append\_for\_xml,  
\_gpgme\_data\_append\_percentstring\_for\_xml): Likewise.  
(\_gpgme\_progress\_status\_handler): Change first arg to void \*.

\* progress.c (\_gpgme\_progress\_status\_handler): Likewise.

\* conversion.c: Do not include <string.h>, <errno.h>, <ctype.h>,  
and <sys/types.h>, but <string.h>.

(\_gpgme\_data\_append): Remove function.

(\_gpgme\_data\_append\_string): Likewise.

(\_gpgme\_data\_append\_for\_xml): Likewise.

(\_gpgme\_data\_append\_string\_for\_xml): Likewise.

(\_gpgme\_data\_append\_percentstring\_for\_xml): Likewise.

\* data-mem.c (\_gpgme\_data\_get\_as\_string): Likewise.

(\_gpgme\_data\_release\_and\_return\_string): Likewise.

\* gpgme.c (gpgme\_get\_op\_info): Likewise.

(\_gpgme\_set\_op\_info): Likewise.

\* gpgme.h (struct \_gpgme\_key): New structure.

(GpgmeKey): Define using \_gpgme\_key.

(struct \_gpgme\_subkey): New structure.

(GpgmeSubKey): New type.

(struct \_gpgme\_key\_sig): New structure.

(GpgmeKeySig): New type.

(struct \_gpgme\_user\_id): New structure.

(GpgmeUserID):  
New type.  
(struct \_gpgme\_op\_keylist\_result): New structure.  
(GpgmeKeyListResult): New type.  
(gpgme\_op\_keylist\_result): New function.  
(gpgme\_key\_get\_as\_xml): Remove prototype.  
\* context.h (struct gpgme\_context\_s): Remove members tmp\_key,  
tmp\_uid, key\_cond and key\_queue.  
(struct key\_queue\_item\_s): Remove structure.  
(struct user\_id\_s): Remove structure.  
(struct gpgme\_recipients\_s): Replace with simple  
GpgmeUserID list.  
\* gpgme.c (gpgme\_release): Do not release CTX->tmp\_key.  
\* ops.h (\_gpgme\_key\_add\_subkey, \_gpgme\_key\_append\_name,  
\_gpgme\_key\_add\_sig, \_gpgme\_trust\_item\_new): New prototypes.  
\* runpg.c (command\_cb): Return GpgmeError instead int.  
New variable ERR. Use it to hold return value of cmd handler.  
(gpg\_delete): Access fingerprint of key directly.  
(append\_args\_from\_signers): Likewise.  
(gpg\_edit): Likewise.  
(append\_args\_from\_recipients): Use GpgmeUserID for recipient list.  
\* engine-gpgsm.c: Do not include "key.h".  
(gpgsm\_delete): Access fingerprint of key  
directly.  
(gpgsm\_sign): Likewise.  
(set\_recipients): Use GpgmeUserID for recipients. Invert invalid  
user ID flag.  
\* key.h: File removed.  
\* key.c: Completely reworked to use exposed GpgmeKey data types.  
\* keylist.c: Likewise.  
\* recipient.c: Completely reworked to use GpgmeUserID.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_get\_key): Remove force\_update argument.  
\* key-cache.c: File removed.  
\* Makefile.am (libgpgme\_la\_SOURCES): Remove key-cache.c.  
\* ops.h (\_gpgme\_key\_cache\_add, \_gpgme\_key\_cache\_get): Remove  
prototypes.  
\* keylist.c (\_gpgme\_op\_keylist\_event\_cb): Don't call  
\_gpgme\_key\_cache\_add.  
(gpgme\_get\_key): New function.  
\* verify.c (gpgme\_get\_sig\_key): Remove last argument to  
gpgme\_get\_key invocation.  
  
\* gpgme.h (struct \_gpgme\_trust\_item): New structure.  
(GpgmeTrustItem): New type.  
(gpgme\_trust\_item\_ref, gpgme\_trust\_item\_unref): New prototypes.

\* context.h (struct trust\_queue\_item\_s): Remove structure.  
(struct gpgme\_context\_s): Remove trust\_queue member.  
\* Makefile.am (libgpgme\_la\_SOURCES): Add trust-item.c.  
\* trust-item.c: New file.  
\* trustlist.c: Do not include <stdio.h> or <time.h>, but "gpgme.h".  
(struct trust\_queue\_item\_s): Change to new type op\_data\_t.  
(trust\_status\_handler): Change first argument to void \*.  
(trust\_colon\_handler): Likewise.  
(\_gpgme\_op\_trustlist\_event\_cb): Use op\_data\_t type.  
(gpgme\_op\_trustlist\_start): Use op\_data\_t and rework error handling.  
(gpgme\_op\_trustlist\_next): Use op\_data\_t.  
(gpgme\_trust\_item\_release): Remove function.  
(gpgme\_trust\_item\_get\_string\_attr): Likewise.  
(gpgme\_trust\_item\_get\_int\_attr): Likewise.

\* verify.c (calc\_sig\_summary): Do not set GPGME\_SIGSUM\_SYS\_ERROR for bad signatures.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

\* context.h: Remove OPDATA\_VERIFY\_COLLECTING.  
(struct gpgme\_context\_s): Remove member notation.  
\* gpgme.h: Make enum for GPGME\_KEYLIST\_MODE\_\* values.

\* gpgme.h (struct \_gpgme\_sig\_notation): New structure.  
(GpgmeSigNotation): New type.  
(struct \_gpgme\_signature): New structure.  
(GpgmeSignature): New type.  
(struct \_gpgme\_op\_verify\_result): New structure.  
(GpgmeVerifyResult): New type.  
(gpgme\_op\_verify\_result): New prototype.  
(gpgme\_get\_notation): Remove prototype.  
\* ops.h (\_gpgme\_op\_verify\_init\_result): New prototype.  
(\_gpgme\_verify\_status\_handler): Change first argument to void \*.  
\* util.h (\_gpgme\_decode\_percent\_string, \_gpgme\_map\_gnupg\_error):  
New prototypes.  
\* conversion.c (\_gpgme\_decode\_percent\_string): New function.  
(gnupg\_errors): New static global.  
(\_gpgme\_map\_gnupg\_error): New function.  
\* gpgme.c (gpgme\_release): Don't release CTX->notation.  
(gpgme\_get\_notation): Remove function.  
\* decrypt-verify.c (\_gpgme\_op\_decrypt\_verify\_start): Call  
\_gpgme\_op\_verify\_init\_result.  
\* verify.c: Do not include <stdio.h>, <assert.h> and "key.h", but

do include "gpgme.h".  
(struct verify\_result): Replace with ...  
(op\_data\_t): ... this type.  
(release\_verify\_result): Remove function.  
(release\_op\_data):  
New function.  
(is\_token): Remove function.  
(skip\_token): Remove function.  
(copy\_token): Remove function.  
(gpgme\_op\_verify\_result): New function.  
(calc\_sig\_summary): Rewritten.  
(finish\_sig): Remove function.  
(parse\_new\_sig): New function.  
(parse\_valid\_sig): New function.  
(parse\_notation): New function.  
(parse\_trust): New function.  
(parse\_error): New function.  
(\_gpgme\_verify\_status\_handler): Rewritten. Change first argument to void \*.  
(\_gpgme\_op\_verify\_start): Rework error handling. Call \_gpgme\_op\_verify\_init\_result.  
(gpgme\_op\_verify): Do not release or clear CTX->notation.  
(gpgme\_get\_sig\_status): Rewritten.  
(gpgme\_get\_sig\_string\_attr): Likewise.  
(gpgme\_get\_sig\_ulong\_attr): Likewise.  
(gpgme\_get\_sig\_key): Likewise.

\* gpgme.h (struct \_gpgme\_op\_decrypt\_result): New structure.  
(GpgmeDecryptResult): New type.  
(gpgme\_op\_decrypt\_result): New prototype.  
\* ops.h (\_gpgme\_op\_decrypt\_init\_result): New prototype.  
(\_gpgme\_decrypt\_status\_handler): Fix prototype.  
(\_gpgme\_decrypt\_start):  
Remove prototype.  
\* decrypt-verify.c: Do not include <stdio.h>, <stdlib.h>, <string.h> and <assert.h>, "util.h" and "context.h", but "gpgme.h".  
(decrypt\_verify\_status\_handler): Change first argument to void \*, and rework error handling.  
(\_gpgme\_op\_decrypt\_verify\_start): New function.  
(gpgme\_op\_decrypt\_verify\_start): Rewrite using \_gpgme\_op\_decrypt\_verify\_start.  
(gpgme\_op\_decrypt\_verify): Likewise.  
\* decrypt.c: Include <string.h>, "gpgme.h" and "util.h".  
(struct decrypt\_result): Change to typedef op\_data\_t, rewritten.  
(is\_token): Remove function.  
(release\_op\_data): New function.  
(skip\_token): Remove function.

(gpgme\_op\_decrypt\_result): New function.  
(\_gpgme\_decrypt\_status\_handler): Change first argument to void \*.  
Rework error handling.  
(\_gpgme\_decrypt\_start): Rename to ...  
(decrypt\_start): ... this. Call \_gpgme\_op\_decrypt\_init\_result.  
(\_gpgme\_op\_decrypt\_init\_result): New function.  
(gpgme\_op\_decrypt\_start): Use decrypt\_start.  
(gpgme\_op\_decrypt): Likewise.

2003-04-27

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\* encrypt-sign.c: Do not include <stddef.h>, <stdio.h>, <stdlib.h>, <string.h>, <assert.h> and "util.h", but "gpgme.h".  
(\_gpgme\_op\_encrypt\_sign\_start): Rename to ...  
(encrypt\_sign\_start): ... this.  
(gpgme\_op\_encrypt\_sign\_start): Use encrypt\_sign\_start, not \_gpgme\_op\_encrypt\_sign\_start.  
(gpgme\_op\_encrypt\_sign): Likewise.

\* gpgme.h (GpgmeEncryptResult): New data type.  
(gpgme\_op\_encrypt\_result): New prototype.  
\* ops.h (\_gpgme\_op\_encrypt\_init\_result): New prototype.  
(\_gpgme\_op\_encrypt\_status\_handler): Fix prototype.  
\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Call \_gpgme\_op\_encrypt\_init\_result.  
\* encrypt.c: Do not include <stdio.h>, <assert.h>, "util.h" and "wait.h". Include <errno.h> and "gpgme.h".  
(SKIP\_TOKEN\_OR\_RETURN): Remove macro.  
(struct encrypt\_result): Rename to ...  
(op\_data\_t): ... new data type. Rewrite for user result data.  
(append\_xml\_encinfo): Remove function.  
(release\_op\_data): New function.  
(gpgme\_op\_encrypt\_result):  
New function.  
(\_gpgme\_op\_encrypt\_status\_handler): Change first argument to void \*.  
Rewrite result parsing.  
(\_gpgme\_op\_encrypt\_sym\_status\_handler): Change first argument to void \*.  
(\_gpgme\_op\_encrypt\_init\_result): New function.  
(\_gpgme\_op\_encrypt\_start): Rename to ...  
(encrypt\_start): ... this.  
(gpgme\_op\_encrypt\_start): Use encrypt\_start, not gpgme\_op\_encrypt\_start.  
(gpgme\_op\_encrypt): Likewise.

\* gpgme.h (GpgmePubKeyAlgo, GpgmeHashAlgo, GpgmeInvalidUserID, GpgmeNewSignature, GpgmeSignResult): New data types.

(gpgme\_op\_sign\_result, gpgme\_pubkey\_algo\_name, gpgme\_hash\_algo\_name): New prototypes.  
\* gpgme.c (gpgme\_pubkey\_algo\_name): New function.  
(gpgme\_hash\_algo\_name): Likewise.  
\* ops.h (\_gpgme\_parse\_inv\_userid, \_gpgme\_op\_sign\_init\_result): New prototype.  
(\_gpgme\_op\_sign\_status\_handler): Fix prototype.  
\* op-support.c: Include <errno.h> and <string.h>.  
(\_gpgme\_parse\_inv\_userid): New function.  
\* sign.c: Include <errno.h> and "gpgme.h", but not <stdio.h>, <assert.h> and "util.h".  
(SKIP\_TOKEN\_OR\_RETURN): Remove macro.  
(struct sign\_result): Change to op\_data\_t type and rework it.  
(release\_sign\_result): Rename to ...  
(release\_op\_data): ... this and rewrite it.  
(append\_xml\_info): Remove function.  
(gpgme\_op\_sign\_result): New function.  
(parse\_sig\_created): New function.  
(\_gpgme\_sign\_status\_handler): Change first argument to void \*. Rewrite the function to use the new result structure and functions.  
(\_gpgme\_op\_sign\_init\_result): New function.  
(\_gpgme\_op\_sign\_start): Rename to ...  
(sign\_start): ... this. Call \_gpgme\_op\_sign\_init\_result.  
(gpgme\_op\_sign\_start): Use sign\_start instead \_gpgme\_op\_sign\_start.  
(gpgme\_op\_sign): Likewise.  
\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Call \_gpgme\_op\_sign\_init\_result.  
  
\* delete.c: Include <errno.h> and "gpgme.h", but not "util.h" or "key.h".  
(enum delete\_problem): Move into function delete\_status\_handler.  
(delete\_status\_handler): Change first argument to void \*. Parse delete problem with strtol instead atoi. Return better error values.  
(\_gpgme\_op\_delete\_start): Rename to ...  
(delete\_start): ... this. Rework error handling.  
(gpgme\_op\_delete\_start): Use delete\_start instead \_gpgme\_op\_delete\_start.  
(gpgme\_op\_delete): Likewise.  
\* gpgme.h (GpgmeDataType): Removed.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Change GPGME\_IMPORT\_PRIVATE to GPGME\_IMPORT\_SECRET.  
\* import.c (parse\_import\_res): Parse unchanged field.



\* gpgme.h: New enum for GPGME\_IMPORT\_NEW, GPGME\_IMPORT\_UID, GPGME\_IMPORT\_SIG, GPGME\_IMPORT\_SUBKEY, GPGME\_IMPORT\_PRIVATE. (GpgmeError): GPGME\_Unknown\_Reason, GPGME\_Not\_Found, GPGME\_Ambiguous\_Specification, GPGME\_Wrong\_Key\_Usage, GPGME\_Key\_Revoked, GPGME\_Key\_Expired, GPGME\_No\_CRL\_Known, GPGME\_CRL\_Too\_Old, GPGME\_Policy\_Mismatch, GPGME\_No\_Secret\_Key, GPGME\_Key\_Not\_Trusted, GPGME\_Issuer\_Missing, GPGME\_Chain\_Too\_Long, GPGME\_Unsupported\_Algorithm, GPGME\_Sig\_Expired, GPGME\_Bad\_Signature, GPGME\_No\_Public\_Key added as new error codes.

(struct \_gpgme\_import\_status): New structure.

(GpgmeImportStatus): New type.

(struct \_gpgme\_op\_import\_result): New structure.

(GpgmeImportResult): New type.

(gpgme\_op\_import\_result): New function.

\* import.c: Include <errno.h> and "gpgme.h", but not "util.h".

(struct import\_result): Change to type op\_data\_t.

(release\_import\_result): Rename to ...

(release\_op\_data): ... this.

(append\_xml\_impinfo): Function removed.

(gpgme\_op\_import\_result): New function.

(parse\_import): New function.

(parse\_import\_res): Likewise.

(import\_status\_handler): Change first argument to void \*. Rewrite to use new functions.

(\_gpgme\_op\_import\_start): Rework error handling.

\* edit.c: Do not include <assert.h>, "util.h", but "gpgme.h".

(edit\_resut): Change to typedef for op\_data\_t.

(edit\_status\_handler): Change first argument to void \*.

Rework error handling.

(command\_handler): Rework error handling.

(\_gpgme\_op\_edit\_start): Rename to ...

(edit\_start): ... this. Rework

error handling.

(gpgme\_op\_edit\_start): Rewrite using edit\_start.

(gpgme\_op\_edit): Likewise.

\* ops.h (\_gpgme\_passphrase\_start): Remove prototype.

\* passphrase.c: Do not include <assert.h>, "util.h" or "debug.h", but "gpgme.h".

(struct passphrase\_result): Change to typedef for op\_data\_t.

(release\_passphrase\_result): Rename to release\_op\_data.

(\_gpgme\_passphrase\_status\_handler): Change first argument to void \*.

Use new op\_data\_t type.

(\_gpgme\_passphrase\_command\_handler): Use new op\_data\_t type.

(\_gpgme\_passphrase\_start): Remove function.

\* decrypt.c (\_gpgme\_decrypt\_start): Rewrite error handling. Do

not call `_gpgme_passphrase_start`, but install command handler.

- \* `encrypt.c` (`_gpgme_op_encrypt_start`): Likewise.
- \* `encrypt-sign.c` (`_gpgme_op_encrypt_sign_start`): Likewise.
- \* `sign.c` (`_gpgme_op_sign_start`): Likewise.

\* `context.h` (struct `gpgme_context_s`): Remove member `initialized`, `use_cms` and `help_data_1`. Add member `protocol`. Make `use_armor` and `use_textmode` bit flags.

Make `keylist_mode`, `include_certs`, `signers_len` and `signers_size` unsigned.

- \* `gpgme.c` (`gpgme_new`): Initialize `CTX->protocol`.
- (`gpgme_set_protocol`): Do not check `CTX`. Use `CTX->protocol`.
- (`gpgme_get_protocol`): Likewise.
- (`gpgme_release`): Do not release `CTX->help_data_1`.
- \* `op-support.c` (`_gpgme_op_reset`): Use `CTX->protocol`.

\* `wait-private.c` (`_gpgme_wait_private_event_cb`): Remove variable `CTX`.

\* `data.c`: Do not include `<assert.h>`, but `"gpgme.h"`.

- (`_gpgme_data_inbound_handler`): Expand `_gpgme_data_append`, because it will go. Do not assert `DH`.
- (`_gpgme_data_outbound_handler`): Do not assert `DH`.

\* `export.c`: Do not include `<stdlib.h>`, `"debug.h"` and `"util.h"`, but `"gpgme.h"`.

- (`export_status_handler`): Change type of first argument to `void *`.
- (`_gpgme_op_export_start`): Rename to ...
- (`export_start`): ... this. Rework error handling.
- (`gpgme_op_export_start`): Rewritten to use `export_start` instead `_gpgme_op_export_start`.
- (`gpgme_op_export`): Likewise.

\* `gpgme.h` (`GpgmeError`): Add `GPGME_Busy`, `GPGME_No_Request`.

(`GPGME_No_Recipients`, `GPGME_Invalid_Recipient`, `GPGME_No_Passphrase`): New macros.

\* `key.c` (`gpgme_key_get_string_attr`): Fix validity attribute.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

- \* `gpgme.h` (struct `_gpgme_op_genkey_result`): New structure.
- (`GpgmeGenKeyResult`): New type.
- (`gpgme_op_genkey`): Drop last argument.
- (`gpgme_op_genkey_result`): New function.
- \* `genkey.c`: Do not include `"util.h"`, but `"gpgme.h"`.
- (struct `genkey_result`): Replace with ...
- (`op_data_t`): ... this new type.

(release\_genkey\_result): Replace with ...

(release\_op\_data): ... this new function.

(gpgme\_op\_genkey\_result): New function.

(genkey\_status\_handler): Rewritten using new op\_data\_t type.

(get\_key\_parameter): New function.

(\_gpgme\_op\_genkey\_start): Renamed to

(genkey\_start): ... this and rewritten.

(gpgme\_op\_genkey\_start): Use genkey\_start instead  
\_gpgme\_op\_genkey\_start.

(gpgme\_op\_genkey): Rewritten. Remove FPR argument.

\* context.h (struct gpgme\_context\_s): Remove member  
verbosity.

\* gpgme.c (gpgme\_new): Do not set member verbosity.

\* engine.h (\_gpgme\_engine\_set\_verbosity): Remove prototype.

\* engine.c (\_gpgme\_engine\_set\_verbosity): Remove function.

\* engine-backend.h (struct engine\_ops): Remove set\_verbosity.

\* engine-gpgsm.c (\_gpgme\_engine\_ops\_gpgsm): Remove set\_verbosity member.

\* runpg.c (\_gpgme\_engine\_ops\_pg): Likewise.

(gpg\_set\_verbosity): Remove function.

\* decrypt.c (\_gpgme\_decrypt\_start): Don't call  
\_gpgme\_engine\_set\_verbosity.

\* delete.c (\_gpgme\_op\_delete\_start): Likewise.

\* edit.c (\_gpgme\_op\_edit\_start): Likewise.

\* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.

\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.

\* export.c (\_gpgme\_op\_export\_start): Likewise.

\* genkey.c (\_gpgme\_op\_genkey\_start): Likewise.

\* import.c (\_gpgme\_op\_import\_start): Likewise.

\* keylist.c (gpgme\_op\_keylist\_start): Likewise.

(gpgme\_op\_keylist\_ext\_start): Likewise.

\* sign.c (\_gpgme\_op\_sign\_start): Likewise.

\* verify.c (\_gpgme\_op\_verify\_start):  
Likewise.

\* Makefile.am (libgpgme\_la\_SOURCES): Add key-cache.c.

\* key.c (key\_cache\_initialized, key\_cache\_size,  
key\_cache\_max\_chain\_length, ): Removed.

(struct key\_cache\_item\_s, key\_cache\_lock, key\_cache,  
key\_cache\_unused\_items, hash\_key, \_gpgme\_key\_cache\_add,  
\_gpgme\_key\_cache\_get, gpgme\_get\_key): Moved to ...

\* key-cache.c: ... here. New file.

\* key.h (\_gpgme\_key\_cache\_init): Remove prototypes.

(\_gpgme\_key\_cache\_add, \_gpgme\_key\_cache\_get): Move to ...

\* ops.h: ... here.

\* version.c: Do not include "key.h".

(do\_subsystem\_inits): Do not call \_gpgme\_key\_cache\_init.

- \* mkstatus: Strip trailing comma.
- \* gpgme.h (GpgmeStatus): Pretty print.
  
- \* gpgme.h (GpgmeError): Rename GPGME\_No\_Passphrase to GPGME\_Bad\_Passphrase.
- \* passphrase.c (\_gpgme\_passphrase\_status\_handler): Use GPGME\_Bad\_Passphrase instead GPGME\_No\_Passphrase.
  
- \* gpgme.h (GpgmeError): Rename GPGME\_No\_Recipients to GPGME\_No\_UserID and GPGME\_Invalid\_Recipient to GPGME\_Invalid\_UserID.
- \* encrypt.c (\_gpgme\_encrypt\_status\_handler): Use GPGME\_No\_UserID instead GPGME\_No\_Recipients and GPGME\_Invalid\_UserID instead GPGME\_Invalid\_Recipient.
- (\_gpgme\_op\_encrypt\_start): Likewise.
  
- \* gpgme.h (GpgmeError): Remove GPGME\_Busy and GPGME\_No\_Request.
- \* wait-user.c (\_gpgme\_wait\_user\_event\_cb): Don't clear CTX->pending.
- \* wait-private.c (\_gpgme\_wait\_private\_event\_cb): Likewise.
- \* wait-global.c (gpgme\_wait): Likewise.
- \* verify.c (\_gpgme\_op\_verify\_start): Likewise.
- (gpgme\_get\_sig\_status): Don't check pending flag.
- (gpgme\_get\_sig\_string\_attr): Likewise.
- (gpgme\_get\_sig\_ulong\_attr): Likewise.
- (gpgme\_get\_sig\_key): Likewise.
- \* op-support.c (\_gpgme\_op\_reset): Likewise.
- \* trustlist.c (gpgme\_op\_trustlist\_start): Don't clear pending flag.
- (gpgme\_op\_trustlist\_next): Don't check or clear pending flag.
- (gpgme\_op\_trustlist\_end): Likewise.
- \* sign.c (\_gpgme\_op\_sign\_start): Likewise.
- \* context.h (struct gpgme\_context\_s): Remove member PENDING.
- \* decrypt.c (\_gpgme\_decrypt\_start): Likewise.
- \* delete.c (\_gpgme\_op\_delete\_start): Likewise.
- \* edit.c (\_gpgme\_op\_edit\_start): Likewise.
- \* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.
- \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* export.c (\_gpgme\_op\_export\_start): Likewise.
- \* genkey.c (\_gpgme\_op\_genkey\_start): Likewise.
- \* import.c (\_gpgme\_op\_import\_start): Likewise.
- \* key.c (gpgme\_get\_key): Likewise.
- \* keylist.c (gpgme\_op\_keylist\_start): Likewise.
- (gpgme\_op\_keylist\_ext\_start): Likewise.
- (gpgme\_op\_keylist\_next): Likewise.
- (gpgme\_op\_keylist\_end): Likewise.
- \* data-compat.c (gpgme\_error\_to\_errno): Don't convert EBUSY.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (GpgmePassphraseCb): Change type to return GpgmeError, and add argument for returning the result string.
- (gpgme\_cancel): Remove prototype.
- \* gpgme.c (gpgme\_cancel): Remove function.
- \* context.h (struct gpgme\_context\_s): Remove member cancel.
- \* passphrase.c (\_gpgme\_passphrase\_command\_handler): Call the passphrase callback in the new way.

2003-01-30

Marcus Brinkmann <marcus@g10code.de>

- \* edit.c (\_gpgme\_edit\_status\_handler): Call the progress status handler.

2003-02-05 Marcus Brinkmann <marcus@g10code.de>

- \* wait-user.c (\_gpgme\_wait\_user\_remove\_io\_cb): Move check for no I/O handlers left to ...
- (\_gpgme\_user\_io\_cb\_handler): ... here.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

- \* trustlist.c (trustlist\_colon\_handler): Release ITEM if name could not be allocated.
- (gpgme\_trust\_item\_release): Only release name if it is allocated.
- Reported by Marc Mutz <Marc.Mutz@uni-bielefeld.de>.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

- \* runpgg.c (read\_status): If the status handler returns an error, return it.
- (status\_handler): If read\_status fails, just return the error.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c (start): Handle all errors, not only most of them.
- (xtoi\_1, xtoi\_2): Remove macro.
- (status\_handler): Replace use of xtoi\_2 with \_gpgme\_hextobyte.

2003-02-01 Marcus

Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c (map\_assuan\_error): Replace ASSUAN\_Bad\_Certificate\_Path with ASSUAN\_Bad\_Certificate\_Chain.
- (gpgsm\_new): Use assuan\_pipe\_connect instead assuan\_pipe\_connect2.

\* util.h (DIMof): Remove macro.

\* ops.h (\_gpgme\_op\_event\_cb, \_gpgme\_op\_event\_cb\_user, \_gpgme\_data\_unread): Prototypes removed.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

\* types.h: File removed.

\* Makefile.am (libgpgme\_la\_SOURCES): Remove types.h.

\* io.h (struct spawn\_fd\_item\_s): Do not include "types.h".

\* key.h: Likewise.

\* context.h: Likewise.

\* engine-gpgsm.h: Likewise.

\* engine.h: Include "gpgme.h" instead "types.h". Add prototypes for EngineStatusHandler, EngineColonLineHandler and EngineCommandHandler.

(\_gpgme\_engine\_set\_status\_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.

(\_gpgme\_engine\_set\_command\_handler): Change parameter type from GpgmeCommandHandler to EngineCommandHandler.

(\_gpgme\_engine\_set\_colon\_line\_handler):

Change parameter type from

GpgmeColonLineHandler to EngineColonLineHandler.

\* engine-backend.h: Include "engine.h" instead "types.h".

(struct engine\_ops): Change Gpgme\*Handler parameters in members set\_command\_handler, set\_colon\_line\_handler and set\_status\_handler to Engine\*Handler.

\* engine.c (\_gpgme\_engine\_set\_status\_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.

(\_gpgme\_engine\_set\_command\_handler): Change parameter type from GpgmeCommandHandler to EngineCommandHandler.

(\_gpgme\_engine\_set\_colon\_line\_handler): Change parameter type from GpgmeColonLineHandler to EngineColonLineHandler.

\* runpg.c (struct gpg\_object\_s): Change type of member status.fnc from GpgmeStatusHandler to EngineStatusHandler. Change type of member colon.fnc from GpgmeColonLineHandler to EngineColonLineHandler. Change type of member cmd.fnc from GpgmeCommandHandler to EngineCommandHandler.

\* engine-gpgsm.c (struct gpgsm\_object\_s): Likewise.

\* runpg.c

(gpg\_set\_status\_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.

\* engine-gpgsm.c (gpgsm\_set\_status\_handler): Likewise.

(assuan\_simple\_command): Likewise.

\* runpg.c (gpg\_set\_colon\_line\_handler): Change parameter type from GpgmeColonLineHandler to EngineColonLineHandler.

\* engine-gpgsm.c (gpgsm\_set\_colon\_line\_handler): Likewise.

\* `runpgg.c` (`gpg_set_command_handler`): Change parameter type from `GpgmeCommandHandler` to `EngineCommandHandler`.

\* `engine-gpgsm.c` (`status_handler`): Do not close status fd at end of function.

\* `ops.h` (`_gpgme_op_data_lookup`): Add prototype.

\* `op-support.c`: Include `<stdlib.h>`.

(`_gpgme_op_data_lookup`): New function.

\* `decrypt.c` (`_gpgme_release_decrypt_result`): Function removed.

(`struct decrypt_result_s`): Rename to ...

(`struct decrypt_resul`): ... this.

(`DecryptResult`): New type.

(`_gpgme_decrypt_status_handler`): Don't use

`test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

\* `sign.c`

(`_gpgme_release_sign_result`): Function removed.

(`release_sign_result`): New function.

(`struct sign_result_s`): Rename to ...

(`struct sign_result`): ... this.

(`SignResult`): New type.

(`_gpgme_sign_status_handler`): Don't use

`test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

\* `encrypt.c` (`struct encrypt_result_s`): Rename to ...

(`struct encrypt_result`): ... this.

(`_gpgme_release_encrypt_result`): Function removed.

(`release_encrypt_result`): New function.

(`_gpgme_encrypt_status_handler`): Don't use

`test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

\* `verify.c` (`struct verify_result_s`): Rename to ...

(`struct verify_result`): ... this. Remove member `next`.

(`VerifyResult`): New type.

(`_gpgme_release_verify_result`): Function removed.

(`release_verify_result`): New function.

(`finish_sig`): Change first argument to type `VerifyResult`. Diddle the type of the `op_data` structure.

(`add_notation`): Change first argument to type `VerifyResult`.

(`_gpgme_verify_status_handler`): Don't use

`test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

\* `passphrase.c` (`struct passphrase_result_s`): Rename to ...

(`struct passphrase_result`): ... this. Remove member `next`.

(`PassphraseResult`): New type.

(`_gpgme_release_passphrase_result`): Function removed.

(release\_passphrase\_result): New function.  
(\_gpgme\_passphrase\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to retrieve result data object.  
(\_gpgme\_passphrase\_command\_handler): Likewise.  
\* keylist.c (struct keylist\_result\_s): Rename to ...  
(struct keylist\_result): ... this. Remove member next.  
(KeylistResult): New type.  
(\_gpgme\_release\_keylist\_result): Function removed.  
(release\_keylist\_result): New function.  
(keylist\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to retrieve result data object.  
\* edit.c (struct edit\_result\_s): Rename to ...  
(struct edit\_result): ... this. Remove member next.  
(EditResult): New type.  
(\_gpgme\_release\_edit\_result): Function removed.  
(release\_edit\_result): New function.  
(edit\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to retrieve result data object.  
(command\_handler): Likewise.  
\* types.h (DecryptResult, SignResult, EncryptResult, PassphraseResult, ImportResult, DeleteResult, GenKeyResult, KeylistResult, EditResult): Types removed.  
\* ops.h: Don't include "types.h", but "gpgme.h" and "context.h".  
(test\_and\_allocate\_result): Remove macro.  
(\_gpgme\_release\_decrypt\_result): Remove prototype.  
(\_gpgme\_decrypt\_result): Remove prototype.  
(\_gpgme\_release\_sign\_result): Remove prototype.  
(\_gpgme\_release\_encrypt\_result): Remove prototype.  
(\_gpgme\_release\_passphrase\_result): Remove prototype.  
(\_gpgme\_release\_import\_result): Remove prototype.  
(\_gpgme\_release\_delete\_result): Remove prototype.  
(\_gpgme\_release\_genkey\_result): Remove prototype.  
(\_gpgme\_release\_keylist\_result):  
Remove prototype.  
(\_gpgme\_release\_edit\_result): Remove prototype.  
(\_gpgme\_release\_verify\_result): Remove prototype.  
\* gpgme.c (\_gpgme\_release\_result): Rewritten.  
\* context.h (enum ctx\_op\_data\_type): New enum.  
(struct ctx\_op\_data): New structure.  
(struct gpgme\_context\_s): Replace the member result with a member op\_data.  
(fail\_on\_pending\_request): Remove macro.  
\* op-support.c (\_gpgme\_op\_reset): Expand macro fail\_on\_pending\_request.



\* util.h: Don't include "types.h" or "debug.h", but include "gpgme.h".

2003-01-19 Marcus Brinkmann <marcus@g10code.de>

\* `runpgg.c` (`_gpgme_engine_ops_gpg`): Remove `gpg_start`.

(`gpg_start`): Rename to ...

(`start`): ... this function. Change arguments to `GpgObject`.

(`gpg_decrypt`): Call `start`.

(`gpg_edit`): Likewise.

(`gpg_encrypt`): Likewise.

(`gpg_encrypt_sign`): Likewise.

(`gpg_export`): Likewise.

(`gpg_import`): Likewise.

(`gpg_keylist`): Likewise.

(`gpg_keylist_ext`): Likewise.

(`gpg_trustlist`): Likewise.

(`gpg_verify`): Likewise.

\*

`engine-gpgsm.c` (`_gpgme_engine_ops_encrypt`): Remove `gpgsm_start`.

(`gpgsm_start`): Rename to ...

(`struct gpgsm_object_s`): Remove member `command`.

(`gpgsm_release`): Don't free `command`.

(`start`): ... this function. Change arguments to `GpgsmObject` and `const char *`.

(`gpgsm_decrypt`): Call `start`.

(`gpgsm_delete`): Likewise.

(`gpgsm_encrypt`): Likewise.

(`gpgsm_export`): Likewise.

(`gpgsm_genkey`): Likewise.

(`gpgsm_import`): Likewise.

(`gpgsm_keylist`): Likewise.

(`gpgsm_keylist_ext`): Likewise.

(`gpgsm_verify`): Likewise.

\* `decrypt.c` (`_gpgme_decrypt_start`): Don't call

`_gpgme_engine_start`.

\* `delete.c` (`_gpgme_op_delete_start`): Likewise.

\* `edit.c` (`_gpgme_op_edit_start`): Likewise.

\* `encrypt.c` (`_gpgme_op_encrypt_start`):

\* `encrypt-sign.c` (`_gpgme_op_encrypt_sign_start`):

\* `export.c` (`_gpgme_op_export_start`): Likewise.

\* `genkey.c` (`_gpgme_op_genkey_start`): Likewise.

\* `import.c` (`_gpgme_op_import_start`): Likewise.

\* `keylist.c` (`gpgme_op_keylist_ext_start`): Likewise.

(`gpgme_op_keylist_start`):

Likewise.

\* `sign.c` (`_gpgme_op_sign_start`): Likewise.

- \* trustlist.c (gpgme\_op\_trustlist\_start): Likewise.
- \* verify.c (\_gpgme\_op\_verify\_start): Likewise.
  
- \* engine-backend.h (struct engine\_ops): Remove member start.
  
- \* engine.h (\_gpgme\_engine\_start): Remove prototype.
- \* engine.c (\_gpgme\_engine\_start): Remove function.

2003-01-19 Miguel Coca <mcoca@gnu.org>

- \* w32-io.c (\_gpgme\_io\_select): Add missing argument in calls to DEBUG\_BEGIN.
- \* w32-util.c: Include "sema.h".
- (find\_program\_in\_registry): Change DEBUG1 to DEBUG2, fixes compilation error.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

- \* types.h: Remove byte and ulong types.
- \* util.h (\_gpgme\_hextobyte): Change prototype to unsigned char instead byte.
- \* conversion.c (\_gpgme\_hextobyte): Change argument to unsigned char instead byte.
- (\_gpgme\_decode\_c\_string): Likewise, and beautify. Also support a few more escaped characters. Be more strict about buffer size.
- (\_gpgme\_data\_append\_percentstring\_for\_xml): Change type of SRC, BUF and DST to unsigned char instead byte.
- \* progress.c (\_gpgme\_progress\_status\_handler): Use unsigned char instead byte.
- \* debug.c (trim\_spaces): Likewise.
  
- \* util.h (mk\_error): Remove macro.
- \* conversion.c, data.c, data-compat.c, decrypt.c, delete.c, edit.c, encrypt.c, encrypt-sign.c, engine.c, engine-gpgsm.c, export.c, genkey.c, gpgme.c, import.c, key.c, keylist.c, passphrase.c, progress.c, recipient.c, runpgg.c, sign.c, signers.c, trustlist.c, verify.c, wait.c, wait-global.c, wait-private (literally everywhere): Expand the mk\_error macro.
  
- \* context.h (wait\_on\_request\_or\_fail): Remove macro.
  
- \* context.h (gpgme\_context\_s): Remove member ERROR.
- \* types.h (GpgmeStatusHandler): Change return type to GpgmeError.
- (GpgmeCommandHandler): Change return type to GpgmeError and add new argument RESULT.
- \* gpgme.h (GpgmeIOCb): Change return type to GpgmeError.
- (GpgmeEventIO): New event GPGME\_EVENT\_START.

(GpgmeIdleFunc): Remove type.

(gpgme\_register\_idle): Remove prototype.

\* data.c: Include <assert.h>.

(\_gpgme\_data\_inbound\_handler): Change return type to GpgmeError. Return any error instead ignoring it, don't close file descriptor on error.

(\_gpgme\_data\_outbound\_handler): Likewise.

\* decrypt.c: Do not include <stdio.h>, <string.h> and <assert.h>.

(\_gpgme\_decrypt\_status\_handler): Change return type to GpgmeError. Return error instead setting ctx->error. Return success at end of function.

(gpgme\_op\_decrypt): Don't work around the old kludge anymore.

\* decrypt-verify.c (decrypt\_verify\_status\_handler): Change return type to GpgmeError. Return possible errors.

\* delete.c: Do not include <stdio.h>, <string.h>, <time.h> and <assert.h>.

(delete\_status\_handler): Change return type to GpgmeError. Return error instead setting ctx->error. Return success at end of function.

\* edit.c: Do not include <stdio.h> and <string.h>.

(\_gpgme\_edit\_status\_handler): Change type to GpgmeError, make static and rename to ...

(edit\_status\_handler):  
... this. Return error directly.

(command\_handler): Change return type to GpgmeError, add result argument. Return error directly.

\* encrypt.c (status\_handler\_finish): Remove function.

(\_gpgme\_encrypt\_status\_handler): Change return type to GpgmeError. Return error directly.

(\_gpgme\_encrypt\_sym\_status\_handler): Likewise.

\* encrypt-sign.c (encrypt\_sign\_status\_handler): Likewise.

\* engine-gpgsm.c (close\_notify\_handler): Do not signal done event anymore.

(status\_handler): Change return type to GpgmeError. Diddle things around a bit to return errors directly.

(start): Send start event.

\* export.c: Do not include <stdio.h>, <string.h> and <assert.h>.

(export\_status\_handler): Change return type to GpgmeError. Don't check ctx->error.

\* genkey.c: Do not include <stdio.h> and <assert.h>.

(genkey\_status\_handler): Change return type to GpgmeError. Don't check ctx->error. Return errors directly.

\* gpgme.c (\_gpgme\_release\_result): Do not initialize ctx->error.

(\_gpgme\_op\_event\_cb):  
Function removed.

(\_gpgme\_op\_event\_cb\_user): Likewise.

\* import.c: Do not include <stdio.h>, <string.h> and <assert.h>.

(import\_status\_handler): Change return type to GpgmeError. Don't check ctx->error.

\* keylist.c (keylist\_colon\_handler, keylist\_status\_handler, finish\_key): Change return type to GpgmeError, return error directly.

\* Makefile (libgpgme\_la\_SOURCES): Add wait-global.c, wait-private.c and wait-user.c

\* ops.h (test\_and\_allocate\_result): Return error instead setting ctx->error.

(\_gpgme\_data\_inbound\_handler, \_gpgme\_data\_outbound\_handler, \_gpgme\_verify\_status\_handler, \_gpgme\_decrypt\_status\_handler, \_gpgme\_sign\_status\_handler, \_gpgme\_encrypt\_status\_handler, \_gpgme\_passphrase\_status\_handler, \_gpgme\_progress\_status\_handler): Change return type to GpgmeError.

(\_gpgme\_passphrase\_command\_handler): Change return type to GpgmeError and add new argument RESULT.

\* op-support.c: Use new callback functions, and change private data to ctx everywhere.

\* passphrase.c

(\_gpgme\_passphrase\_status\_handler): Change return type to GpgmeError, return error directly.

(\_gpgme\_passphrase\_command\_handler): Change return type to GpgmeError, add result argument. Return results accordingly.

\* progress.c (\_gpgme\_progress\_status\_handler): Change return type to GpgmeError, return errors directly.

\* runpgg.c (status\_handler): Change return type to GpgmeError. Return error directly.

(close\_notify\_handler): Don't send done event.

(colon\_line\_handler): Change return type to GpgmeError, return errors directly.

\* runpgg.c (start): Send start event.

\* sign.c (\_gpgme\_sign\_status\_handler): Change return type to GpgmeError, return errors directly.

\* trustlist.c (trustlist\_status\_handler): Change return type to GpgmeError. Return 0.

(trustlist\_colon\_handler): Change return type GpgmeError. Return errors directly.

\* verify.c (add\_notation): Change return type to GpgmeError, return errors directly.

(\_gpgme\_verify\_status\_handler): Likewise.

\* wait.h

(struct fd\_table): Remove lock member.

(struct wait\_item\_s): Moved here from wait.c.

(struct tag): New structure.

(\_gpgme\_wait\_event\_cb): Remove prototype.

(\_gpgme\_wait\_private\_event\_cb, \_gpgme\_wait\_global\_event\_cb, \_gpgme\_wait\_user\_add\_io\_cb, \_gpgme\_wait\_user\_remove\_io\_cb, \_gpgme\_wait\_user\_event\_io\_cb): New prototypes.

\* wait.c: Don't include <stdio.h>.

(ftd\_global, ctx\_done\_list, ctx\_done\_list\_size, ctx\_done\_list\_length, ctx\_done\_list\_lock, idle\_function): Remove global variable.

(gpgme\_register\_idle, do\_select, \_gpgme\_wait\_event\_cb): Remove function.

(gpgme\_wait): Move to file wait-global.c.

(\_gpgme\_add\_io\_cb): Take ctx as private argument, initialize ctx member in wait item and tag.

(\_gpgme\_remove\_io\_cb): Take ctx from tag. Don't use FDT lock.

(\_gpgme\_wait\_one, \_gpgme\_wait\_on\_condition): Move to wait-private.c.

(gpgme\_fd\_table\_init): Don't initialize FDT->lock.

(gpgme\_fd\_table\_deinit): Don't destroy FDT->lock.

(\_gpgme\_fd\_table\_put): Make static and rename to ...

(fd\_table\_put): ... this function. Don't use FDT->lock.

(struct wait\_item\_s): Move to wait.h.

\* wait-global.c: New file.

\* wait-private.c: New file.

\* wait-user.c: New file.

\* key.c (gpgme\_key\_sig\_get\_string\_attr): Use validity\_to\_string instead of trust\_to\_string to calculate validity.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

\* types.h (EngineObject): Move typedef to ...

\* engine.h: ... here.

\* types.h (GpgObject): Move typedef to ...

\* runpgg.c: ... here.

\* types.h (GpgsmObject): Move typedef to ...

\* engine-gpgsm.c: ... here.

\* util.h (return\_if\_fail, return\_null\_if\_fail, return\_val\_if\_fail): Remove macro.

\* gpgme.c (gpgme\_cancel): Don't use return\_if\_fail.

\* key.c (gpgme\_key\_ref): Likewise.

\* signers.c (gpgme\_signers\_enum): Likewise.

(gpgme\_signers\_clear): Likewise.

\* engine-backend.h (struct engine\_ops): Rename get\_path to get\_file\_name.

\* gpgme.h (struct \_gpgme\_engine\_info): Rename member path to file\_name.

\* version.c: Do not include <stdio.h>, <stdlib.h>, context.h and util.h. Other clean ups.

(parse\_version\_number): Protect more seriously against

overflow.

(gpgme\_get\_engine\_info): Move to ...

\* engine.c (gpgme\_get\_engine\_info): ... here.

(\_gpgme\_engine\_get\_info): Function removed.

(\_gpgme\_engine\_get\_path): Make static and rename to ...

(engine\_get\_file\_name): .. this.

(\_gpgme\_engine\_get\_version): Make static and rename to ...

(engine\_get\_version): ... this.

(\_gpgme\_engine\_get\_req\_version): Make static and rename to ...

(engine\_get\_req\_version): ... this.

\* engine.h (\_gpgme\_engine\_get\_path, \_gpgme\_engine\_get\_version, \_gpgme\_engine\_req\_version, \_gpgme\_engine\_get\_info.): Remove prototypes.

\* gpgme.h (enum GpgmeProtocol): Remove GPGME\_PROTOCOL\_AUTO.

\* gpgme.c (gpgme\_set\_protocol): Don't handle GPGME\_PROTOCOL\_AUTO.

(gpgme\_get\_protocol\_name): New function.

\* engine-backend.h (struct engine\_ops): New member

get\_req\_version, remove member check\_version.

\* engine.h (\_gpgme\_Engine\_get\_version): New prototype.

\*

rungpg.c (gpg\_get\_req\_version): New function.

(gpg\_check\_version): Function removed.

(\_gpgme\_engine\_ops\_gpg): Add gpg\_get\_req\_version, remove gpg\_check\_version.

\* engine-gpgsm.c (gpgsm\_get\_req\_version): New function.

(gpgsm\_check\_version): Function removed.

(\_gpgme\_engine\_ops\_gpgsm): Add gpgsm\_get\_req\_version, remove gpgsm\_check\_version.

\* engine.c: Include ops.h.

(\_gpgme\_engine\_get\_req\_version): New function.

(gpgme\_engine\_check\_version): Rewritten.

\* version.c (gpgme\_get\_engine\_info): Rewritten.

\* gpgme.h (gpgme\_engine\_info): New structure.

(GpgmeEngineInfo): New type.

2003-01-06 Werner Koch <wk@gnupg.org>

\* keylist.c (set\_mainkey\_capability): Handle 'd' and 'D' used since gpg 1.3 to denote disabled keys.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

\* data-mem.c: Include <string.h>.

\* engine.c: Likewise.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libpgpme\_la\_DEPENDENCIES): Correct bug in last change.

2002-12-24 Marcus

Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_op\_verify, gpgme\_op\_decrypt\_verify): Drop R\_STAT argument.

\* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Drop R\_STAT argument.

\* verify.c (gpgme\_op\_verify): Drop R\_STAT argument.

(\_gpgme\_intersect\_stati): Function removed.

\* ops.h (\_gpgme\_intersect\_stati): Remove prototype.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

\* libpgpme.vers: New file.

\* Makefile.am (EXTRA\_DIST): Add libpgpme.vers.

(libpgpme\_version\_script\_cmd): New variable.

(libpgpme\_la\_LDFLAGS): Add libpgpme\_version\_script\_cmd here.

(libpgpme\_la\_DEPENDENCIES): New variable.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* key.c (gpgme\_key\_get\_string\_attr): Don't accept GPGME\_ATTR\_IS\_SECRET.

(otrust\_to\_string): New function.

(gpgme\_key\_get\_as\_xml): Use it.

(validity\_to\_string): New function.

(gpgme\_key\_get\_string\_attr): Beautify using above functions.

(gpgme\_key\_get\_ulong\_attr): Likewise.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* data-mem.c

(mem\_release): Fix gcc warning.

\* data-user.c (user\_release): Likewise.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

\* data.h (gpgme\_data\_release\_cb): Change return type to void.

(gpgme\_data\_read\_cb): Change return type to ssize\_t.

\* data.c (gpgme\_data\_read): Likewise.

\* data-stream.c (stream\_read): Likewise.

\* data-fd.c (fd\_read): Likewise.

\* data-mem.c (mem\_read): Likewise.

(mem\_release): Change return type to void.

\* data-user.c (user\_read): Change return type to ssize\_t.

(user\_release): Change return type to void.

\* data-compat.c (old\_user\_read): Change return type to ssize\_t.  
\* gpgme.h (GpgmeDataReadCb): Likewise.  
(gpgme\_data\_read): Likewise.  
(GpgmeDataSeekCb): Change return type to off\_t.

2002-12-04 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add prototype for gpgme\_get\_key.  
\* key.c (gpgme\_get\_key): New function.  
\* verify.c (gpgme\_get\_sig\_key): Rewrite using gpgme\_get\_key.

\* gpgme.h: Add prototypes for new interfaces  
gpgme\_key\_sig\_get\_string\_attr  
and gpgme\_key\_get\_ulong\_attr.  
(enum GpgmeAttr): New attribute GPGME\_ATTR\_SIG\_CLASS.  
\* gpgme.c (gpgme\_set\_keylist\_mode): Allow GPGME\_KEYLIST\_MODE\_SIGS.  
\* key.h (struct certsig\_s): New members ALGO, NAME\_PART,  
EMAIL\_PART, COMMENT\_PART, NAME, SIG\_STAT and SIG\_CLASS.

\* conversion.c (\_gpgme\_decode\_c\_string): Add new parameter LEN.  
Use that to determine if allocation is desired or not.  
\* util.h: Adjust prototype of \_gpgme\_decode\_c\_string.  
\* keylist.c (keylist\_colon\_handler): Adjust caller of  
\_gpgme\_decode\_c\_string.

\* key.h (struct gpgme\_key\_s): New member last\_uid.  
\* key.c (\_gpgme\_key\_append\_name): Rewritten using  
\_gpgme\_decode\_c\_string and the last\_uid pointer.  
(my\_isdigit): Macro removed.  
(ALLOC\_CHUNK): Likewise.  
\* keylist.c (set\_userid\_flags): Use last\_uid member of KEY.

\* context.h (struct user\_id\_s): New member last\_certsig.  
\* key.h: Add prototype for \_gpgme\_key\_add\_certsig.  
\* key.c (\_gpgme\_key\_add\_certsig): New function.  
(set\_user\_id\_part): Move function  
before \_gpgme\_key\_add\_certsig.  
(parse\_user\_id): Change first argument to SRC, add new arguments  
NAME, EMAIL and COMMENT. Change code to use these arguments  
instead going through UID. Move function before  
\_gpgme\_add\_certsig.  
(parse\_x509\_user\_id): Likewise.  
(\_gpgme\_key\_append\_name): Adjust arguments to parse\_x509\_user\_id  
and parse\_user\_id invocation.  
(one\_certsig\_as\_xml): New function.  
(one\_uid\_as\_xml): Print signatures.  
\* context.h (struct gpgme\_context\_s): New member TMP\_UID.  
\* keylist.c (keylist\_colon\_handler): Rewritten, implement "sig"



record entries.

\* key.c (get\_certsig): New function.  
(gpgme\_key\_sig\_get\_string\_attr): Likewise.  
(gpgme\_key\_sig\_get\_ulong\_attr): Likewise.

\* keylist.c: Include <ctype.h>.  
(my\_isdigit): Macro removed.  
(set\_mainkey\_trust\_info): Use isdigit, not my\_isdigit.  
(set\_userid\_flags): Likewise.  
(set\_subkey\_trust\_info): Likewise.  
(set\_ownertrust): Likewise.  
(finish\_key): Move function up a bit and remove prototype.

\* runpgg.c (gpg\_keylist\_ext):  
Correct precedence of signature  
listing mode.  
(gpg\_keylist\_ext): Implement signature listing mode.

2002-11-25 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_spawn): Do not set parent fds to -1.  
\* posix-io.c (\_gpgme\_io\_spawn): Call \_gpgme\_io\_close instead close  
for parent fds.  
\* w32-io.c (\_gpgme\_io\_spawn): Call \_gpgme\_io\_close instead  
CloseHandle for parent fds.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h [\_MSC\_VER]: Define ssize\_t as long.

2002-11-22 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Save the result of a first  
setlocale before doing another setlocale.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

\* decrypt.c: Some beautification.  
  
\* verify.c (\_gpgme\_verify\_status\_handler): Treat  
GPGME\_STATUS\_UNEXPECTED like GPGME\_STATUS\_NODATA.  
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* genkey.c: Only include <config.h> if [HAVE\_CONFIG\_H].  
(struct

genkey\_result\_s): Add new member FPR.  
(\_gpgme\_release\_genkey\_result): Free RESULT->fpr if set.  
(genkey\_status\_handler): Extract the fingerprint from the status line.  
(gpgme\_op\_genkey): Add new argument FPR and return the fingerprint in it.  
\* gpgme.h: Adjust prototype of gpgme\_op\_genkey.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (gpg\_keylist): Add --with-fingerprint to gpg invocation twice, to get fingerprints on subkeys. Suggested by Timo Schulz <twoaday@freakmail.de>.  
(gpg\_keylist\_ext): Likewise.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

\* import.c (append\_xml\_impinfo): Use \_gpgme\_data\_append\_string\_for\_xml rather than \_gpgme\_data\_append\_string for the field content.  
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

\* runpg.h, engine-gpgsm.h: File removed.  
\* engine-backend.h: New file.  
\* Makefile.am (gpgsm\_components): New variable, set depending on automake conditional HAVE\_GPGSM.  
(libgpgme\_la\_SOURCES):  
Add engine-backend.h, remove runpg.h and engine-gpgsm.h. Replace engine-gpgsm.c with \${gpgsm\_components}.  
(status-table.h): Depend on gpgme.h, not runpg.h.  
\* conversion.c: Include <stdlib.h>.  
\* engine-gpgsm.c: Do not set ENABLE\_GPGSM here. Include "engine-backend.h" instead "engine-gpgsm.h". Reorder some functions and remove all function prototypes.  
(\_gpgme\_gpgsm\_get\_version): Make static and rename to ...  
(gpgsm\_get\_version): ... this.  
(\_gpgme\_gpgsm\_check\_version): Make static and rename to ...  
(gpgsm\_check\_version): ... this.  
(\_gpgme\_gpgsm\_new): Make static. Change argument type from GpgsmObject \* to void \*\*. Call gpgsm\_release instead \_gpgme\_gpgsm\_release.  
(\_gpgme\_gpgsm\_op\_decrypt): Make static and rename to ...  
(gpgsm\_check\_decrypt): ... this.  
(\_gpgme\_gpgsm\_op\_delete): Make static and rename to ...  
(gpgsm\_check\_delete): ... this.  
(\_gpgme\_gpgsm\_set\_recipients): Make static and rename to ...

(gpgsm\_check\_set\_recipients): ... this.

(\_gpgme\_gpgsm\_op\_encrypt):  
Make static and rename to ...

(gpgsm\_encrypt): ... this.

(\_gpgme\_gpgsm\_op\_export): Make static and rename to ...

(gpgsm\_export): ... this.

(\_gpgme\_gpgsm\_op\_genkey): Make static and rename to ...

(gpgsm\_genkey): ... this.

(\_gpgme\_gpgsm\_op\_import): Make static and rename to ...

(gpgsm\_import): ... this.

(\_gpgme\_gpgsm\_op\_keylist): Make static and rename to ...

(gpgsm\_keylist): ... this.

(\_gpgme\_gpgsm\_op\_keylist\_ext): Make static and rename to ...

(gpgsm\_keylist\_ext): ... this.

(\_gpgme\_gpgsm\_op\_sign): Make static and rename to ...

(gpgsm\_sign): ... this.

(\_gpgme\_gpgsm\_op\_trustlist): Make static and rename to ...

(gpgsm\_trustlist): ... this.

(\_gpgme\_gpgsm\_op\_verify): Make static and rename to ...

(gpgsm\_verify): ... this.

(gpgsm\_status\_handler): Rename to ...

(status\_handler): ... this.

(\_gpgme\_gpgsm\_set\_status\_handler): Make static and rename to ...

(gpgsm\_set\_status\_handler): ... this.

(\_gpgme\_gpgsm\_set\_colon\_line\_handler): Make static  
and rename to ...

(gpgsm\_set\_colon\_line\_handler): ... this.

(\_gpgme\_gpgsm\_add\_io\_cb): Rename to ...

(add\_io\_cb): ... this.

(\_gpgme\_gpgsm\_start): Make static and rename to ...

(gpgsm\_start): ... this.

(\_gpgme\_gpgsm\_set\_io\_cb): Make static and rename to ...

(gpgsm\_set\_io\_cb): ... this.

(\_gpgme\_gpgsm\_io\_event): Make static and rename to ...

(gpgsm\_io\_event): ... this.

(struct \_gpgme\_engine\_ops\_gpgsm): New variable.

[!ENABLE\_GPGSM]: Removed.

\* engine.c: Do not include <time.h>, <sys/types.h>, <string.h>, <assert.h>, "io.h", "runpg.h" and "engine-gpgsm.h". Include <stdlib.h> and "engine-backend.h".

(struct engine\_object\_s): Rewritten.

(engine\_ops): New variable.

\* engine.c (\_gpgme\_engine\_get\_path, \_gpgme\_engine\_get\_version, \_gpgme\_engine\_check\_version, \_gpgme\_engine\_new, \_gpgme\_engine\_release, \_gpgme\_engine\_set\_verbosity, \_gpgme\_engine\_set\_status\_handler, \_gpgme\_engine\_set\_command\_handler, \_gpgme\_engine\_set\_colon\_line\_handler, \_gpgme\_engine\_op\_decrypt,

\_gpgme\_engine\_op\_delete,  
 \_gpgme\_engine\_op\_edit,  
 \_gpgme\_engine\_op\_encrypt, \_gpgme\_engine\_op\_encrypt\_sign,  
 \_gpgme\_engine\_op\_export, \_gpgme\_engine\_op\_genkey,  
 \_gpgme\_engine\_op\_import, \_gpgme\_engine\_op\_keylist,  
 \_gpgme\_engine\_op\_keylist\_ext, \_gpgme\_engine\_op\_sign,  
 \_gpgme\_engine\_op\_trustlist, \_gpgme\_engine\_op\_verify,  
 \_gpgme\_engine\_start, \_gpgme\_engine\_set\_io\_cbs,  
 \_gpgme\_engine\_io\_event): Reimplement.  
 \* engine.h: Fix a few comments and a variable name in a prototype.  
 \* ops.h: Do not include "runggpg.h".  
 \* passphrase.c: Include config.h only if [HAVE\_CONFIG\_H]. Do not  
 include "runggpg.h".  
 \* recipient.c: Likewise.  
 \* signers.c: Likewise.  
 \* version.c: Likewise.  
 \* runngpg.c: Likewise. Include "engine-backend.h". Reorder  
 functions and remove prototypes.  
 (\_gpgme\_gpg\_get\_version): Make static and rename to ...  
 (gpg\_get\_version): ... this.  
 (\_gpgme\_gpg\_check\_version): Make static and rename to ...  
 (gpg\_check\_version): ... this.  
 (\_gpgme\_gpg\_new): Make static. Change argument type from  
 GpgObject  
 \* to void \*\*. Call gpg\_release instead  
 \_gpgme\_gpg\_release.  
 (\_gpgme\_gpg\_op\_decrypt): Make static and rename to ...  
 (gpg\_check\_decrypt): ... this.  
 (\_gpgme\_gpg\_op\_delete): Make static and rename to ...  
 (gpg\_check\_delete): ... this.  
 (\_gpgme\_gpg\_set\_recipients): Make static and rename to ...  
 (gpg\_check\_set\_recipients): ... this.  
 (\_gpgme\_gpg\_op\_encrypt): Make static and rename to ...  
 (gpg\_encrypt): ... this.  
 (\_gpgme\_gpg\_op\_export): Make static and rename to ...  
 (gpg\_export): ... this.  
 (\_gpgme\_gpg\_op\_genkey): Make static and rename to ...  
 (gpg\_genkey): ... this.  
 (\_gpgme\_gpg\_op\_import): Make static and rename to ...  
 (gpg\_import): ... this.  
 (\_gpgme\_gpg\_op\_keylist): Make static and rename to ...  
 (gpg\_keylist): ... this.  
 (\_gpgme\_gpg\_op\_keylist\_ext): Make static and rename to ...  
 (gpg\_keylist\_ext): ... this.  
 (\_gpgme\_gpg\_op\_sign): Make static and rename to ...  
 (gpg\_sign): ... this.  
 (\_gpgme\_gpg\_op\_trustlist): Make static and rename to ...  
 (gpg\_trustlist): ... this.

(\_gpgme\_gpg\_op\_verify):  
Make static and rename to ...  
(gpg\_verify): ... this.  
(gpg\_status\_handler): Rename to ...  
(status\_handler): ... this.  
(\_gpgme\_gpg\_set\_status\_handler): Make static and rename to ...  
(gpg\_set\_status\_handler): ... this.  
(\_gpgme\_gpg\_set\_colon\_line\_handler): Make static and rename to ...  
(gpg\_set\_colon\_line\_handler): ... this.  
(gpgme\_gpg\_add\_io\_cb): Rename to ...  
(add\_io\_cb): ... this.  
(\_gpgme\_gpg\_start): Make static and rename to ...  
(gpg\_start): ... this.  
(\_gpgme\_gpg\_set\_io\_cb): Make static and rename to ...  
(gpg\_set\_io\_cb): ... this.  
(\_gpgme\_gpg\_io\_event): Make static and rename to ...  
(gpg\_io\_event): ... this.  
(struct\_gpgme\_engine\_ops\_gpg): New variable.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify) [!ENABLE\_GPGSM]: Add missing argument.

2002-10-09 Marcus Brinkmann <marcus@g10code.de>

\* data.h, data-user.c, data-stream.c, data-mem.c, data-fd.c, data-compat.c: New file. Really check them in this time, completes  
2002-10-08 change.

\* rungpg.h (GpgStatusHandler): Rename type to GpgmeStatusHandler and move to ...  
\* types.h (GpgmeStatusHandler): ... here.  
\* rungpg.h (GpgColonLineHandler): Rename type to GpgmeColonLineHandler. and move to ...  
\* types.h (GpgmeColonLineHandler): ... here.  
\* rungpg.h (GpgCommandHandler): Rename type to GpgmeCommandHandler. and move to ...  
\* types.h (GpgmeCommandHandler): ... here.  
\* engine.h: Don't include "rungpg.h".  
(\_gpgme\_engine\_set\_status\_handler): Change type of argument from GpgStatusHandler to GpgmeStatusHandler.  
(\_gpgme\_engine\_set\_colon\_line\_handler): Change type of argument from GpgColonLineHandler to GpgmeColonLineHandler.  
(\_gpgme\_engine\_set\_command\_handler): Change type of argument from GpgCommandHandler to GpgmeCommandHandler.  
\* engine-gpgsm.h: Don't include "rungpg.h".

(\_gpgme\_gpgsm\_set\_status\_handler): Change type of argument from GpgStatusHandler to GpgmeStatusHandler.

(\_gpgme\_gpgsm\_set\_colon\_line\_handler): Change type of argument from GpgColonLineHandler to GpgmeColonLineHandler.

\* engine-gpgsm.c: Do not include "rungpg.h".

(struct gpgsm\_object\_s): Change type of status.fnc to GpgmeStatusHandler. Change type of colon.fnc to GpgmeColonLineHandler.

(gpgsm\_assuan\_simple\_command): Change type of argument from GpgStatusHandler to GpgmeStatusHandler.

(\_gpgme\_gpgsm\_set\_status\_handler): Likewise.

(\_gpgme\_gpgsm\_set\_colon\_line\_handler): Change type of argument from GpgColonLineHandler to GpgmeColonLineHandler.

\* rungpg.h (\_gpgme\_gpg\_set\_status\_handler): Change type of argument from GpgStatusHandler to GpgmeStatusHandler.

(\_gpgme\_gpg\_set\_colon\_line\_handler): Change type of argument from GpgColonLineHandler to GpgmeColonLineHandler.

(\_gpgme\_gpg\_set\_command\_handler): Change type of argument from GpgCommandHandler to GpgmeCommandHandler.

\* rungpg.c (struct gpg\_object\_s): Change type of status.fnc to GpgmeStatusHandler. Change type of colon.fnc to GpgmeColonLineHandler. Change type of cmd.fnc to GpgmeCommandLineHandler.

(\_gpgme\_gpg\_set\_status\_handler): Change type of argument FNC to GpgmeStatusHandler.

(\_gpgme\_gpg\_set\_colon\_line\_handler): Change type of argument FNC to GpgmeColonLineHandler.

(\_gpgme\_gpg\_set\_command\_handler): Change type of argument FNC to GpgmeCommandHandler.

\* engine.c (\_gpgme\_engine\_set\_status\_handler): Change type of argument FNC to GpgmeStatusHandler.

(\_gpgme\_engine\_set\_colon\_line\_handler): Change type of argument FNC to GpgmeColonLineHandler.

(\_gpgme\_engine\_set\_command\_handler): Change type of argument FNC to GpgmeCommandHandler.

\* rungpg.h (\_gpgme\_gpg\_enable\_pipemode): Remove prototype.

\* rungpg.c (struct gpg\_object\_s): Remove PM.

(pipemode\_cb): Prototype removed.

(add\_pm\_data): Function removed.

(\_gpgme\_gpg\_enable\_pipemode): Likewise.

(pipemode\_copy): Likewise.

(pipemode\_cb): Likewise.

(add\_arg): Don't check for pipemode.

(add\_data): Likewise.

(\_gpgme\_gpg\_set\_status\_handler): Likewise.

(\_gpgme\_gpg\_set\_colon\_line\_handler):  
Likewise.  
(\_gpgme\_gpg\_set\_command\_handler): Likewise.  
(\_gpgme\_gpg\_spawn): Likewise.  
(\_gpgme\_gpg\_spawn): Don't set PM.active.  
(\_gpgme\_gpg\_op\_verify): Remove pipemode case.  
\* verify.c (\_gpgme\_op\_verify\_start): Remove pipemode case.

\* runpgp.h (\_gpgme\_gpg\_add\_arg, \_gpgme\_gpg\_add\_data,  
\_gpgme\_gpg\_add\_pm\_data, \_gpgme\_gpg\_housecleaning,  
\_gpgme\_gpg\_set\_simple\_line\_handler): Prototype removed.  
(\_gpgme\_gpg\_set\_verbosity): New prototype.  
\* runpgp.c (\_gpgme\_gpg\_add\_data): Make static and rename to ...  
(add\_data): ... this.  
(\_gpgme\_gpg\_add\_pm\_data): Call add\_data, not \_gpgme\_gpg\_add\_data.  
(\_gpgme\_gpg\_set\_command\_handler): Likewise.  
(\_gpgme\_gpg\_op\_decrypt, \_gpgme\_gpg\_op\_edit, \_gpgme\_gpg\_op\_encrypt,  
\_gpgme\_gpg\_op\_encrypt\_sign, \_gpgme\_gpg\_op\_export,  
\_gpgme\_gpg\_op\_genkey, \_gpgme\_gpg\_op\_import, \_gpgme\_gpg\_op\_sign,  
\_gpgme\_gpg\_op\_verify): Likewise.  
(\_gpgme\_gpg\_add\_pm\_data): Rename to ...  
(add\_pm\_data): ... this.  
(\_gpgme\_gpg\_op\_verify): Call add\_pm\_data, not  
\_gpgme\_gpg\_add\_pm\_data.  
(\_gpgme\_gpg\_add\_arg):  
Make static and rename to ...  
(add\_arg): ... this.  
(\_gpgme\_gpg\_set\_command\_handler, \_gpgme\_gpg\_new,  
\_gpgme\_gpg\_op\_decrypt, \_gpgme\_gpg\_op\_delete,  
\_gpgme\_append\_gpg\_args\_from\_signers, \_gpgme\_gpg\_op\_edit,  
\_gpgme\_append\_gpg\_args\_from\_recipients, \_gpgme\_gpg\_op\_encrypt,  
\_gpgme\_gpg\_op\_encrypt\_sign, \_gpgme\_gpg\_op\_export,  
\_gpgme\_gpg\_op\_genkey, \_gpgme\_gpg\_op\_import, \_gpgme\_gpg\_op\_keylist,  
\_gpgme\_gpg\_op\_keylist\_ext, \_gpgme\_gpg\_op\_trustlist,  
\_gpgme\_gpg\_op\_sign, \_gpgme\_gpg\_op\_verify): Use add\_arg, not  
\_gpgme\_gpg\_add\_arg.  
(\_gpgme\_gpg\_set\_verbosity): New function.  
(struct gpg\_object\_s): Remove member simple from colon.  
(\_gpgme\_gpg\_set\_colon\_line\_handler): Don't initialize simple.  
(\_gpgme\_gpg\_set\_simple\_line\_handler): Removed function.  
(read\_colon\_line): Don't check the GPG->colon.simple.  
\* engine.c (\_gpgme\_engine\_set\_verbosity): Call  
\_gpgme\_gpg\_set\_verbosity instead \_gpgme\_gpg\_add\_arg.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

\* util.h (\_gpgme\_malloc,

`_gpgme_realloc`, `_gpgme_calloc`,  
`_gpgme_strdup`, `_gpgme_free`): Remove prototypes.  
`(xtrymalloc, xtrycalloc, xtryrealloc, xtrystrdup, xfree)`: Remove macros.

- \* `util.c`: File removed.
- \* `Makefile.am (libgpgme_la_SOURCES)`: Remove `util.h`.
- \* `conversion.c (_gpgme_decode_c_string)`: Use `malloc` instead of `xtrymalloc`, `realloc` instead of `xtryrealloc`, `calloc` instead of `xtrycalloc`, `free` instead of `xfree`.
- `(_gpgme_data_append_percentstring_for_xml)`: Likewise.
- \* `data.c (_gpgme_data_new, _gpgme_data_release)`: Likewise.
- \* `data-compat.c (gpgme_data_new_from_filepart)`: Likewise.
- \* `data-mem.c (mem_write, mem_release, gpgme_data_new_from_mem, _gpgme_data_get_as_string)`: Likewise.
- \* `debug.c (debug_init)`: Likewise.
- \* `decrypt.c (_gpgme_release_decrypt_result)`: Likewise.
- \* `delete.c (_gpgme_release_delete_result)`: Likewise.
- \* `edit.c (_gpgme_release_edit_result, _gpgme_op_edit_start)`: Likewise.
- \* `encrypt.c (_gpgme_release_encrypt_result)`: Likewise.
- \* `engine.c (_gpgme_engine_get_info, _gpgme_engine_new, _gpgme_engine_release)`: Likewise.
- \* `engine-gpgsm.c (_gpgme_gpgsm_new, _gpgme_gpgsm_release, _gpgme_gpgsm_op_decrypt, _gpgme_gpgsm_op_delete, gpgsm_set_recipients, _gpgme_gpgsm_op_encrypt, _gpgme_gpgsm_op_export, _gpgme_gpgsm_op_genkey, _gpgme_gpgsm_op_import, _gpgme_gpgsm_op_keylist, _gpgme_gpgsm_op_keylist_ext, _gpgme_gpgsm_op_sign, _gpgme_gpgsm_op_verify, gpgsm_status_handler)`: Likewise.
- \* `genkey.c (_gpgme_release_genkey_result)`: Likewise.
- \* `gpgme.c (gpgme_new, gpgme_release)`: Likewise.
- \* `import.c (_gpgme_release_import_result)`: Likewise.
- \* `key.c (_gpgme_key_cache_init, _gpgme_key_cache_add, key_new, add_subkey, gpgme_key_release, _gpgme_key_append_name)`: Likewise.
- \* `keylist.c (_gpgme_release_keylist_result, keylist_colon_handler, _gpgme_op_keylist_event_cb, gpgme_op_keylist_next)`: Likewise.
- \* `ops.h (test_and_allocate_result)`: Likewise.
- \* `passphrase.c (_gpgme_release_passphrase_result, _gpgme_passphrase_status_handler, _gpgme_passphrase_command_handler)`: Likewise.
- \*
- `progress.c (_gpgme_progress_status_handler)`: Likewise.
- \* `recipient.c (gpgme_recipients_new, gpgme_recipients_release, gpgme_recipients_add_name_with_validity)`: Likewise.
- \* `rungpg.c (_gpgme_gpg_new, _gpgme_gpg_release, _gpgme_gpg_add_arg, _gpgme_gpg_add_data, _gpgme_gpg_set_colon_line_handler, free_argv, free_fd_data_map,`



build\_argv, \_gpgme\_gpg\_spawn, read\_status, read\_colon\_line):  
Likewise.

- \* sign.c (\_gpgme\_release\_sign\_result): Likewise.
- \* signers.c (\_gpgme\_signers\_add): Likewise.
- \* trustlist.c (trust\_item\_new, trustlist\_colon\_handler, \_gpgme\_op\_trustlist\_event\_cb, gpgme\_op\_trustlist\_next, gpgme\_trustitem\_release): Likewise.
- \* verify.c (\_gpgme\_release\_verify\_result, finish\_sig): Likewise.
- \* version.c (gpgme\_get\_engine\_info, \_gpgme\_get\_program\_version):  
Likewise.
- \* w32-io.c (create\_reader, create\_writer, destroy\_reader, destroy\_writer, build\_commandline, \_gpgme\_io\_spawn): Likewise.
- \* w32-sema.c (critsect\_init, \_gpgme\_sema\_cs\_destroy): Likewise.
- \* w32-util.c (read\_w32\_registry\_string):  
Likewise.
- \* wait.c (\_gpgme\_fd\_table\_deinit, \_gpgme\_fd\_table\_put, \_gpgme\_wait\_event\_cb, \_gpgme\_add\_io\_cb, \_gpgme\_remove\_io\_cb)
- \* data-compat.c: Include <stdlib.h>.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

New data object component:

- \* gpgme.h (GpgmeDataReadCb, GpgmeDataWriteCb, GpgmeDataSeekCb, GpgmeDataReleaseCb): New types.
- (struct GpgmeDataCbs): New structure.
- (gpgme\_data\_read): Changed prototype to match that of read() closely.
- (gpgme\_data\_write): Similar for write().
- (gpgme\_data\_seek, gpgme\_data\_new\_from\_cbs, gpgme\_data\_new\_from\_fd, gpgme\_data\_new\_from\_stream): New prototypes.
- (gpgme\_data\_get\_type, gpgme\_check\_engine): Prototype removed.
- \* Makefile.am (libgpgme\_la\_SOURCES): Add data.h, data-fd.c, data-stream.c, data-mem.c, data-user.c and data-compat.c.
- \* data.c: Reimplemented from scratch.
- \* (data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c, data-user.c): New file.
- \* context.h (struct gpgme\_data\_s): Removed.
- \* conversion.c:  
Include <errno.h> and <sys/types.h>.
- (\_gpgme\_data\_append): New function.
- \* data.c (\_gpgme\_data\_append\_string): Move to ...
- \* conversion.c (\_gpgme\_data\_append\_string): ... here.
- \* data.c (\_gpgme\_data\_append\_for\_xml): Move to ...
- \* conversion.c (\_gpgme\_data\_append\_for\_xml): ... here.
- \* data.c (\_gpgme\_data\_append\_string\_for\_xml): Move to ...
- \* conversion.c (\_gpgme\_data\_append\_string\_for\_xml): ... here.
- \* data.c (\_gpgme\_data\_append\_percentstring\_for\_xml): Move to ...

- \* conversion.c (\_gpgme\_data\_append\_percentstring\_for\_xml): ... here.
- \* ops.h (\_gpgme\_data\_get\_mode, \_gpgme\_data\_set\_mode): Prototype removed.
- \* types.h (GpgmeDataMode): Type removed.
- \* decrypt.c (\_gpgme\_decrypt\_start): Don't check data type or mode.
- \* edit.c (\_gpgme\_op\_edit\_start): Likewise.
- \* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.
- \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* export.c (\_gpgme\_op\_export\_start): Likewise.
- \*
- genkey.c (\_gpgme\_op\_genkey\_start): Likewise.
- \* import.c (\_gpgme\_op\_import\_start): Likewise.
- \* sign.c (\_gpgme\_op\_sign\_start): Likewise.
- \* verify.c (\_gpgme\_op\_verify\_start): Likewise.
- 
- \* encrypt.c (gpgme\_op\_encrypt): Remove hack that returns invalid no recipient if no data was returned.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign): Remove hack that returns no recipient if no data was returned.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign): Remove hack that returns no recipient if no data was returned.
- 
- \* engine.c (\_gpgme\_engine\_op\_verify): Add new argument to differentiate detached from normal signatures.
- \* engine.h (\_gpgme\_engine\_op\_verify): Likewise for prototype.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Likewise. Don't check mode of data argument.
- \* engine-gpgsm.h (\_gpgme\_gpgsm\_op\_verify): Likewise for prototype.
- \* gpgme.h (gpgme\_op\_verify\_start): Likewise for prototype.
- (gpgme\_op\_verify): Likewise for prototype.
- \* runpg.c (\_gpgme\_gpg\_op\_verify): Likewise.
- \* runpg.h
- (\_gpgme\_gpg\_op\_verify): Likewise for prototype.
- \* verify.c (\_gpgme\_op\_verify\_start): Likewise.
- (gpgme\_op\_verify\_start): Likewise.
- (gpgme\_op\_verify): Likewise.
- 
- \* runpg.c (struct arg\_and\_data\_s): New member INBOUND to hold direction of data object.
- (\_gpgme\_gpg\_add\_data): Add new argument INBOUND. Use it to determine direction of data object.
- (\_gpgme\_gpg\_add\_pm\_data, \_gpgme\_gpg\_set\_command\_handler, \_gpgme\_gpg\_op\_decrypt, \_gpgme\_gpg\_op\_edit, \_gpgme\_gpg\_op\_encrypt, \_gpgme\_gpg\_op\_encrypt\_sign, \_gpgme\_gpg\_op\_export, \_gpgme\_gpg\_op\_genkey, \_gpgme\_gpg\_op\_import, \_gpgme\_gpg\_op\_sign,

\_gpgme\_gpg\_op\_verify): Add new argument to \_gpgme\_gpg\_add\_data invocation.

(build\_argv): Use new member INBOUND to determine direction of file descriptor. Don't check the data type.

\* runpgp.h (\_gpgme\_gpg\_add\_data): Add new argument to prototype.

\* gpgme.c (gpgme\_get\_op\_info): Don't call \_gpgme\_data\_get\_as\_string if CTX->op\_info is NULL.

\* version.c (gpgme\_check\_engine): Function removed.

2002-09-30

Werner Koch <wk@gnupg.org>

\* keylist.c (keylist\_colon\_handler): Take care when printing a NULL with the DEBUG.

\* engine-gpgsm.c (struct gpgsm\_object\_s): New member ANY.  
(gpgsm\_status\_handler): Run the colon function to indicate EOF.  
(\_gpgme\_gpgsm\_set\_colon\_line\_handler): Better reset ANY here.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c (\_gpgme\_hextobyte): Prevent superfluous multiplication with base. Reported by Stphane Corthsy.

\* keylist.c (gpgme\_op\_keylist\_ext\_start): Use private asynchronous operation type in invocation of \_gpgme\_op\_reset.

2002-09-20 Werner Koch <wk@gnupg.org>

\* ath.c: Include sys/time.h if sys/select.h is not available.

2002-09-13 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (keylist\_status\_handler): Do not call finish\_key() here.  
(gpgme\_op\_keylist\_ext\_start): Set CTX->tmp\_key to NULL.

2002-09-03 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (assuan\_libobjs): Remove @LTLIBOBJS@ as we link them into gpgme unconditionally.  
(libgpgme\_la\_LIBADD): Change @LIBOBJS@ into @LTLIBOBJS@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (assuan\_libobjs): Use @LTLIBOBJS@ instead @LIBOBJS@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* debug.c (\_gpgme\_debug\_add): Test \*LINE, not LINE.  
(\_gpgme\_debug\_end): Likewise.  
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* posix-io.c (\_gpgme\_io\_select): Don't use a non-constant struct  
initializer.  
\* version.c (\_gpgme\_get\_program\_version): Likewise.  
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c (\_gpgme\_decode\_c\_string): Set DESTP before  
modifying DEST.  
  
\* conversion.c (\_gpgme\_decode\_c\_string): Fix off by one error in  
last change.  
\* runpg.c (\_gpgme\_append\_gpg\_args\_from\_signers): Move before  
\_gpgme\_op\_edit so its prototype is known early on.  
  
\* conversion.c: New  
file.  
\* util.h: Add prototypes for \_gpgme\_decode\_c\_string and  
\_gpgme\_hextobyte.  
\* keylist.c (keylist\_colon\_handler): Call \_gpgme\_decode\_c\_string  
on issuer name.  
\* Makefile.am (libpgme\_la\_SOURCES): Add conversion.c  
\* key.c (\_gpgme\_key\_append\_name): Replace calls to hextobyte by  
calls to \_gpgme\_hextobyte.  
(hash\_key): Likewise.

2002-09-01 Marcus Brinkmann <marcus@g10code.de>

\* op-support.c (\_gpgme\_op\_reset): Set CTX->pending after calling  
\_gpgme\_engine\_release, as this will reset pending to zero in the  
event done callback on cancelled operations.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (\_gpgme\_gpg\_op\_edit): Add args from signers.  
Suggested by Miguel Coca <e970095@zipi.fi.upm.es>.  
  
\* runpg.c (\_gpgme\_gpg\_op\_edit): Add bogus ctx argument.  
\* runpg.h: Also to prototype.

\* engine.c (\_gpgme\_engine\_op\_edit): Likewise.

\* engine.h: Likewise.

\* edit.c (\_gpgme\_op\_edit\_start): Likewise.

2002-08-29 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign):

Implement signer

selection.

\* vasprintf.c (va\_copy): Define macro if not yet defined.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Reset

CTX->result.passphrase->no\_passphrase if passphrase is given (good or bad). Submitted by Jean DIRAISON <jean.diraison@free.fr>.

2002-08-28 Marcus Brinkmann <marcus@g10code.de>

\* posix-io.c (\_gpgme\_io\_spawn): Use a double-fork approach.

Return 0 on success, -1 on error.

\* version.c (\_gpgme\_get\_program\_version): Don't wait for the child.

\* engine.c (\_gpgme\_engine\_housecleaning): Function removed.

(do\_reaping): Likewise.

(\_gpgme\_engine\_add\_child\_to\_reap\_list): Likewise.

(struct reap\_s): Removed.

(reap\_list): Likewise.

(reap\_list\_lock): Likewise.

\* engine.h (\_gpgme\_engine\_io\_event): Remove prototypes for

\_gpgme\_engine\_housecleaning and

\_gpgme\_engine\_add\_child\_to\_reap\_list.

\* runpg.c (\_gpgme\_gpg\_release): Don't add child to reap list.

(struct gpg\_object\_s): Remove

PID member.

(\_gpgme\_gpg\_new): Don't initialize GPG->pid.

(\_gpgme\_gpg\_spawn): Don't set GPG->pid.

\* wait.c (run\_idle): Removed.

(gpgme\_wait): Run idle\_function directly.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* encrypt-sign.c (encrypt\_sign\_status\_handler): Remove dead variables encrypt\_info and encrypt\_info\_len.

\* trustlist.c (gpgme\_op\_trustlist\_start): Set colon line handler.

\* posix-sema.c (sema\_fatal): Remove function.

All these reported by Stphane Corthsy.

2002-08-23 Werner Koch <wk@gnupg.org>

\* gpgme-config.in: Made --prefix work for --libs.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* ath.h: Update list of symbols that get a prefix: Rename the ath\_mutex\_\*\_available symbols to ath\_\*\_available.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* stpcpy.c: New file from gnulib.  
\* Makefile.am (assuan\_libobjs): Remove jnlib.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add prototype for gpgme\_op\_import\_ext.  
\* import.c  
(struct import\_result\_s): New member `nr\_considered'.  
Rename `any\_imported' to `nr\_imported'.  
(import\_status\_handler): Increment nr\_imported. Set nr\_considered if appropriate.  
(gpgme\_op\_import\_ext): New function.  
(gpgme\_op\_import): Implement in terms of gpgme\_op\_import\_ext.

2002-08-20 Werner Koch <wk@gnupg.org>

\* gpgme.m4: Replaced with a new and faster version. This does not anymore try to build test programs. If we really need test programs, we should add an option to gpgme-config to do so.

\* vasprintf.c (int\_vasprintf): Hack to handle NULL passed for %s.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (\_gpgme\_set\_op\_info): Append data on subsequent calls.  
\* encrypt-sign.c (encrypt\_sign\_status\_handler): Remove op\_info handling.

2002-08-19 Werner Koch <wk@gnupg.org>

\* decrypt.c (is\_token, skip\_token): Duplicated from verify.c  
(gpgme\_op\_decrypt): Hack to properly return Decryption\_Failed..  
(\_gpgme\_decrypt\_status\_handler): Create an operation info.

2002-08-14

Werner Koch <wk@gnupg.org>

\* key.h (struct certsig\_s): New. Use it in gpgme\_key\_s.

\* key.c (gpgme\_key\_release): Release it. We need to add more code of course.

(\_gpgme\_key\_append\_name): Use memset to initialize the struct.

\* gpgme.h (GPGME\_KEYLIST\_MODE\_SIGS): New.

\* runpgg.c (\_gpgme\_gpg\_op\_keylist): Include sigs in listing depending non the list mode.

\* key.c (gpgme\_key\_get\_string\_attr): Use GPGME\_ATTR\_TYPE to return information about the key type (PGP or X.509).

(gpgme\_key\_get\_ulong\_attr): Likewise.

\* keylist.c (keylist\_colon\_handler): Include 1 in the check for valid algorithms so that RSA is usable. Store the issuer name and serial number also for "crs" records. Parse the expire date for subkeys.

(set\_userid\_flags): Put them onto the last appended key.

2002-07-29 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_op\_edit): Use --with-colons.

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

\* data.c (gpgme\_data\_read): For GPGME\_DATA\_TYPE\_NONE, return EOF instead an error.

The following changes make it possible to flush an inbound data pipe before invoking a command handler:

\* posix-io.c (\_gpgme\_io\_select): Accept new argument NONBLOCK to \_gpgme\_io\_select. Set timeout of 0 if this is set.

\* w32-io.c (\_gpgme\_io\_select): Likewise.

\* io.h: Add new argument NONBLOCK to \_gpgme\_io\_select prototype.

\* wait.c (do\_select): Add new argument to \_gpgme\_io\_select invocation.

\* runpgg.h (\_gpgme\_gpg\_set\_command\_handler): Add new argument linked\_data to prototype.

\* engine.h (\_gpgme\_engine\_set\_command\_handler): Likewise.

\* engine.c (\_gpgme\_engine\_set\_command\_handler): Likewise.

\* passphrase.c (\_gpgme\_passphrase\_start): Pass NULL as linked\_data argument to \_gpgme\_engine\_set\_command\_handler.

\* runpgg.c (struct gpg\_object\_s): New members linked\_data and linked\_idx in CMD.

(\_gpgme\_gpg\_new): Initialize those new members.

(\_gpgme\_gpg\_set\_command\_handler): Accept new argument linked\_data.

(build\_argv): Handle linked\_data

in the same hack as `cb_data`.

(`read_status`): If `linked_data` is in use, flush the pipe before activating the command handler.

\* `gpgme.h`: Add prototypes for `gpgme_op_edit_start` and `gpgme_op_edit`.

The next changes export the status codes to the user:

\* `decrypt.c` (`_gpgme_decrypt_status_handler`): Likewise, also prefix all `STATUS_` with `GPGME_`.

\* `delete.c` (`delete_status_handler`): Likewise.

\* `decrypt-verify.c` (`decrypt_verify_status_handler`): Likewise.

\* `encrypt.c` (`_gpgme_encrypt_status_handler`): Likewise.

(`_gpgme_encrypt_sym_status_handler`): Likewise.

\* `encrypt-sign.c` (`encrypt_sign_status_handler`): Likewise.

\* `engine-gpgsm.c` (`parse_status`): Likewise.

(`gpgsm_status_handler`): Likewise.

(`gpgsm_set_recipients`): Likewise.

\* `export.c` (`export_status_handler`): Likewise.

\* `genkey.c` (`genkey_status_handler`): Likewise.

\* `import.c` (`append_xml_impinfo`): Likewise.

(`import_status_handler`): Likewise.

\* `keylist.c` (`keylist_status_handler`): Likewise.

\* `passphrase.c` (`_gpgme_passphrase_status_handler`):

Likewise.

(`command_handler`): Likewise.

\* `progress.c` (`_gpgme_progress_status_handler`): Likewise.

\* `sign.c` (`_gpgme_sign_status_handler`): Likewise.

\* `trustlist.c` (`trustlist_status_handler`): Likewise.

\* `verify.c` (`_gpgme_verify_status_handler`): Likewise.

\* `gpgme.h` (`GpgmeEditCb`): New type.

\* `rungpg.h` (`GpgStatusCode`): Rename and move to ...

\* `gpgme.h` (`GpgmeStatusCode`): ... this and here.

\* `Makefile.am` (`status-table.h`): Run `mkstatus` on `gpgme.h`, not `rungpg.h`.

\* `mkstatus`: Prefix `STATUS` with `GPGME_`.

\* `rungpg.h` (`GpgStatusHandler`, `GpgCommandHandler`): Change type accordingly.

\* `ops.h` (`_gpgme_verify_status_handler`,  
`_gpgme_decrypt_status_handler`, `_gpgme_sign_status_handler`,  
`_gpgme_encrypt_status_handler`, `_gpgme_passphrase_status_handler`,  
`_gpgme_progress_status_handler`): Likewise.

\* `rungpg.c` (`struct gpg_object_s`): Likewise for `CMD.code`.

These changes add an edit operation to GPGME:

\* `context.h` (`struct gpgme_context_s`): New member `RESULT.edit`. \*

`ops.h`: Add prototype



for `_gpgme_release_edit_result` and  
`_gpgme_passphrase_command_handler`.  
\* `passphrase.c` (`command_handler`): Make non-static and rename to ...  
(`_gpgme_passphrase_command_handler`): ... this.  
(`_gpgme_passphrase_start`): Use new name for command handler.  
\* `types.h`: Add `EditResult` type.  
\* `gpgme.c` (`_gpgme_release_result`): Release EDIT result.  
\* `edit.c`: New file.  
\* `Makefile.am` (`libgpgme_la_SOURCES`): Add `edit.c`.  
(`libgpgme_la_LDADD`): Rename to `libgpgme_la_LIBADD`, and include  
`assuan_libobjs`.  
(`assuan_libobjs`): New variable, set this instead  
`libgpgme_la_LIBADD`.  
\* `engine.h` (`_gpgme_engine_op_edit`): New prototype.  
\* `engine.c` (`_gpgme_engine_op_edit`): New function.  
\* `rungpg.h` (`_gpgme_gpg_op_edit`): New prototype.  
\* `rungpg.c` (`_gpgme_gpg_op_edit`): New function.

2002-07-27 Marcus Brinkmann <marcus@g10code.de>

\* `delete.c` (`delete_problem`): New case ambiguous specification.  
(`delete_status_handler`): Handle new case (poorly).

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c`  
(`_gpgme_gpgsm_op_delete`): Implement this.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* `Makefile.am` (`libgpgme_la_LDADD`): Add `@LIBOBJS@` for `vasprintf` and  
`fopencookie`.  
\* `vasprintf.c`: Update to more recent `libiberty` version.  
\* `debug.h`: Replace `#elif` with `#elif`.

Submitted by Stphane Corthsy:

\* `util.h` (`vasprintf`): Correct prototype.  
\* `encrypt-sign.c`: Include `<stddef.h>`.  
(`encrypt_sign_status_handler`): Change type of `ENCRYPT_INFO_LEN` to  
`size_t`.  
\* `ath-pthread.c`: Include `<stdlib.h>`, not `<malloc.h>`.  
\* `ath-pth.c`: Likewise.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* `wait.c` (`fdt_global`): Make static. Reported by Stphane  
Corthsy.

- \* `rungpg.c` (`_gpgme_gpg_op_keylist_ext`): Skip empty string patterns. Reported by Stphane Corthsy.
- \* `key.c` (`gpgme_key_get_as_xml`): Add OTRUST attribute. Requested by Stphane Corthsy.
- (`gpgme_key_get_string_attr`): Add `GPGME_ATTR_SIG_SUMMARY` case to silence gcc warning.
- \* `rungpg.c` (`_gpgme_gpg_new`): Always set utf8 as charset.

2002-07-03

Marcus Brinkmann <marcus@g10code.de>

- \* `gpgme.c` (`gpgme_set_io_cbs`): Deal with CTX being NULL.
- \* `gpgme.c` (`_gpgme_op_event_cb_user`): New function.
- \* `op-support.c` (`_gpgme_op_reset`): Support a new mode of operation for private or user event loop. Use new user event callback wrapper.
- \* `trustlist.c` (`gpgme_op_trustlist_start`): Use this new mode.
- \* `keylist.c` (`gpgme_op_keylist_start`): Likewise.
- \* `rungpg.c` (`_gpgme_gpg_io_event`): New function.
- \* `rungpg.h` (`_gpgme_gpg_io_event`): New prototype.
- \* `engine-gpgsm.c` (`_gpgme_gpg_io_event`): New function.
- \* `engine-gpgsm.h` (`_gpgme_gpgsm_io_event`): New prototype.
- \* `engine.c` (`_gpgme_engine_io_event`): New function.
- \* `engine.h` (`_gpgme_engine_io_event`): New prototype.
- \* `keylist.c` (`finish_key`): Call `_gpgme_engine_io_event`, and move the real work for the default IO callback routines to ...
- (`_gpgme_op_keylist_event_cb`): ... here. New function.
- \* `trustlist.c` (`trustlist_colon_handler`): Signal `GPGME_EVENT_NEXT_TRUSTITEM`. Move queue manipulation to ...
- (`_gpgme_op_trustlist_event_cb`): ... here. New function.
- \* `gpgme.c` (`_gpgme_op_event_cb`): Call `_gpgme_op_keylist_event_cb` and `_gpgme_op_trustlist_event_cb` when appropriate.
- \* `ops.h` (`_gpgme_op_keylist_event_cb`): New prototype.
- (`_gpgme_op_trustlist_event_cb`): Likewise.
- \* `op-support.c` (`_gpgme_op_reset`): Add comment why we don't use the user provided event handler directly.
- \* `gpgme.h` (`GpgmeRegisterIOCb`): Return `GpgmeError` value, and TAG in a pointer argument.
- \* `wait.c` (`_gpgme_add_io_cb`): Likewise.
- \* `wait.h` (`_gpgme_add_io_cb`): Likewise for prototype.
- \* `rungpg.c` (`_gpgme_gpg_add_io_cb`): Call `IO_CBS->add` with new argument. Fix up error handling.
- \* `engine-gpgsm.c` (`_gpgme_gpgsm_add_io_cb`): Call `IO_CBS->add` with

new argument, fix up error handling.

2002-07-03 Werner Koch <wk@gnupg.org>

\* encrypt.c (status\_handler\_finish): New.  
(\_gpgme\_encrypt\_status\_handler): Moved some code out to the new  
function and call this function also in case we get into the  
status  
handler with an error which might happen due to a kludge in  
engine-gpgsm.c

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (gpgme\_op\_keylist\_ext\_start): Always use our own FD  
table (eg use synchronous mode).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Fix documentation of key attribute retrieval functions.

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

\* ops.h (\_gpgme\_wait\_on\_condition): Remove HANG argument from  
prototype and change return type to GpgmeError.  
(\_gpgme\_wait\_one): New prototype.  
\* wait.c (gpgme\_wait): Replace with the meat from  
\_gpgme\_wait\_on\_condition here, and remove the support for  
conditions.  
(\_gpgme\_wait\_on\_condition): Remove HANG argument from prototype  
and change return type to GpgmeError. Replace with meat from  
\_gpgme\_wait\_one and add support for conditions.  
(\_gpgme\_wait\_one): Just call \_gpgme\_wait\_on\_condition without  
condition.  
\* keylist.c (gpgme\_op\_keylist\_ext\_start): Always use our own FD  
table (eg  
use synchronous mode).  
(gpgme\_op\_keylist\_next): Remove HANG argument from  
\_gpgme\_wait\_on\_condition. Check its return value.  
\* trustlist.c (gpgme\_op\_trustlist\_start): Always use our own FD  
table (eg use synchronous mode).  
(gpgme\_op\_trustlist\_next): Remove HANG argument from  
\_gpgme\_wait\_on\_condition. Check its return value.

2002-06-26 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (map\_assuan\_error): Map No\_Data\_Available to EOF.

\* import.c (append\_xml\_impinfo): Kludge to print fingerprint

instead of keyid for use with gpgsm.

(import\_status\_handler): Set a flag to know whether any import occurred.

(gpgme\_op\_import): Return -1 if no certificate was imported.

2002-06-25 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_set\_io\_cbs) [ENABLE\_GPGSM]: Fixed function arguments.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_export): Only export the keys listed in RECP.

\* export.c (gpgme\_op\_export): If no data was returned, return GPGME\_No\_Recipients.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_export): Implement.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_assuan\_simple\_command): Return ERR.

(parse\_status): New function.

(gpgsm\_status\_handler): Use parse\_status.

(gpgsm\_assuan\_simple\_command): Accept new arguments STATUS\_FNC and STATUS\_FNC\_VALUE and process status messages.

(gpgsm\_set\_recipients): Pass new arguments to gpgsm\_assuan\_simple\_command.

(gpgsm\_set\_fd): Likewise.

(\_gpgme\_gpgsm\_op\_keylist): Likewise.

(\_gpgme\_gpgsm\_op\_keylist\_ext): Likewise.

(\_gpgme\_gpgsm\_op\_sign): Likewise.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (\_gpgme\_remove\_io\_cb): Unlock FDT->lock.

2002-06-20 Werner Koch <wk@gnupg.org>

\* runpg.c (build\_argv): Ignore GPG\_AGENT\_INFO if set but empty.

\* verify.c (calc\_sig\_summary): Set bad policy for wrong key usage.

(skip\_token): New.

(\_gpgme\_verify\_status\_handler): Watch out for wrong key usage.

(gpgme\_get\_sig\_string\_attr): Hack to return info on the key

usage. Does now make use of the former RESERVED argument which has been renamed to WHATIDX.

(gpgme\_get\_sig\_ulong\_attr): Renamed RESERVED to WHATIDX.

2002-06-14 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (do\_select): Return -1 on error, and 0 if nothing to run.

(\_gpgme\_wait\_one): Only set HANG to zero if do\_select returned an error, or there are no more file descriptors to wait on.

(\_gpgme\_wait\_on\_condition): Ignore return value from do\_select for now.

2002-06-13 Werner Koch <wk@gnupg.org>

\* verify.c (gpgme\_op\_verify): Make sure that we never access an uninitialized result structure.

2002-06-12 Werner Koch <wk@gnupg.org>

\* keylist.c (struct keylist\_result\_s): New.

(\_gpgme\_release\_keylist\_result): Release it here

(keylist\_status\_handler): Handle truncated.

(append\_xml\_keylistinfo): New.

\* gpgme.c (\_gpgme\_release\_result): and use it here.

\* types.h: Declare the new type here.

\*

context.h (struct gpgme\_context\_s): Use it here.

2002-06-11 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_release): Close status\_cb.fd.

(\_gpgme\_gpgsm\_new): Duplicate status file descriptor, so we can use our own close notification mechanism without interfering with assuan.

2002-06-11 Werner Koch <wk@gnupg.org>

\* gpgme.h: Add GPGME\_ATTR\_SIG\_SUMMARY and the GPGME\_SIGSUM\_ constants.

\* verify.c (calc\_sig\_summary): New.

(gpgme\_get\_sig\_ulong\_attr): And use it here.

2002-06-10 Werner Koch <wk@gnupg.org>

\* runpgg.h: Add new status codes TRUNCATED and ERROR.

\* verify.c (is\_token, copy\_token): New.

(\_gpgme\_verify\_status\_handler): Use copy\_token, handle the new ERROR status and store the errorcode used withgpgsm and trust

status codes.

\* gpgme.h: New attribute ERRTOK.

\* key.c (gpgme\_key\_get\_string\_attr): Add dummy case for it.

(gpgme\_get\_sig\_string\_attr): Use it here to return the last error.

2002-06-10 Marcus Brinkmann <marcus@g10code.de>

\*

engine-gpgsm.c (\_gpgme\_gpgsm\_start): Move the code that sets the close notification for the status fd to ...

(\_gpgme\_gpgsm\_new): ... here.

\* wait.h: Include "sema.h". Remove prototypes of

\_gpgme\_remove\_proc\_from\_wait\_queue and

\_gpgme\_register\_pipe\_handler. Add prototypes of

\_gpgme\_fd\_table\_init, \_gpgme\_fd\_table\_deinit, \_gpgme\_fd\_table\_put,

\_gpgme\_add\_io\_cb, \_gpgme\_remove\_io\_cb, \_gpgme\_wait\_event\_cb and

\_gpgme\_wait\_one..

\* wait.c: Remove global variables PROC\_QUEUE, PROC\_QUEUE\_LOCK,

FD\_TABLE\_SIZE, FD\_TABLE, FD\_TABLE\_LOCK. New global variables

FDT\_GLOBAL, CTX\_DONE\_LIST, CTX\_DONE\_LIST\_SIZE,

CTX\_DONE\_LIST\_LENGTH and CTX\_DONE\_LIST\_LOCK. Remove struct

proc\_s. Replace struct wait\_item\_s.

(\_gpgme\_fd\_table\_init): New function.

(\_gpgme\_fd\_table\_deinit): Likewise.

(\_gpgme\_fd\_table\_put): Likewise.

(set\_process\_done): Remove function.

(do\_select): Take argument FDT. Use that to decide which fds to select on.

(\_gpgme\_remove\_proc\_from\_wait\_queue): Remove function.

(\_gpgme\_wait\_event\_cb):

New function.

(\_gpgme\_wait\_one): Likewise.

(\_gpgme\_register\_pipe\_handler): Remove function.

(\_gpgme\_add\_io\_cb): New function.

(\_gpgme\_remove\_io\_cb): Likewise.

(\_gpgme\_freeze\_fd): Remove function.

(\_gpgme\_thaw\_fd): Remove function.

\* runpg.c (struct fd\_data\_map\_s): Add new member TAG.

(struct gpg\_object\_s): Likewise for STATUS and COLON. Add member

IDX to CMD. Add new member IO\_CBS.

(close\_notify\_handler): New variables POSSIBLY\_DONE and NOT\_DONE.

For each I/O callback, check if it should be unregistered. If all

callbacks have been unregistered, trigger GPGME\_EVENT\_DONE.

Remove member RUNNING.

(\_gpgme\_gpg\_new): Initialize new members.

(\_gpgme\_gpg\_release): Check PID not RUNNING. Don't call

\_gpgme\_remove\_proc\_from\_wait\_queue. Close GPG->CMD.FD if set.

(build\_argv): Store away the index instead the file descriptor for

CMD.

(`_gpgme_gpg_add_io_cb`): New function.

(`_gpgme_gpg_spawn`): Use `_gpgme_gpg_add_io_cb` to register IO callbacks.

(`gpg_status_handler`):

Change return type to void, remove PID argument, close filedescriptor if EOF or error occurs.

(`read_status`): Use `_gpgme_gpg_add_io_cb` instead `_gpgme_thaw_fd`. Use `IO_CBS->remove` instead `_gpgme_freeze_fd`.

(`gpg_colon_line_handler`): Change return type to void, remove PID argument, close filedescriptor if EOF or error occurs.

(`command_cb`): Use `IO_CBS->remove` instead `_gpgme_freeze_fd`.

(`_gpgme_gpg_set_io_cbs`): New function.

\* `runpg.h` (`_gpgme_gpg_set_io_cbs`): Prototype for `_gpgme_gpg_set_io_cbs`.

\* `gpgme.h` (`GpgmeIOCb`): New type.

(`GpgmeRegisterIOCb`): Likewise.

(`GpgmeRemoveIOCb`): Likewise.

(`GpgmeEventIO`): Likewise.

(`GpgmeEventIOCb`): Likewise.

(`struct GpgmeIOCb`s): New structure to hold I/O callbacks.

(`gpgme_set_op_io_cbs`): New prototype.

(`gpgme_get_op_io_cbs`): Likewise.

\* `ops.h`: New prototype for `_gpgme_op_event_cb`. Remove prototypes for `_gpgme_freeze_fd` and `_gpgme_thaw_fd`. Remove PID argument from `_gpgme_data_inbound_handler` and `_gpgme_data_outbound_handler` prototype.

Add prototype for `_gpgme_op_reset`.

Add synchronous argument to `_gpgme_decrypt_start` prototype.

\* `io.h`: Beautification.

\* `gpgme.c`: Include "wait.h".

(`gpgme_new`): Initialize FDT.

(`gpgme_set_io_cbs`): New function.

(`gpgme_get_io_cbs`): Likewise.

(`_gpgme_op_event_cb`): Likewise.

\* `data.c` (`_gpgme_data_inbound_handler`): Change return type to void. Drop PID argument. Close FD on error and EOF.

(`write_mem_data`): Don't close FD here ...

(`write_cb_data`): ... or here ...

(`_gpgme_data_outbound_handler`): ... but here. Change return type to void. Drop PID argument.

\* `context.h`: Include "wait.h".

(`struct gpgme_context_s`): New members FDT and `IO_CBS`.

\* `op-support.c`: New file.

\* `Makefile.am` (`libgpgme_la_SOURCES`): Add `op-support.c`.

\* `ops.h`: Add prototype for `_gpgme_op_reset()`.

\* `decrypt.c` (`_gpgme_decrypt_start`): New argument `SYNCHRONOUS`. Use `_gpgme_op_reset`.

(gpgme\_op\_decrypt\_start): Add synchronous argument.  
(gpgme\_op\_decrypt): Likewise. Use `_gpgme_wait_one` instead  
`gpgme_wait`.  
\*  
delete.c (gpgme\_op\_delete\_start): Rename to ...  
(`_gpgme_op_delete_start`): ... this. New argument SYNCHRONOUS.  
Use `_gpgme_op_reset`. Make function static.  
(gpgme\_op\_delete\_start): Just a wrapper around  
`_gpgme_op_delete_start` now.  
(gpgme\_op\_delete): Add synchronous argument. Use `_gpgme_wait_one`  
instead `gpgme_wait`.  
\* encrypt.c: Include "wait.h".  
(gpgme\_op\_encrypt\_start): Rename to ...  
(`_gpgme_op_encrypt_start`): ... this. New argument SYNCHRONOUS.  
Use `_gpgme_op_reset`. Make function static.  
(gpgme\_op\_encrypt\_start): Just a wrapper around  
`_gpgme_op_encrypt_start` now.  
(gpgme\_op\_encrypt): Add synchronous argument. Use `_gpgme_wait_one`  
instead `gpgme_wait`.  
\* encrypt\_sign.c (gpgme\_op\_encrypt\_sign\_start): Rename to ...  
(`_gpgme_op_encrypt_sign_start`): ... this. New argument  
SYNCHRONOUS. Use `_gpgme_op_reset`. Make function static.  
(gpgme\_op\_encrypt\_sign\_start): Just a wrapper around  
`_gpgme_op_encrypt_sign_start` now.  
(gpgme\_op\_encrypt\_sign): Add synchronous argument.  
Use  
`_gpgme_wait_one` instead `gpgme_wait`.  
\* export.c (gpgme\_op\_export\_start): Rename to ...  
(`_gpgme_op_export_start`): ... this. New argument SYNCHRONOUS.  
Use `_gpgme_op_reset`. Make function static.  
(gpgme\_op\_export\_start): Just a wrapper around  
`_gpgme_op_export_start` now.  
(gpgme\_op\_export): Add synchronous argument. Use `_gpgme_wait_one`  
instead `gpgme_wait`.  
\* genkey.c (gpgme\_op\_genkey\_start): Rename to ...  
(`_gpgme_op_genkey_start`): ... this. New argument SYNCHRONOUS.  
Use `_gpgme_op_reset`. Make function static.  
(gpgme\_op\_genkey\_start): Just a wrapper around  
`_gpgme_op_genkey_start` now.  
(gpgme\_op\_genkey): Add synchronous argument. Use `_gpgme_wait_one`  
instead `gpgme_wait`.  
\* import.c (gpgme\_op\_import\_start): Rename to ...  
(`_gpgme_op_import_start`): ... this. New argument SYNCHRONOUS.  
Use `_gpgme_op_reset`. Make function static.  
(gpgme\_op\_import\_start): Just a wrapper around  
`_gpgme_op_import_start` now.  
(gpgme\_op\_import): Add synchronous argument. Use `_gpgme_wait_one`  
instead



gpgme\_wait.

\* keylist.c (gpgme\_op\_keylist\_start): Use \_gpgme\_op\_reset.  
(gpgme\_op\_keylist\_ext\_start): Likewise.

\* sign.c (gpgme\_op\_sign\_start): Rename to ...  
(\_gpgme\_op\_sign\_start): ... this. New argument SYNCHRONOUS. Use \_gpgme\_op\_reset. Make function static.  
(gpgme\_op\_sign\_start): Just a wrapper around \_gpgme\_op\_sign\_start now.

(gpgme\_op\_sign): Add synchronous argument. Use \_gpgme\_wait\_one instead gpgme\_wait.

\* trustlist.c (gpgme\_op\_trustlist\_start): Use \_gpgme\_op\_reset.

\* verify.c (gpgme\_op\_verify\_start): Rename to ...  
(\_gpgme\_op\_verify\_start): ... this. New argument SYNCHRONOUS. Use \_gpgme\_op\_reset. Make function static.  
(gpgme\_op\_verify\_start): Just a wrapper around \_gpgme\_op\_verify\_start now.

(gpgme\_op\_verify): Add synchronous argument. Use \_gpgme\_wait\_one instead gpgme\_wait.

\* engine-gpgsm.c (iocb\_data\_t): New type.  
(struct gpgsm\_object\_s): New member status\_cb. Replace input\_fd and input\_data with input\_cb. Replace output\_fd and output\_data with output\_cb. Replace message\_fd and message\_data with message\_cb. New member io\_cbs.

(\_gpgme\_gpgsm\_new): Initialize all new members (and drop the old ones).

(close\_notify\_handler): New variable POSSIBLY\_DONE. For each I/O callback, check if it should be unregistered. If all callbacks have been unregistered, trigger GPGME\_EVENT\_DONE.

(\_gpgme\_gpgsm\_release): Remove variable PID. Use new variable names to close the file descriptors.

(\_gpgme\_gpgsm\_op\_decrypt): Use new variable names,  
(\_gpgme\_gpgsm\_op\_encrypt): Likewise.  
(\_gpgme\_gpgsm\_op\_genkey): Likewise.  
(\_gpgme\_gpgsm\_op\_import): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist\_ext): Likewise.  
(\_gpgme\_gpgsm\_op\_sign): Likewise.  
(\_gpgme\_gpgsm\_op\_verify): Likewise.

(gpgsm\_status\_handler): Drop argument PID. Change return type to void. Close status pipe before returning because of EOF or error.

(\_gpgme\_gpgsm\_add\_io\_cb): New function.

(\_gpgme\_gpgsm\_start): Use \_gpgme\_gpgsm\_add\_io\_cb to register callback function.

(\_gpgme\_gpgsm\_set\_io\_cbs): New function.

\* engine-gpgsm.h: New prototype for \_gpgme\_gpgsm\_set\_io\_cbs.

\* engine.c (\_gpgme\_engine\_set\_io\_cbs): New function.

\* engine.h: New prototype for \_gpgme\_engine\_set\_io\_cbs.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_la\_SOURCES): Remove mutex.h.

2002-06-03 Marcus Brinkmann <marcus@g10code.de>

\* key.c: Include <ctype.h>.

(\_gpgme\_key\_append\_name): Skip one more char when processing escaped char. Submitted by Marc Mutz <mutz@kde.org>. Handle hexadecimal encodings. Also reported by Marc. Thanks!

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* ath.h: Enable the \_gpgme\_prefix. Fix all those prefix macros.

\* posix-sema.c: Use that prefix here.

\* posix-io.c: Include "ath.h".

(\_gpgme\_io\_read): Use \_gpgme\_ath\_read instead read.

(\_gpgme\_io\_write): Use \_gpgme\_ath\_write instead write.

(\_gpgme\_io\_waitpid): Use \_gpgme\_ath\_waitpid instead waitpid.

(\_gpgme\_io\_select): Use \_gpgme\_ath\_select instead select.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (ath\_components): New variable.

(ath\_components\_pthread): Likewise.

(ath\_components\_pth): Likewise.

(system\_components): Add ath\_componentes.

\* ath.h: New file.

\* ath.c: Likewise.

\* ath-pthread.c: Likewise.

\* ath-pth.c: Likewise.

\* posix-sema.c (\_gpgme\_sema\_cs\_enter): Rework to use the ATH interface.

\* mutex.h: Remove file.

2002-05-30 Werner Koch <wk@gnupg.org>

\* key.c (gpgme\_key\_get\_string\_attr): Return NULL when asking for an issuer with IDX > 0. We don't support altIssuerNames for now.

2002-05-22 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist\_ext): Aehmm, added missing variable definition. Oohh - Marcus was faster.

2002-05-22 Marcus Brinkmann <marcus@gnu.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist\_ext): Fix last change.

2002-05-21 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist)  
(\_gpgme\_gpgsm\_op\_keylist\_ext):  
Pass the keylist mode to gpgsm.

2002-05-10 Werner Koch <wk@gnupg.org>

\* key.h (gpgme\_key\_s): Add OTRUST.  
\* keylist.c (set\_ownertrust): New.  
(keylist\_colon\_handler): Get the ownertrust value  
\* key.c (gpgme\_key\_get\_string\_attr, gpgme\_key\_get\_ulong\_attr):  
Return that value.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

\* w32-util.c: New static variable GET\_PATH\_LOCK.  
(\_gpgme\_get\_gpg\_path): Remove superfluous NULL initializer.  
Take lock while determining path.  
(\_gpgme\_get\_gpgsm\_path): Likewise.  
\* version.c (do\_subsystem\_inits): Set DONE to 1 after  
initialization.  
(gpgme\_get\_engine\_info): New variable ENGINE\_INFO\_LOCK. Take lock  
while determining engine info.  
\* runpg.c (\_gpgme\_gpg\_get\_version): New variable  
GPG\_VERSION\_LOCK. Take the lock while determining the program  
version.  
\* posix-io.c: Include "sema.h".  
(\_gpgme\_io\_spawn): New variable FIXED\_SIGNALS\_LOCK. Take the lock  
while fixing the signals.  
(\_gpgme\_io\_select): Make READFDS and WRITEFDS non-static.  
\*  
key.c: Include "sema.h". New globals KEY\_CACHE\_LOCK and  
KEY\_REF\_LOCK.  
(capabilities\_to\_string): Make STRINGS very const.  
(\_gpgme\_key\_cache\_add): Lock the key cache.  
(\_gpgme\_key\_cache\_get): Likewise.  
(gpgme\_key\_ref, gpgme\_key\_release): Lock the key\_ref\_lock.  
\* import.c (append\_xml\_impinfo): Make IMPORTED\_FIELDS and  
IMPORT\_RES\_FIELDS very const. Make FIELD and FIELD\_NAME a little  
const.  
\* engine.c (\_gpgme\_engine\_get\_info): New variable  
ENGINE\_INFO\_LOCK. Take lock while determining engine info.

\* engine-gpgsm.c: Include "sema.h".  
(\_gpgme\_gpgsm\_get\_version): New variable GPGSM\_VERSION\_LOCK. Take lock while getting program version.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

\* debug.h: New file.  
\* Makefile.am (libpgme\_la\_SOURCES): Add debug.h.  
\* util.h: Removed all prototypes and declarations related to debugging. Include "debug.h".

\* debug.c (debug\_level): Comment variable and remove superfluous zero initializer.  
(errfp): Likewise.  
(\_gpgme\_debug\_enabled):  
Function removed.  
(struct debug\_control\_s): Definition removed.  
(\_gpgme\_debug\_level): Function removed.  
(\_gpgme\_debug\_begin): Rewritten to use vasprintf. Accept a printf-style format specification and a variable number of arguments.  
(\_gpgme\_debug\_add): Rewritten using vasprintf. Expect that format starts out with "%s" for simplicity.  
(\_gpgme\_debug\_end): Rewritten using vasprintf. Do not accept a TEXT argument anymore.

\* posix-io.c (\_gpgme\_io\_select): Use new level argument for DEBUG\_BEGIN instead explicit if construct.

\* debug.c (debug\_init): Remove superfluous zero initializer, remove volatile flag of INITIALIZED. Do not use the double-checked locking algorithm, it is fundamentally flawed and will empty your fridge (on a more serious note, despite the volatile flag it doesn't give you the guarantee you would expect, for example on a DEC Alpha or an SMP machine. The volatile only serializes accesses to the volatile variable, but not to the other variables).

2002-05-03

Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Redirect any gpgsm error output to /dev/null.

\* verify.c (gpgme\_get\_sig\_key): Set the protocol of the listctx.  
\* gpgme.c (gpgme\_get\_protocol): New.

\* data.c (gpgme\_data\_write): Changed type of BUFFER to void\*.

(gpgme\_data\_read): Ditto.

\* verify.c (\_gpgme\_verify\_status\_handler): Handle TRUST\_\* status lines so that a claim can be made without looking up the key.

(gpgme\_get\_sig\_string\_attr): New.

(gpgme\_get\_sig\_ulong\_attr): New.

\* gpgme.h (GpgmeAttr): Added GPGME\_ATTR\_SIG\_STATUS.

\* runpgg.h: Add new status codes from gpg 1.0.7 and formatted the list to align with the status.h file from gnupg.

\* gpgme.h (GpgmeSigStat): Add \_GOOD\_EXP and \_GOOD\_EXPKEY.

\* verify.c (\_gpgme\_verify\_status\_handler, finish\_sig): Handle these new status codes. Store the expiration time

2002-04-27 Werner Koch <wk@gnupg.org>

\* gpgme.h (GpgmeData\_Encoding): New.

\* data.c (gpgme\_data\_get\_encoding, gpgme\_data\_set\_encoding): New.

\* engine-gpgsm.c (map\_input\_enc): New. Use it in all local functions where the INPUT command gets send.

2002-04-27 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Close the output descriptor only when we don't need it anymore. Close the message descriptor if we don't need it.

2002-04-26 Werner Koch <wk@gnupg.org>

\* Makefile.am (libgpgme\_la\_LIBADD): Use libtool libraries.

2002-04-25 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_release): Call gpgme\_data\_release on GPG->cmd.cb\_data, not xfree.

2002-04-25 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Set the display, ttyname, ttytype, lc\_ctype and lc\_messages options in the server.

2002-04-24 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (map\_assuan\_error): Add new error codes.

2002-04-23 Werner Koch <wk@gnupg.org>

\* key.c (gpgme\_key\_get\_ulong\_attr): Swapped use of can\_encrypt and can\_certify to return the requested values.

2002-04-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_get\_progress\_cb): Allow either return parameter to be NULL.  
(gpgme\_get\_passphrase\_cb): Likewise.

2002-04-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_get\_passphrase\_cb): New function.  
(gpgme\_get\_progress\_cb): New function.  
\* gpgme.h: Add new prototypes for gpgme\_get\_passphrase\_cb and gpgme\_get\_progress\_cb.

2002-03-28 Werner Koch <wk@gnupg.org>

\* gpgme.h (GpgmeAttr): Add values for issuer and chaining.  
\* key.h (gpgme\_key\_s): Add issuer and chaining elements for X509.  
\* keylist.c (keylist\_colon\_handler): Store them.  
\* key.c (gpgme\_key\_release): Free them.  
(gpgme\_key\_get\_as\_xml,gpgme\_key\_get\_string\_attr): Print them.

2002-03-26 Werner Koch <wk@gnupg.org>

\* Makefile.am (libgpgme\_la\_SOURCES): Add mutex.h

2002-03-21 Werner Koch <wk@gnupg.org>

\* util.h [!HAVE\_FOPENCOOKIE]: Make sure off\_t and ssize\_t are defined.

2002-03-18 Marcus Brinkmann <marcus@g10code.de>

\*

Makefile.am (system\_components): New variable, set depending on HAVE\_DOSISH\_SYSTEM.  
(libgpgme\_la\_SOURCES): Use system\_components. Remove `syshdr.h'.  
\* syshdr.h: File removed.

\* posix-io.c: Remove !HAVE\_DOSISH\_SYSTEM safeguard. Clean up source.  
\* posix-sema.c: Likewise.  
\* posix-util.c: Likewise.

\* w32-io.c: Remove HAVE\_DOSISH\_SYSTEM safeguard.

\* w32-sema.c: Likewise.

\* w32-util.c: Likewise.

\* posix-io.c: Include `unistd.h', do not include `syshdr.h'.

\* posix-sema.c: Likewise.

\* w32-io.c: Include `io.h', do not include `syshdr.h'

\* w32-sema.c: Likewise.

\* w32-util.c: Likewise.

\* data.c: Do not include `syshdr.h'.

\* wait.c: Likewise.

\* wait.h: Code cleanup.

\* mutex.h: New file.

\* posix-sema.c: Implement.

2002-03-08 Werner Koch <wk@gnupg.org>

\* util.h [HAVE\_FOPENCOOKIE]: Fixed type. Thanks to Frank Heckenbach.

2002-03-07 Werner Koch <wk@gnupg.org>

\* gpgme.h (gpgme\_op\_keylist\_ext\_start): Add prototype.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

\*

encrypt.c (\_gpgme\_encrypt\_sym\_status\_handler): New function.

(gpgme\_op\_encrypt\_start): New variable SYMMETRIC, set it if RECP is null, and if it is set, use \_gpgme\_encrypt\_sym\_status\_handler as status handler and run \_gpgme\_passphrase\_start.

\* runpg.c (\_gpgme\_gpg\_op\_encrypt): If RECP is zero, do symmetric encryption.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_encrypt): If RECP is zero, return error value.

\* runpg.c (\_gpgme\_gpg\_op\_verify): Add "--" argument.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Also set the error No\_Passphrase if only a bad passphrase was provided.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (\_gpgme\_gpg\_op\_verify): If TEXT is of mode GPGME\_DATA\_MODE\_IN, construct a command line that stores the plaintext in TEXT.

\* verify.c (gpgme\_op\_verify\_start): Accept TEXT being uninitialized, and in this case interpret SIG as a normal or cleartext signature and TEXT as a return data object.  
\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist\_ext) [!ENABLE\_GPGSM]: Add stub function.

2002-02-28 Werner Koch <wk@gnupg.org>

\* key.h (subkey\_s): New member expires\_at.  
\* keylist.c (keylist\_colon\_handler): Set it here  
\* key.c (gpgme\_key\_get\_as\_xml,gpgme\_key\_get\_ulong\_attr): Return it.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.h (\_gpgme\_gpg\_op\_keylist\_ext): New prototype.  
\* runpgg.c (\_gpgme\_gpg\_op\_keylist\_ext): New function.  
\* engine-gpgsm.h (\_gpgme\_gpgsm\_op\_keylist\_ext): New prototype.  
\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist\_ext): New function.  
\* engine.h (\_gpgme\_engine\_op\_keylist\_ext): New prototype.  
\* engine.c (\_gpgme\_engine\_op\_keylist\_ext): New function.  
\* keylist.c (gpgme\_op\_keylist\_ext\_start): New function.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add new error code GPGME\_Invalid\_Recipient.  
\* encrypt.c (struct encrypt\_result\_s): New member invalid\_recipients, rename no\_recipients to no\_valid\_recipients.  
(\_gpgme\_encrypt\_status\_handler): Include error for invalid recipients.  
\* engine-gpgsm.c (gpgsm\_set\_recipients): Change type of first argument to GpgsmObject. Use that to report back the status about the recipients.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (\_gpgme\_verify\_status\_handler): Fix the last change.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (\_gpgme\_verify\_status\_handler): Parse the args line to see if the problem is due to a missing key, and report that back to the user.



2002-02-25 Marcus Brinkmann <marcus@g10code.de>

- \* engine.c (\_gpgme\_engine\_op\_encrypt\_sign): New function.
- \* engine.h (\_gpgme\_engine\_op\_encrypt\_sign): New prototype.
- \* runpgg.c (\_gpgme\_append\_gpg\_args\_from\_signers): New function.
- (\_gpgme\_gpg\_op\_sign): Use that new function.
- (\_gpgme\_gpg\_op\_encrypt\_sign): New function.
- \* runpgg.h (\_gpgme\_gpg\_op\_encrypt\_sign):  
New prototype.
- \* gpgme.h (gpgme\_op\_encrypt\_sign\_start): New prototype.
- (gpgme\_op\_encrypt\_sign): Likewise.
- \* Makefile.am (libgpgme\_la\_SOURCES): Add encrypt-sign.c.
- \* ops.h (\_gpgme\_encrypt\_status\_handler): Add prototype.
- (\_gpgme\_sign\_status\_handler): Add prototype.
- \* sign.c (sign\_status\_handler): Rename to ...
- (\_gpgme\_sign\_status\_handler): ... this and make non-static.
- \* encrypt.c (encrypt\_status\_handler): Rename to ...
- (\_gpgme\_encrypt\_status\_handler): ... this and make non-static.
- \* encrypt.c (gpgme\_op\_encrypt\_start): Use new status handler name.
- \* sign.c (gpgme\_op\_sign\_start): Likewise.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

- \* context.h (struct gpgme\_context\_s): New member include\_certs.
- \* gpgme.h (gpgme\_set\_include\_certs): Add prototype.
- (gpgme\_get\_include\_certs): Likewise.
- \* gpgme.c (gpgme\_set\_include\_certs): New function.
- (gpgme\_get\_include\_certs): Likewise.
- (gpgme\_new): Set include\_certs to 1 (the default).
- \* engine.c (\_gpgme\_engine\_op\_sign): Accept  
new argument include\_certs,  
and pass it to \_gpgme\_gpgsm\_op\_sign.
- \* engine.h (\_gpgme\_engine\_op\_sign): Likewise for prototype.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign): Accept new argument  
include\_certs and handle it.
- \* engine-gpgsm.h (\_gpgme\_gpgsm\_start): Add new argument include\_certs.
- \* sign.c (gpgme\_op\_sign\_start): Add new argument to  
\_gpgme\_engine\_op\_sign call.

2002-02-14 Werner Koch <wk@gnupg.org>

- \* keylist.c (gpgme\_op\_keylist\_start): Do not use a verbose listing.

2002-02-13 Werner Koch <wk@gnupg.org>

- \* vasprintf.c, fopencookie.c: Add replacement functions.
- \* util.h: Add prototypes for them.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_assuan\_simple\_command): Return 0 if we reach the end of the function.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* genkey.c (gpgme\_op\_genkey\_start): Fix logic in validity check.  
(gpgme\_op\_genkey\_start): Skip newlines after opening tag.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_start): Remove cruft.

2002-02-08

Marcus Brinkmann <marcus@g10code.de>

\* genkey.c (gpgme\_op\_genkey\_start): Allow PUBKEY and SECKEY to be set, and pass them down to the crypto engine.

\* engine-gpgsm.h (\_gpgme\_gpgsm\_start): New arguments PUBKEY and SECKEY.

\* engine.h: Likewise.

\* runpgg.h (\_gpgme\_gpg\_spawn): Likewise.

\* engine.c (\_gpgme\_engine\_op\_genkey): Likewise. Use those arguments.

\* runpgg.c (\_gpgme\_gpg\_op\_genkey): Likewise. Complain if those arguments are set.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_genkey): Likewise. Implement function.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist): Beautify comment.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_op\_keylist): Remove handling of keylist mode (for now).

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (gpgme\_wait): Add new argument STATUS, in which the status of the returned context is returned.

(\_gpgme\_wait\_on\_condition): Rework the function a bit, to make it aware of cancelled processes, and to allow to use gpgme\_wait with

CTX being NULL (as documented in the source).

(struct proc\_s): New member REPORTED.

\* gpgme.h: Fix prototype.

\* verify.c (gpgme\_op\_verify): Fix use of gpgme\_wait.

\* sign.c (gpgme\_op\_sign): Likewise.

\* import.c (gpgme\_op\_import): Likewise.

- \* genkey.c (gpgme\_op\_genkey): Likewise.
- \* export.c (gpgme\_op\_export): Likewise.
- \* encrypt.c (gpgme\_op\_encrypt): Likewise.
- \* delete.c (gpgme\_op\_delete): Likewise.
- \* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Likewise.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_set\_keylist\_mode): Possibly return an error value.
- (gpgme\_get\_keylist\_mode): New function.
- (gpgme\_new): Set the default for keylist\_mode member of CTX.
- \* gpgme.h (gpgme\_set\_keylist\_mode): Fix prototype.
- (gpgme\_get\_keylist\_mode): New prototype.
- (GPGME\_KEYLIST\_MODE\_LOCAL): New macro.
- (GPGME\_KEYLIST\_MODE\_EXTERN): Likewise..

2002-02-02 Marcus Brinkmann <marcus@g10code.de>

This patch has gotten a bit large... mmh. The main thing that happens here is that error values are now not determined in the operation function after gpgme\_wait completed, but in the status handler when EOF is received. It should always be the case that either an error is flagged or EOF is received, so that after a gpgme\_wait you should never have the situation that no error is flagged and EOF is not received. One problem is that the engine status handlers don't have access to the context, a horrible kludge works around this for now. All errors that happen during a pending operation should be caught and reported in ctx->error, including out-of-core and cancellation. This rounds up neatly a couple of loose ends, and makes it possible to pass up any errors in the communication with the backend as well. As a bonus, there will be a function to access gpgme->wait, so that the operations can truly be implemented with their \_start function.

- \* engine-gpgsm.c (gpgsm\_status\_handler): Horrible kludge to report error back to the context.
- \* runpg.c (gpg\_status\_handler): Same horrible kludge applied here.
- \* engine-gpgsm.c (gpgsm\_assuan\_simple\_command): Add error checking.
- \* wait.c (\_gpgme\_wait\_on\_condition): If canceled, set CTX->error to a value indication that.
- \* verify.c (add\_notation): Set error, not out\_of\_core.

(finish\_sig): Likewise.

(gpgme\_op\_verify\_start): Don't clear out\_of\_core.

(\_gpgme\_verify\_status\_handler): At EOF, clean up the notation data.

(gpgme\_op\_verify): And don't do it here.

\* trustlist.c (trustlist\_status\_handler): Check error, not out\_of\_core.

(gpgme\_op\_trustlist\_start): Don't clear out\_of\_core.

(gpgme\_op\_trustlist\_next): Check error, not out\_of\_core.

(gpgme\_op\_trustlist\_end): Likewise.

\* ops.h (test\_and\_allocate\_result): New macro.

(\_gpgme\_passphrase\_result): Remove prototype.

\* delete.c (gpgme\_op\_delete): Return error from context.

(delete\_status\_handler): Use macro test\_and\_allocate\_result.  
Perform error checking at EOF.

(gpgme\_op\_delete\_start): Release  
result.

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Use macro  
test\_and\_allocate\_result, and perform error checking here.

(\_gpgme\_passphrase\_result): Function removed.

\* sign.c (gpgme\_op\_sign\_start): Do not set out\_of\_core to zero.

(gpgme\_op\_sign): Just return the error value from the context.

(sign\_status\_handler): Only progress if no error is set yet. If  
we process an EOF, set the resulting error value (if any).

\* decrypt.c (\_gpgme\_decrypt\_result): Function removed.

(create\_result\_struct): Function removed.

(\_gpgme\_decrypt\_status\_handler): Use macro test\_and\_allocate\_result,  
calculate error on EOF, do not progress with errors.

(\_gpgme\_decrypt\_start): Do not set out\_of\_core to zero.

(gpgme\_op\_decrypt): Just return the error value from the context.

\* encrypt.c (encrypt\_status\_handler): Perform the error checking  
here.

(gpgme\_op\_encrypt\_start): Do not clear out\_of\_core.

\* export.c (export\_status\_handler): Return if error is set in context.

(gpgme\_op\_export\_start):  
Release result.

(gpgme\_op\_export): Return error from context.

\* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Return the error in  
the context.

\* genkey.c (genkey\_status\_handler): Use macro  
test\_and\_allocate\_result. Perform error checking at EOF.

(gpgme\_op\_genkey): Just return the error from context.

\* import.c (gpgme\_op\_import): Return the error from context.

(import\_status\_handler): Use macro test\_and\_allocate\_result.

\* keylist.c (gpgme\_op\_keylist\_start): Do not clear out\_of\_core.

(gpgme\_op\_keylist\_next): Return error of context.

(keylist\_colon\_handler): Set error instead out\_of\_code.

(finish\_key): Likewise.

\* context.h: Remove member out\_of\_core, add member error.  
\* gpgme.c (\_gpgme\_release\_result): Clear error flag.

\* engine.h (\_gpgme\_engine\_get\_error): New prototype.  
\* engine.c (\_gpgme\_engine\_get\_error): New function.  
\* engine-gpgsm.c (\_gpgme\_gpgsm\_get\_error): New function.

\* engine-gpgsm.c (map\_assuan\_error): New function.  
(gpgsm\_assuan\_simple\_command): Change  
return type to GpgmeError,  
use the new function to map error values.  
(gpgsm\_set\_fd): Change return type to GpgmeError.  
(\_gpgme\_gpgsm\_op\_decrypt): Change type of ERR to GpgmeError.  
(gpgsm\_set\_recipients): Likewise. Change type of return value  
equivalently. Adjust error values.  
(\_gpgme\_gpgsm\_op\_import): Likewise.  
(\_gpgme\_gpgsm\_op\_sign): Likewise.  
(struct gpgsm\_object\_s): New member error.  
(gpgsm\_status\_handler): Set error if error occurs. Determine  
error number from ERR line received. If assuan\_read\_line fails,  
terminate the connection.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (MOSTLYCLEANFILES): New variable.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): At error, terminate the  
connection to the server.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.h: Add STATUS\_KEY\_CREATED.

\* progress.c: New file.  
\* Makefile.am (libgpgme\_la\_SOURCES): Add progress.c.

\* genkey.c (genkey\_status\_handler):  
Use  
\_gpgme\_progress\_status\_handler. Add check for status.  
(struct genkey\_result\_s): New structure.  
(\_gpgme\_release\_genkey\_result): New function.  
(gpgme\_op\_genkey): Check for error.  
\* gpgme.c (\_gpgme\_release\_result): Call  
\_gpgme\_release\_genkey\_result.  
\* ops.h (\_gpgme\_release\_genkey\_result): Add prototype.

- \* types.h (GenKeyResult): New type.
- \* context.h (gpgme\_context\_s): Add GenKeyResult to member result.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (\_gpgme\_release\_result): Call \_gpgme\_release\_delete\_result.
- \* ops.h (\_gpgme\_release\_delete\_result): Add prototype.
- \* types.h (DeleteResult): New type.
- \* context.h (gpgme\_context\_s): Add DeleteResult to member result.

- \* delete.c (enum delete\_problem): New type.
- (struct delete\_result\_s): New structure.
- (\_gpgme\_release\_delete\_result): New function.
- (delete\_status\_handler): Implement more status codes.
- (gpgme\_op\_delete): Return error on failure.

- \* import.c (MAX\_IMPORTED\_FIELDS): Bump up to 14.

2002-01-30

Marcus Brinkmann <marcus@g10code.de>

- \* import.c (struct import\_result\_s): New structure.
- (\_gpgme\_release\_import\_result): New function.
- (append\_xml\_impinfo): Likewise.
- (import\_status\_handler): Implement.
- \* gpgme.c (\_gpgme\_release\_result): Add call to \_gpgme\_release\_import\_result.
- \* ops.h (\_gpgme\_release\_import\_result): Add prototype.
- \* types.h (ImportResult): New type.
- \* context.h (gpgme\_context\_s): Add ImportResult to member result.

- \* encrypt.c (gpgme\_op\_encrypt): Code clean up.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h: Add lots of comment and fix the formatting. Add gpgme\_trustlist\_end prototype.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h: Add new type GpgmeIdleFunc. Change type of gpgme\_register\_idle to return and accept this type.
- \* wait.c (gpgme\_register\_idle): Fix type.
- Save and return old value of idle\_function.

2002-01-29 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist): Implement secret only mode.

\* keylist.c (keylist\_colon\_handler): Add support for the new "crs" record type.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_release): Call assuan\_disconnect, not assuan\_pipe\_disconnect.

\* Makefile.am (libgpgme\_la\_LIBADD): Change to link assuan and jnlib (needed by assuan) statically into libgpgme. Linking a static library into a shared library this way is not portable.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (GpgmePassphraseCb): Change type of R\_HD from void\* to void\*\*.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* data.c (gpgme\_data\_new\_from\_filepart): Change type of LENGTH from off\_t to size\_t.

\* gpgme.h: Likewise.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (\_gpgme\_wait\_on\_condition): If the process finished, reset the pending flag. Also if the operation was cancelled.

(struct proc\_s): Rename READY to DONE.

(wait\_item\_s): Likewise.

(set\_process\_ready): Rename

to ...

(set\_process\_done): ... this.

(\_gpgme\_remove\_proc\_from\_wait\_queue): Call set\_process\_done instead set\_process\_ready.

(\_gpgme\_wait\_on\_condition): Likewise.

(do\_select): Rename READY to DONE.

\* verify.c (gpgme\_op\_verify): Do not set pending to zero here.

\* sign.c (gpgme\_op\_sign): Likewise.

\* import.c (gpgme\_op\_import): Likewise.

\* genkey.c (gpgme\_op\_genkey): Likewise.

\* export.c (gpgme\_op\_export): Likewise.

\* encrypt.c (gpgme\_op\_encrypt): Likewise.

\* delete.c (gpgme\_op\_delete): Likewise.

\* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Likewise.

\* decrypt.c (gpgme\_op\_decrypt): Likewise.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* export.c: Cleanup.

2002-01-15 Marcus Brinkmann <marcus@g10code.de>

\* trustlist.c: Various source clean ups.

(my\_isdigit): Removed.

(gpgme\_op\_trustlist\_end): New function.

2002-01-13 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c: Various source clean ups, like renaming C to CTX where appropriate.

(gpgme\_new): Clear

R\_CTX before starting the work.

(my\_isdigit): Removed.

(my\_isxdigit): Likewise.

\* data.c: Various source clean ups.

(gpgme\_data\_new\_from\_mem): Check BUFFER after clearing R\_DH.

(gpgme\_data\_new\_with\_read\_cb): Similar for READ\_CB.

(gpgme\_data\_new\_from\_file): Loop over fread while EINTR.

(gpgme\_data\_new\_from\_filepart): Rediddled a bit. Allow LENGTH to be zero. Loop over fread while EINTR.

(my\_isdigit): Removed.

(my\_isxdigit): Likewise.

2001-12-21 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Replace General\_Error with Pipe\_Error where appropriate.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* engine.c: Include `string.h'. Reported by Stphane Corthisy.

\* version.c (get\_engine\_info): Remove prototype.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): New variable CHILD\_FDS.

Fill it with the servers fds, and pass it to assuan\_pipe\_connect.



2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\*

keylist.c (gpgme\_op\_keylist\_end): New function.

\* gpgme.h (gpgme\_op\_keylist\_end): New prototype.

\* engine.h (gpgme\_engine\_check\_version): Move prototype to ...

\* gpgme.h (gpgme\_engine\_check\_version): ... here.

\* genkey.c (gpgme\_op\_genkey\_start): Remove unused variable.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* version.c (gpgme\_get\_engine\_info): Reimplemented.

(gpgme\_check\_engine): Reimplemented.

(\_gpgme\_compare\_versions): Return NULL if MY\_VERSION is NULL.

\* engine.c: Include `io.h'.

(gpgme\_engine\_get\_info): New function.

\* engine.h (gpgme\_engine\_check\_version, \_gpgme\_engine\_get\_info):

Add prototype.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (struct reap\_s, reap\_list, reap\_list\_lock): Moved to ...

\* engine.c (struct reap\_s, reap\_list, reap\_list\_lock): ... here.

Include `time.h', `sys/types.h', `assert.h', and `sema.h'.

\* runpgg.c (\_gpgme\_engine\_add\_child\_to\_reap\_list): New function.

(do\_reaping, \_gpgme\_gpg\_housecleaning): Moved to

...

\* engine.c (do\_reaping, \_gpgme\_engine\_housecleaning): ... here.

\* runpgg.c (\_gpgme\_gpg\_release): Replace code that is now in its own function by call to \_gpgme\_engine\_add\_child\_to\_reap\_list().

\* wait.c: Include `engine.h'.

(run\_idle): Call \_gpgme\_engine\_housecleaning(), not

\_gpgme\_gpg\_housecleaning().

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_append\_name): Append, not prepend, the uid.

Initialize the next field of the uid structure.

(gpgme\_key\_get\_as\_xml): Do not list last uid first.

2001-12-17 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_set\_colon\_line\_handler): New

function [!ENABLE\_GPGSM].

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Put TEXT into message\_data, not SIG.

(\_gpgme\_gpgsm\_op\_sign): Use '--detached', not '--detach'.

\* sign.c (sign\_status\_handler): Call \_gpgme\_passphrase\_status\_handler early.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\*

engine-gpgsm.c: Revert last change.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): Freeze the output file handler when ending this operation, otherwise the wait function will sit on it.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (struct gpgsm\_object\_s): New member colon.attic.  
(\_gpgme\_gpgsm\_new): Initialize some more members.  
(\_gpgme\_gpgsm\_release): Free the colon line handler's attic line.  
(gpgsm\_status\_handler): Rework the inline-data processing.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (\_gpgme\_gpg\_spawn): Do not add the fds to the child list that are not dup'ed, for those the close-on-exec flag is set now.

\* version.c (\_gpgme\_get\_program\_version): Remove first entry in CFD, as the close-on-exec flag is now set for this fd.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_encrypt): Do not add 'armor' option to 'ENCRYPT'.

\* engine-gpgsm.c

(gpgsm\_set\_recipients): Free LINE when returning successfully.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (close\_notify\_handler): New function.

(\_gpgme\_gpgsm\_new): Manage the file descriptors a bit differently. Do not set close-on-exec flags.  
(\_gpgme\_gpgsm\_op\_decrypt): Do not set message\_fd to -1, this is done by the close handler.  
(\_gpgme\_gpgsm\_op\_encrypt): Likewise.  
(\_gpgme\_gpgsm\_op\_import): Likewise (also for output\_fd).  
(\_gpgme\_gpgsm\_op\_keylist): Likewise (also for input\_fd and output\_fd).  
(\_gpgme\_gpgsm\_op\_sign): Likewise.  
(\_gpgme\_gpgsm\_op\_verify): Likewise, but for output\_fd.

\* posix-io.c (\_gpgme\_io\_pipe): Set the close-on-exec flag for the non-inherited file descriptor index of the pipe.

2001-12-13 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_set\_colon\_line\_handler): New.  
(gpgsm\_status\_handler): Pass datalines to a colon handler  
\* engine.c (\_gpgme\_engine\_set\_colon\_line\_handler): Set the colon handler for gpgsm.

\* engine-gpgsm.c  
(\_gpgme\_gpgsm\_op\_keylist): Allow NULL for pattern.  
(gpgsm\_assuan\_simple\_command): Removed underscore from assuan\_write\_line.  
(\_gpgme\_gpgsm\_start): Ditto.  
(gpgsm\_assuan\_simple\_command): Replaced internal Assuan read function by the new assuan\_read\_line. Removed the use of the internal header.  
(gpgsm\_status\_handler): Ditto. Use the new assuan\_pending\_line.  
(\_gpgme\_gpgsm\_start): Use the documented way to get an fd from assuan.

\* keylist.c (keylist\_colon\_handler): Handle "crt" records  
\* key.h (gpgme\_key\_s): Add an x509 flag.  
\* key.c (parse\_x509\_user\_id): New.  
(\_gpgme\_key\_append\_name): Handle x.509 names.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): Make it work with current version of assuan.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_set\_fd): Accept one more argument OPT.  
(\_gpgme\_gpgsm\_op\_encrypt): Pass armor argument to gpgsm\_set\_fd for output descriptor.

(\_gpgme\_gpgsm\_op\_sign):

Likewise.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (gpgme\_op\_keylist\_next): Set pending to 0 if EOF occurs.

2001-11-26 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign): Fix stupid typo.

2001-11-24 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): Don't break if bsearch fails. Deal with assuan read line returning more than one line (for now).

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign): Implement it according to the current protocol definition.

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Set CLOEXEC flag for parent ends of the pipe.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Include stdlib.h and string.h. Also include, for now, runpg.h and status-table.h. (gpgsm\_status\_handler): Implement more of the status handler.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\*

engine.c (\_gpgme\_engine\_op\_decrypt): Implement CMS case.

(\_gpgme\_engine\_op\_delete): Likewise.

(\_gpgme\_engine\_op\_encrypt): Likewise.

(\_gpgme\_engine\_op\_export): Likewise.

(\_gpgme\_engine\_op\_genkey): Likewise.

(\_gpgme\_engine\_op\_keylist): Likewise.

(\_gpgme\_engine\_op\_sign): Likewise.

(\_gpgme\_engine\_op\_trustlist): Likewise.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_encrypt): New function.

(gpgsm\_assuan\_simple\_command): Likewise.

(gpgsm\_set\_recipients): Likewise.

(gpgsm\_set\_fd): Reimplement using gpgsm\_assuan\_simple\_command.  
(\_gpgme\_gpgsm\_op\_delete): New function.  
(\_gpgme\_gpgsm\_op\_export): Likewise.  
(\_gpgme\_gpgsm\_op\_genkey): Likewise.  
(\_gpgme\_gpgsm\_op\_sign): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist): Likewise.  
(\_gpgme\_gpgsm\_op\_trustlist): Likewise.  
(\_gpgme\_gpgsm\_release): Release command.  
(\_gpgme\_gpgsm\_op\_decrypt): Allocate command.  
(\_gpgme\_gpgsm\_op\_import): Likewise.  
(gpgsm\_status\_handler): Also treat `ERR` strings as EOF.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h  
(gpgme\_set\_protocol): New prototype.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_decrypt): New function.  
(\_gpgme\_gpgsm\_op\_import): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Shuffle around header inclusion a bit, to still  
keep them separate.  
(\_gpgme\_set\_status\_handler) [ENABLE\_GPGSM]: New function.

2001-11-22 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c: Include more headers so that NULL and mk\_error  
is defined even with an undefined GPGSM\_PATH.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (gpg\_inbound\_handler, write\_mem\_data, write\_cb\_data,  
gpg\_outbound\_handler): Moved to ...  
\* data.c (\_gpgme\_data\_inbound\_handler, write\_mem\_data,  
write\_cb\_data, \_gpgme\_data\_outbound\_handler): ... here. Make the  
\_gpgme\_\* ones non-static.  
\* data.c: Include io.h.  
  
\* ops.h (\_gpgme\_data\_inbound\_handler): New prototype.  
(\_gpgme\_data\_outbound\_handler): Likewise.  
(\_gpgme\_gpg\_spawn): Use  
these new functions.  
  
\* engine-gpgsm.h (\_gpgme\_gpgsm\_op\_decrypt, \_gpgme\_gpgsm\_op\_delete,

`_gpgme_gpgsm_op_encrypt`, `_gpgme_gpgsm_op_export`,  
`_gpgme_gpgsm_op_genkey`, `_gpgme_gpgsm_op_import`,  
`_gpgme_gpgsm_op_keylist`, `_gpgme_gpgsm_op_sign`,  
`_gpgme_gpgsm_op_trustlist`, `_gpgme_gpgsm_op_verify`,  
`_gpgme_gpgsm_start`, `_gpgme_gpgsm_set_status_handler`): New prototype.  
Include `<runpg.h>` for status handler function.

\* `engine-gpgsm.c` (struct `gpgsm_object_s`): New members `input_fd`,  
`input_data`, `output_fd`, `output_data`, `message_fd`, `message_data`, `command`  
and `status`.

`(_gpgme_gpgsm_new)`: Open input, output and message pipes before  
connecting to the client. Close server's ends afterwards.

`(_gpgme_gpgsm_release)`: Close open file descriptors. Remove  
server process from wait queue.

`(_gpgme_gpgsm_op_verify`, `_gpgme_gpgsm_start`,  
`_gpgme_gpgsm_set_status_handler`, `gpgms_status_handler`): New function.

\* `engine.c` (`_gpgme_engine_start`): Implement for `GPGME_PROTOCOL_CMS`.

`(_gpgme_engine_set_status_handler)`:

Likewise.

`(_gpgme_engine_op_verify)`: Likewise.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

\* `context.h`: Do not include `runpg.h`, but `engine.h`.

(struct `gpgme_context_s`): Replace member `gpg` with `engine`.

\* `gpgme.c` (`gpgme_release`): Release engine, not `gpg`.

\* `recipient.c` (`_gpgme_append_gpg_args_from_recifipients`): Function  
moved ...

\* `runpg.c` (`_gpgme_append_gpg_args_from_recipients`): ... here.

Make static, change order of arguments, and return an error value.

\* `ops.h` (`_gpgme_append_gpg_args_from_recipients`): Removed prototype.

\* `runpg.h` (`_gpgme_gpg_op_verify`): Add prototype.

`(_gpgme_gpg_op_encrypt)`: Likewise.

`(_gpgme_gpg_op_decrypt)`: Likewise.

`(_gpgme_gpg_op_delete)`: Likewise.

`(_gpgme_gpg_op_export)`: Likewise.

`(_gpgme_gpg_op_genkey)`: Likewise.

`(_gpgme_gpg_op_import)`: Likewise.

`(_gpgme_gpg_op_keylist)`: Likewise.

`(_gpgme_gpg_op_sign)`: Likewise.

`(_gpgme_gpg_op_trustlist)`: Likewise.

\* `runpg.c` (`_gpgme_gpg_op_verify`): New function.

`(_gpgme_gpg_op_encrypt)`: Likewise.

`(_gpgme_gpg_op_decrypt)`:

Likewise.

(\_gpgme\_gpg\_op\_delete): Likewise.

(\_gpgme\_gpg\_op\_export): Likewise.

(\_gpgme\_gpg\_op\_genkey): Likewise.

(\_gpgme\_gpg\_op\_import): Likewise.

(\_gpgme\_gpg\_op\_keylist): Likewise.

(\_gpgme\_gpg\_op\_sign): Likewise.

(\_gpgme\_gpg\_op\_trustlist): Likewise.

\* engine.h (\_gpgme\_engine\_set\_status\_handler): Add prototype.

(\_gpgme\_engine\_set\_command\_handler): Likewise.

(\_gpgme\_engine\_set\_colon\_line\_handler): Likewise.

(\_gpgme\_engine\_op\_decrypt): Likewise.

(\_gpgme\_engine\_op\_delete): Likewise.

(\_gpgme\_engine\_op\_encrypt): Likewise.

(\_gpgme\_engine\_op\_export): Likewise.

(\_gpgme\_engine\_op\_genkey): Likewise.

(\_gpgme\_engine\_op\_import): Likewise.

(\_gpgme\_engine\_op\_keylist): Likewise.

(\_gpgme\_engine\_op\_sign): Likewise.

(\_gpgme\_engine\_op\_trustlist): Likewise.

(\_gpgme\_engine\_op\_verify): Likewise.

(\_gpgme\_engine\_start): Likewise.

\* engine.c (\_gpgme\_engine\_set\_status\_handler): New function.

(\_gpgme\_engine\_set\_command\_handler): Likewise.

(\_gpgme\_engine\_set\_colon\_line\_handler):

Likewise.

(\_gpgme\_engine\_op\_decrypt): Likewise.

(\_gpgme\_engine\_op\_delete): Likewise.

(\_gpgme\_engine\_op\_encrypt): Likewise.

(\_gpgme\_engine\_op\_export): Likewise.

(\_gpgme\_engine\_op\_genkey): Likewise.

(\_gpgme\_engine\_op\_import): Likewise.

(\_gpgme\_engine\_op\_keylist): Likewise.

(\_gpgme\_engine\_op\_sign): Likewise.

(\_gpgme\_engine\_op\_trustlist): Likewise.

(\_gpgme\_engine\_op\_verify): Likewise.

(\_gpgme\_engine\_start): Likewise.

\* verify.c (gpgme\_op\_verify\_start): Reimplement in terms of above functions.

\* encrypt.c (gpgme\_op\_encrypt\_start): Likewise.

\* decrypt.c (\_gpgme\_decrypt\_start): Likewise.

\* passphrase.c (\_gpgme\_passphrase\_start): Likewise.

\* keylist.c (gpgme\_op\_keylist\_start): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* types.h: Add types EngineObject and GpgsmObject.

\* Makefile.am (libgpgme\_la\_SOURCES): Add engine-gpgsm.h, engine-gpgsm.c, engine.h and engine.c.

\* engine.h: New file.

\* engine.c: Likewise.

\* engine-gpgsm.h: Likewise.

\*

engine-gpgsm.c: Likewise.

\* runpg.c (\_gpgme\_gpg\_get\_version): New function.

(\_gpgme\_gpg\_check\_version): Likewise.

\* runpg.h: Add prototypes for \_gpgme\_gpg\_get\_version and \_gpgme\_gpg\_check\_version.

\* version.c (compare\_versions): Rename to ...

(\_gpgme\_compare\_versions): ... this. Make non-static.

(gpgme\_check\_version): Use \_gpgme\_compare\_versions rather than compare\_versions.

(gpgme\_check\_engine): Likewise.

\* ops.h (\_gpgme\_get\_program\_version): Add prototype.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_la\_INCLUDES): Remove obsolete directive.

(AM\_CPPFLAGS): New directive [BUILD\_ASSUAN].

(libgpgme\_la\_LIBADD): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* version.c: Remove global variables lineno and tmp\_engine\_version.

(version\_handler): Removed.

(\_gpgme\_get\_program\_version): New function.

(get\_engine\_info): Don't use context and version\_handler, but \_gpgme\_get\_program\_version.

\* ops.h (\_gpgme\_get\_program\_version):

Add prototype for

\_gpgme\_get\_program\_version (we expect to use it elsewhere soon).

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

\* version.c (get\_engine\_info): If GnuPG is not available, return an error message.

\* posix-util.c (\_gpgme\_get\_gpg\_path): Allow GPG\_PATH to be undefined.

(\_gpgme\_get\_gpgsm\_path): New function.

\* w32-util.c (find\_program\_in\_registry): New static function.



(\_gpgme\_get\_gpg\_path): Allow GPG\_PATH to be undefined. Rework to use find\_program\_in\_registry.  
(\_gpgme\_get\_gpgsm\_path): New function.  
(util.h): Prototype \_gpgme\_get\_gpgsm\_path).  
\* runpg.c (\_gpgme\_gpg\_spawn): Verify that \_gpgme\_get\_gpg\_path() returns non-null.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

\* decrypt-verify.c: New file.  
\* Makefile.am (libgpgme\_la\_SOURCES): Add decrypt-verify.c.  
\* types.h: Add decrypt-verify types.  
\* ops.h: Likewise.  
\* context.h: Add result type for decrypt-verify.  
\* gpgme.h: Add decrypt-verify prototypes.

\* decrypt.c (decrypt\_status\_handler):  
Renamed to ...  
(\_gpgme\_decrypt\_status\_handler): ... this. Make non-static.  
(\_gpgme\_decrypt\_start): New function, derived from  
gpgme\_op\_decrypt\_start.  
(gpgme\_op\_decrypt\_start): Reimplement in terms of  
\_gpgme\_decrypt\_start.  
(\_gpgme\_decrypt\_result): New function to retrieve error value.  
(gpgme\_op\_decrypt): Use \_gpgme\_decrypt\_result.  
\* ops.h: Add prototypes for new functions.

\* verify.c (verify\_status\_handler): Renamed to ...  
(\_gpgme\_verify\_status\_handler): ... this. Make non-static.  
(gpgme\_op\_verify\_start): Use new function name.  
(intersect\_stati): Renamed to ...  
(\_gpgme\_intersect\_stati): ... this. Make non-static.  
(gpgme\_op\_verify): Use new name.  
\* ops.h: Add prototypes for new functions.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

\* passphrase.c: New file.  
\* Makefile.am (libgpgme\_la\_SOURCES): Add passphrase.c.  
\* ops.h (\_gpgme\_passphrase\_result): Add prototypes from  
passphrase.c.  
\* types.h: Likewise.  
\* context.h: Add member passphrase to result.  
\*  
gpgme.c (\_gpgme\_release\_result): Release passphrase member.  
  
\* decrypt.c: Some formatting and variable name changes (like  
CTX instead C).

(struct decrypt\_result\_s): Remove members now found in passphrase result.  
(\_gpgme\_release\_decrypt\_result): Don't release removed members.  
(decrypt\_status\_handler): Call \_gpgme\_passphrase\_status\_handler, and don't handle the cases caught there.  
(command\_handler): Removed.  
(gpgme\_op\_decrypt\_start): Don't set command handler, but invoke \_gpgme\_passphrase\_start which does it.  
(gpgme\_op\_decrypt): Invoke \_gpgme\_passphrase\_result and drop the cases covered by it.

\* sign.c Some formatting and variable name changes (like CTX instead C).

(struct sign\_result\_s): Remove members now found in passphrase result.  
(\_gpgme\_release\_sign\_result): Don't release removed members.  
(sign\_status\_handler): Call \_gpgme\_passphrase\_status\_handler, and don't handle the cases caught there.  
(command\_handler): Removed.  
(gpgme\_op\_sign\_start): Don't set command handler, but invoke \_gpgme\_passphrase\_start which does it.  
(gpgme\_op\_sign): Invoke \_gpgme\_passphrase\_result and drop the cases covered by it.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

\* decrypt.c (command\_handler): Fix last change.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (\_gpgme\_release\_verify\_result): Rename RES to RESULT. Rename R2 to NEXT\_RESULT.  
(intersect\_stati): Rename RES to RESULT.  
(gpgme\_get\_sig\_status): Likewise. Do not check return\_type, but the member verify of result.  
(gpgme\_get\_sig\_key): Likewise.

\* sign.c (\_gpgme\_release\_sign\_result): Rename RES to RESULT. If RESULT is zero, return.  
(sign\_status\_handler, command\_handler): Do not check return\_type, but the member sign of result.  
(gpgme\_op\_sign): Likewise. Drop assertion.

\* encrypt.c (\_gpgme\_release\_encrypt\_result): Rename RES to RESULT. If RESULT is zero, return.  
(encrypt\_status\_handler): Do not check return\_type, but the member encrypt of result.

(gpgme\_op\_encrypt):  
Likewise. Drop assertion.

\* decrypt.c (\_gpgme\_release\_decrypt\_result): Rename RES to RESULT.  
(create\_result\_struct): Do not set result\_type.  
(command\_handler, decrypt\_status\_handler): Do not check  
return\_type, but the member decrypt of result.  
(gpgme\_op\_decrypt): Likewise. Drop assertion.

\* context.h (enum ResultType): Removed.  
(struct gpgme\_context\_s): Remove member result\_type.  
(struct result): Replaces union result.  
\* gpgme.c: Include string.h.  
(\_gpgme\_release\_result): Release all members of c->result, which  
is now a struct. Zero out all members of the struct afterwards.

2001-11-11 Marcus Brinkmann <marcus@g10code.de>

\* runpgp.c (\_gpgme\_gpg\_release): Release GPG->cmd.cb\_data.  
Release all members of the list GPG->arglist.  
Reported by Michael Schmidt <mschmidt@cs.uni-sb.de>.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

\* runpgp.c (pipemode\_copy): Change type of NBYTES to size\_t.  
  
\* key.c: Include string.h.  
\* data.c: Likewise.  
\* recipient.c: Likewise.

2001-10-29

Marcus Brinkmann <marcus@g10code.de>

\* context.h: New member signers\_len.  
\* signers.c (gpgme\_signers\_clear): Require that signers are  
non-NULL with assertion. Use signers\_len to determine how much  
keys to release. Add documentation.  
(gpgme\_signers\_add): Use signers\_len to determine if the buffer is  
large enough. Use xtryrealloc rather than xtrymalloc and copying.  
Add documentation.  
(gpgme\_signers\_enum): Use signers\_len to determine if key is  
available. Add documentation.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* data.c (\_gpgme\_data\_append): Check if LENGTH is smaller than  
ALLOC\_CHUNK, not DH->length.

2001-10-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_set\_protocol): Fix last change.

2001-10-15 Werner Koch <wk@gnupg.org>

\* gpgme.h (GpgmeProtocol): New.

\* gpgme.c (gpgme\_set\_protocol): New.

2001-09-26 Werner Koch <wk@gnupg.org>

\* gpgme.c (gpgme\_set\_passphrase\_cb): Ignore a NULL context.

(gpgme\_set\_progress\_cb): Ditto.

Suggested by Mark Mutz.

2001-09-17 Werner Koch <wk@gnupg.org>

\* keylist.c (finish\_key): Shortcut for no tmp\_key. Changed all callers to use this function without a check for tmp\_key.

\* keylist.c (gpgme\_op\_keylist\_next): Reset the key\_cond after emptying the queue. Bug reported by Stphane Corthsy.

2001-09-12 Werner Koch <wk@gnupg.org>

\* data.c (gpgme\_data\_rewind): Allow rewind for callbacks.

2001-09-07 Werner Koch <wk@gnupg.org>

\* runpg.h: Add NO\_RECP.

\* encrypt.c (encrypt\_status\_handler): Take on No\_RECP.

(gpgme\_op\_encrypt): Better error return.

\* verify.c (verify\_status\_handler): Take on NODATA.

2001-09-03 Werner Koch <wk@gnupg.org>

\* runpg.h: Added STATUS\_INV\_RECP.

\* gpgme.c (\_gpgme\_release\_result): Add support for new EncryptResult object.

\* encrypt.c (append\_xml\_encinfo): New.

(encrypt\_status\_handler): Add some status parsing.

(\_gpgme\_release\_encrypt\_result): New.

2001-08-29 Werner Koch <wk@gnupg.org>

\* recipient.c (gpgme\_recipients\_release):

Free the list. By Timo.

\* keylist.c (keylist\_colon\_handler): Do a finish key if we receive an EOF here. This is probably the reason for a lot of bugs related to keylisting. It is so obvious. Kudos to Enno Cramer for pointing that out.

2001-08-28 Werner Koch <wk@gnupg.org>

\* gpgme.c, gpgme.h (gpgme\_get\_op\_info): New.  
(\_gpgme\_set\_op\_info): New.  
(\_gpgme\_release\_result): Reset the op\_info here.  
\* sign.c (append\_xml\_siginfo): New.  
(sign\_status\_handler): Store the sig create information.

2001-07-31 Werner Koch <wk@gnupg.org>

\* encrypt.c (gpgme\_op\_encrypt): Hack to detect no valid recipients.

2001-07-30 Werner Koch <wk@gnupg.org>

\* gpgme.c (gpgme\_get\_armor, gpgme\_get\_textmode): New.  
\* runpg.c (build\_argv): Disable armor comments  
\* w32-io.c (build\_commandline): Need to add quotes here

2001-07-24 Werner Koch <wk@gnupg.org>

\* data.c (gpgme\_data\_read): Add a way to return the available bytes.

2001-07-23 Werner Koch <wk@gnupg.org>

\* util.c: Removed  
stpcpy() because we use the version from jnlib.

2001-07-19 Werner Koch <wk@gnupg.org>

\* mkstatus: Define the collating sequence for sort.

2001-06-26 Werner Koch <wk@gnupg.org>

\* runpg.h: Add STATUS\_UNEXPECTED as suggested by Timo.

2001-06-15 Werner Koch <wk@gnupg.org>

\* keylist.c (set\_userid\_flags): Fixed the assigned values. Kudos to Timo for pointing this out.

2001-06-01 Werner Koch <wk@gnupg.org>

\* debug.c (\_gpgme\_debug\_begin): Fixed a /tmp race. Noted by Johannes Poehlmann.

2001-05-28 Werner Koch <wk@gnupg.org>

\* version.c (gpgme\_check\_engine): Stop version number parsing at the opening angle and not the closing one. By Tommy Reynolds.

2001-05-01 Jos Carlos Garca Sogo <jose@jaimedelamo.eu.org>

\* encrypt.c (gpgme\_op\_encrypt\_start): Deleted the assert ( !c->gpg ) line, because it gave an error if another operation had been made before using the same context.

\* decrypt.c (gpgme\_op\_decrypt\_start): The same as above. Also added one line to release the gpg object in the context (if any).

2001-04-26 Werner Koch <wk@gnupg.org>

\* key.c, key.h (\_gpgme\_key\_cache\_init): New.  
(\_gpgme\_key\_cache\_add): New.  
(\_gpgme\_key\_cache\_get): New.  
\* version.c (do\_subsystem\_inits): Init the cache.  
\* keylist.c (finish\_key): Put key into the cache  
\* verify.c (gpgme\_get\_sig\_key): First look into the cache.

2001-04-19 Werner Koch <wk@gnupg.org>

\* keylist.c (parse\_timestamp): Adjusted for the changed --fixed-list-mode of gpg 1.0.4h.

2001-04-05 Werner Koch <wk@gnupg.org>

\* verify.c (gpgme\_op\_verify\_start): Enabled pipemode for detached sigs.

2001-04-04 Werner Koch <wk@gnupg.org>

\* w32-io.c (\_gpgme\_io\_select): Don't select on the writer if there are still bytes pending. Timo found this not easy to track down race condition.

2001-04-02 Werner Koch <wk@gnupg.org>

\* gpgme.h: Add GPGME\_ATTR\_KEY\_{EXPIRED,DISABLED}.  
\* key.c (gpgme\_key\_get\_ulong\_attr): And return those attribs.

\* verify.c (gpgme\_get\_sig\_key): Set keylisting mode depending on the mode set in the current context. Suggested by Timo.

\* key.c (gpgme\_key\_get\_ulong\_attr): Return can\_certify and not can\_encrypt. By Timo.

2001-03-30 Werner Koch <wk@gnupg.org>

\* debug.c (debug\_init): Allow to specify a debug file. (\_gpgme\_debug\_level): New.

\* posix-io.c (\_gpgme\_io\_read, \_gpgme\_io\_write): Print output. (\_gpgme\_io\_select): Debug only with level > 2.

2001-03-15 Werner Koch <wk@gnupg.org>

\* runpgg.c: Included time.h.

\* key.h: New keyflags for capabilities.

\* keylist.c (set\_mainkey\_capability, set\_subkey\_capability): New. (keylist\_colon\_handler): Parse them.

\* gpgme.h: New attribute values for capabilities.

\* key.c (gpgme\_key\_get\_string\_attr): Return them. (capabilities\_to\_string): New.

(gpgme\_key\_get\_ulong\_attr): Return the global caps.

2001-03-14 Werner Koch <wk@gnupg.org>

\* w32-io.c (destroy\_reader, destroy\_writer): Fixed syntax error. Thanks to Jan Oliver Wagner.

2001-03-13 Werner Koch <wk@gnupg.org>

\* context.h: Add

invalid and revoke flags to user\_id structure.

\* keylist.c (gpgme\_op\_keylist\_start): Use --fixed-list-mode.

(keylist\_colon\_handler): Adjust for that.

(set\_userid\_flags): New.

(set\_mainkey\_trust\_info): Handle new key invalid flag

(set\_subkey\_trust\_info): Ditto.

\* gpgme.h: Add new attributes for key and user ID flags.

\* key.c (\_gpgme\_key\_append\_name): Init these flags

(gpgme\_key\_get\_as\_xml): Print them.

(one\_uid\_as\_xml): New helper for above.

(gpgme\_key\_get\_string\_attr, gpgme\_key\_get\_ulong\_attr):

Return the new attributes. Enhanced, so that subkey information

can be returned now.

2001-02-28 Werner Koch <wk@gnupg.org>

- \* w32-io.c (destroy\_reader): Set stop\_me flag.
- (writer,create\_writer,destroy\_writer,find\_writer,kill\_writer): New.
- (\_gpgme\_io\_write): Use a writer thread to avoid blocking.
- (\_gpgme\_io\_close): Cleanup a writer thread
- (\_gpgme\_io\_select): Replace the faked wait on writing by a real waiting which is now possible due to the use of a writer thread.

2001-02-20

Werner Koch <wk@gnupg.org>

- \* w32-io.c (destroy\_reader,kill\_reader): New.
- (create\_reader, reader): Add a new event to stop the thread.
- (\_gpgme\_io\_close): Kill the reader thread.
  
- \* posix-io.c (\_gpgme\_io\_select): Handle frozen fds here.
- \* 32-io.c (\_gpgme\_io\_select): Ditto. Removed a bunch of unused code.
  
- \* wait.c: Reworked the whole thing.
- \* runpgp.c (\_gpgme\_gpg\_new): Init pid to -1.
- (\_gpgme\_gpg\_release): Remove the process from the wait queue.

2001-02-19 Werner Koch <wk@gnupg.org>

- \* w32-io.c (\_gpgme\_io\_set\_close\_notify): New.
- (\_gpgme\_io\_close): Do the notification.
  
- \* posix-io.c (\_gpgme\_io\_select): Use a 1 sec timeout and not 200 microseconds.
  
- \* wait.c (remove\_process): Don't close the fd here.
- (do\_select): Set the fd to -1 and remove the is\_closed flag everywhere.
- (\_gpgme\_wait\_on\_condition): Remove the assert on the queue and break out if we could not find the queue. The whole thing should be reworked.
  
- \* posix-io.c (\_gpgme\_io\_set\_close\_notify): New.
- (\_gpgme\_io\_close):  
Do the notification.
  
- \* runpgp.c (close\_notify\_handler): New.
- (\_gpgme\_gpg\_new): Register a callback for the fd.
- (\_gpgme\_gpg\_set\_colon\_line\_handler): Ditto.
- (build\_argv): Ditto



2001-02-13 Werner Koch <wk@gnupg.org>

- \* runpgg.c (struct reap\_s): Replaced pid\_t by int.
- \* types.h: Add ulong typedef.
- \* runpgg.c (do\_reaping,\_gpgme\_gpg\_housecleaning): New.  
(\_gpgme\_gpg\_release): Reap children.
- \* io.h, posix-io.c (\_gpgme\_io\_kill): New.
- \* w32-io.c (\_gpgme\_io\_kill): New (dummy).
- \* keylist.c (gpgme\_op\_keylist\_start): Cancel a pending request.
- \* posix-io.c (\_gpgme\_io\_read): Add some debug output.  
(\_gpgme\_io\_write): Ditto.  
(\_gpgme\_io\_select): Increased the timeout.

2001-02-12 Werner Koch <wk@gnupg.org>

Enhanced the signature verification, so that it can now handle more than one signature and is able to return more information on the signatures.

- \* verify.c (gpgme\_get\_sig\_key): New.  
(gpgme\_get\_sig\_status): New.
- \* gpgme.h: Add stdio.h.  
(GpgmeSigStat):  
New status DIFF.

2001-02-01 Werner Koch <wk@gnupg.org>

- \* w32-io.c (set\_synchronize): Add EVENT\_MODIFY\_STATE. Add Debug code to all Set/ResetEvent().
- \* runpgg.c (read\_status): Check for end of stream only if we have an r. By Timo.

2001-01-31 Werner Koch <wk@gnupg.org>

- \* wait.c (\_gpgme\_wait\_on\_condition): Removed all exit code processing.  
(propagate\_term\_results,clear\_active\_fds): Removed.  
(count\_active\_fds): Renamed to ..  
(count\_active\_and\_thawed\_fds): .. this and count only thawed fds.
- \* runpgg.c (gpg\_colon\_line\_handler): Return colon.eof and not status.eof ;-)

2001-01-30 Werner Koch <wk@gnupg.org>

- \* w32-io.c (`_gpgme_io_spawn`): Use the supplied path arg.
- \* version.c (`get_engine_info`): Return better error information.
- \* posix-util.c, w32-util.c: New.
- (`_gpgme_get_gpg_path`): New, suggested by Jan-Oliver.
- \* `rungpg.c` (`_gpgme_gpg_spawn`): Use new function to get GPG's path.
- \* `signers.c` (`gpgme_signers_add`): Oops, one should test code and not just write it;  
the newarr was not assigned. Thanks to Jos  
for pointing this out. Hmmm, still not tested, why should a coder  
test his fix :-)
- \* w32-io.c: Does now use reader threads, so that we can use  
`WaitForMultipleObjects`.
- \* `sema.h`, `posix-sema.c`, `w32-sema.c`: Support for Critical sections.  
Does currently only work for W32.
- \* `debug.c`, `util.h` : New. Changed all `fprintfs` to use this new  
set of debugging functions.

2001-01-23 Werner Koch <wk@gnupg.org>

- \* `data.c` (`_gpgme_data_release_and_return_string`): Fixed string  
termination.

2001-01-22 Werner Koch <wk@gnupg.org>

- \* `delete.c`: New.
- \* `signers.c`: New.
- \* `key.c` (`gpgme_key_ref`, `gpgme_key_unref`): New.
- \* `sign.c` (`gpgme_op_sign_start`): Allow the use of other keys.
- \* `version.c` (`gpgme_get_engine_info`, `gpgme_check_engine`): New.
- \* `rungpg.c` (`_gpgme_gpg_set_simple_line_handler`): New.

2001-01-05 Werner Koch <wk@gnupg.org>

- \* `data.c` (`gpgme_data_rewind`): Allow to rewind `data_type_none`.

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;;; -\*- Mode: lisp -\*-

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```
(defpackage #:gpgme-system
 (:use #:common-lisp #:asdf))
```

```
(in-package #:gpgme-system)
```

```
(defsystem gpgme
 :description "GnuPG Made Easy."
 :author "g10 Code GmbH"
 :version "1.15.1"
 :licence "GPL"
 :defsystem-depends-on ("cffi-grovel")
 :depends-on ("cffi" "gpg-error" "trivial-garbage")
 :components ((:file "gpgme-package")
 (:cffi-grovel-file "gpgme-grovel"
 :depends-on ("gpgme-package")))
 (:file "gpgme"
 :depends-on ("gpgme-package" "gpgme-grovel"))))
```

```
-*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

\* GPGME Python Bindings

:PROPERTIES:

:CUSTOM\_ID: top

:END:

\*\* Contents

:PROPERTIES:

:CUSTOM\_ID: contents

:END:

- [[file:short-history]][A short history of the project]]
- [[file:what-is-new]][What's New]]
- [[file:maintenance-mode]][Maintenance Mode]] (from January, 2019)
- [[file:what-was-new]][What Was New]]
- [[file:gpgme-python-howto]][GPGME Python Bindings HOWTO]]  
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```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

<signature of Ty Coon>, 1 April 1989

Ty Coon, President of Vice

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library. If this is what you want to do, use the GNU Library General Public License instead of this License.

-----BEGIN PGP PUBLIC KEY BLOCK-----

```
mQENBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAttrV+REqF/o80dvYcdLvRsV21pvncZz/HXLU1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJIO1s0N2c
PSht98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRjLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAAG0EHRlc3RAZXhhbXBsZS5v
cmeJAVQEEwEIAD4WIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8Jn
AAULCQGhAgYVCgkICwIEFgIDAQIeAQIXgAAKCRajAWNe7/DLBf9kB/wOQ/S60HGw
Fq07W9N01HWULyhHKoMmcHL6rfZ64oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6
kaBe+wF6Kqir6udFSBW9rPcFg6/VZXPltT0a6uacIHq6DyQ5iMW4YQWbV9OR2rN
GkYo1JCBR0XdrJYCSX3yB4TWv/eXnZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k7
0DevQeBsv+UjVXjWpNTZmPbvDnd995uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6U
unOf9Rlp1oMzdxMool/d1MICxg2h3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ
1J8Nsv87SZeUqENBFrsKEkBCADjoEBhG/QPqZHg8VyoD1xYRAWGxyDJkX/GrSs6
yE+x2hk5FoQCajxKa/d4AVxOnJpdwhAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0p
O7bgAiZxkA6RHxtNqhpPnPQoXvUzkzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/
8i9Taz67pdZwuJjac8qBuJHjzAo1bjYctFYUSG5pbmMQyNLySzziNkFa4DajODlt
3RuqVGP316Fk+Sy2+60tC/HIX8jgMyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyL
UGKU+L8cB2g1PGGp2biBFWqZbudZoyRBet/0yH/zirBdQJw1ABEBAAGJATwEGAEI
ACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAKCRajAWNe
7/DLBfOpCACPP5hBuUWngu2Hqvg+tNiujsiYzId3MffFxEk3CbXeHcJ5F32NDJ9
PYCnra4L8wSv+NZt9gIa8IFwoFSFQCjzH7KE86XcV3MhfdJTnb/+9CR7Jq3e/4Iy
0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02Lkr+2Cc/Q
k6H+vlNOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe23nntMSD
A+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNYw4WHpZriN69F0t9Mmd7bM1
+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=QyY6
```

-----END

PGP PUBLIC KEY BLOCK-----

Using gpgme.js

-----

At first, make sure that the environment you want to use gpgme.js in has access and permissions for nativeMessaging, and gpgme-json installed. For details, see the README.

The library itself is started via the { @link init } method. This will test the nativeMessaging connection, and then resolve into an Object offering the top level API:

- \* [encrypt]{ @link GpgME#encrypt }
- \* [decrypt]{ @link GpgME#decrypt }
- \* [sign]{ @link GpgME#sign }
- \* [verify]{ @link GpgME#verify }
- \* [Keyring]{ @link GPGME\_Keyring }

```

...
gpgmejs.init()
 .then(function(GPGME) {
 // using GPGME
 }, function(error){
 // error handling;
 })
...

```

All methods that require communication with `nativeMessaging` are asynchronous, using Promises. Rejections will be instances of `{ @link GPGME_Error }`.

An exception are Keys, which can be initialized in a 'sync' mode, allowing them to be cached and used synchronously until manually refreshed.

### Keyring and Keys

-----

The gnupg keys can be accessed via the `[Keyring]{ @link GPGME_Keyring }`.

The Keyring offers the methods for accessing information on all Keys known to gnupg.

**\*\*Due to security constraints, the javascript-binding currently only offers limited support for secret-Key interaction.\*\***

The existence of secret Keys is not secret, and those secret Keys can be used for signing, but Operations that may expose, modify or delete secret Keys are not supported.

```

* [getKeysArmored]{ @link GPGME_Keyring#getKeysArmored }
* [getKeys]{ @link GPGME_Keyring#getKeys }
* [getDefaultKey]{ @link GPGME_Keyring#getDefaultKey }
* [generateKey]{ @link GPGME_Keyring#generateKey }
* [deleteKey]{ @link GPGME_Keyring#deleteKey }
#!/usr/bin/env bash
MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
This script will read the license file into memory, strip out the copyright, and then
generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e

calculate_md5_sum() {
 local FILE="$1"

 # Read the contents of the file into a variable
 local raw_license_text=$(<"$FILE")

```

```

Convert to lowercase
local lowercase_license_text="{raw_license_text,}"

Remove anything before the beginning of the license
local stripped_license_text=$(awk '/permission is hereby granted/{p=1} p' <<< "$lowercase_license_text")

Replace line breaks (Windows or Linux) with a single space
local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

Replace multiple spaces with a single space
local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

Strip away any non-printable, non-whitespace characters
local clean_unprintable_license_text=$(tr
-cd '[:print:][:space:]' <<< "$normalized_license_text")

Remove punctuation and special characters
local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z]//g')

Calculate the MD5 sum of the cleaned license text
local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')

Output the MD5 sum
echo "$MD5SUM"
}

Check if the FILE argument is provided
if [-z "$1"]; then
echo "Please provide a FILE as an argument."
exit 1
fi

Invoke the function with the provided FILE argument
calculate_md5_sum "$1"
;;; gpgme-grovel.lisp

;;; This file is part of GPGME-CL.
;;;
;;; GPGME-CL is free software; you can redistribute it and/or modify it
;;; under the terms of the GNU General Public License as published by
;;; the Free Software Foundation; either version 2 of the License, or
;;; (at your option) any later version.
;;;
;;; GPGME-CL is distributed in the hope that it will be useful, but
;;; WITHOUT ANY WARRANTY; without even the implied warranty of
;;; MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
;;; Lesser General Public License for more details.
;;;

```

;;; You should have received a copy of the GNU General Public License  
;;; along with GPGME; if not, write to the Free Software Foundation,  
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

(in-package :pgpme)

(include "errno.h" "sys/types.h")

(constant (+ebadf+ "EBADF"))

(ctype off-t "off\_t")

(ctype size-t "size\_t")

(ctype ssize-t "ssize\_t")

(cvar ("errno" \*errno\*) :int)

(21:protected-private-key(3:dsa(1:p129:\_d8|po3s@!WGUOAXRC\$\_[8SN:y|o?2[.pVxn(kOc\Bk0zu&FnK)(1:q21:  
vBeOP\P)(1:g129:fU/e(2hp@hjc2uE=Sg GO;ZkIyFnGM!GsG@  
= \_SZkII)(1:y128:K:9tA]4SU1 }sG`nZpx/imV^>A;V%?5!!sS{!=-6@|  
=d

) (9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:Li7:6452224)16:,kO{,}80:z7OCG/sB48(H9%\*ojSO  
OGSma`YUs1h<\_)(12:protected-at15:20130812T105134)))

For a list of the authors of the source code of GPGME, please see the  
file AUTHORS. The following people supported GPGME development in  
various ways (for example by finding bugs or giving advice), and we  
want to thank them for their help. If we forgot you, please let us  
know.

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% Created 2019-01-18 Fri 10:10

% Intended LaTeX compiler: xelatex

\documentclass[12pt]{article}

\usepackage{graphicx}

\usepackage{grffile}

\usepackage{longtable}

\usepackage{wrapfig}

\usepackage{rotating}

\usepackage[normalem]{ulem}

\usepackage{amsmath}

\usepackage{textcomp}

\usepackage{amssymb}

\usepackage{capt-of}

\usepackage{hyperref}

\usepackage{xltextra}

\usepackage[margin=1in]{geometry}

\setmainfont[Ligatures={Common}]{Times New Roman}

\author{Ben McGinnes <ben@gnupg.org>}

\author{Ben McGinnes}

\date{\today}

\title{GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)}

\hypersetup{

pdfauthor={Ben McGinnes},

pdftitle={GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)},

pdfkeywords={},

pdfsubject={},

pdfcreator={Emacs 26.1 (Org mode 9.1.14)},

pdflang={English}}

\begin{document}

\maketitle

\tableofcontents

\section{Introduction}

\label{sec:org8e5fa02}



```
\begin{center}
\begin{tabular}{ll}
Version: & 0.1.4\\
GPGME Version: & 1.12.1\\
Author: & Ben
McGinnes <ben@gnupg.org>\\
Author GPG Key: & DB4724E6FA4286C92B4E55C4321E4E2373590E5D\\
Language: & Australian English, British English\\
Language codes: & en-AU, en-GB, en\\
\end{tabular}
\end{center}
```

This document provides basic instruction in how to use the GPGME Python bindings to programmatically leverage the GPGME library.

### \subsection{Python 2 versus Python 3}

\label{sec:org517cbf4}

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

### \subsection{Examples}

\label{sec:org2c08d53}

All of the examples found in this document can be found as Python 3 scripts in the `\texttt{lang/python/examples/howto}` directory.

### \subsection{Unofficial Drafts}

\label{sec:orgceb2216}

In addition to shipping with each release of GPGME, there is a section on locations to read or download [\hyperref\[sec:org080a94a\]{draft editions}](https://sec.org/080a94a) of this document from at the end of it. These are unofficial versions produced in between major releases.

`\subsection{What's New}`

`\label{sec:orga79ddc2}`

Full

details of what is new are now available in the [\href{what-is-new.org}{What's New}](https://what-is-new.org) file and archives of the preceding `\emph{What's New}` sections are available in the [\href{what-was-new}](https://what-was-new) `{What Was New}` file.

`\subsubsection{New in GPGME 1.13.0}`

`\label{sec:org746b75d}`

See the [\href{what-is-new/#new-stuff-1-13-0}](https://what-is-new/#new-stuff-1-13-0) `{What's New}` document for what is new in version 1.13.0.

`\subsubsection{New in GPGME 1.12.0}`

`\label{sec:org7adcade}`

See the [\href{what-was-new/#new-stuff-1-12-0}](https://what-was-new/#new-stuff-1-12-0) `{What Was New}` document for what was new in version 1.12.0.

`\section{GPGME Concepts}`

`\label{sec:orgb257fc1}`

`\subsection{A C API}`

`\label{sec:org4fe1dfa}`

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `\texttt{gpgme.h}` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very

effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some means of providing an interface to those languages. This is where the need for bindings in various languages stems.

`\subsection{Python bindings}`

`\label{sec:org0e49e52}`

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of `gpgme.h` generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of `gpgme.h`.

#### `subsubsection{Difference between the Python bindings and other GnuPG Python packages}` `label{sec:org97acfd7}`

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

#### `subsubsection{The python-gnupg package maintained by Vinay Sajip}` `label{sec:org0136847}`

This is arguably the most popular means of integrating GPG with Python. The package utilises the `subprocess` module to implement wrappers for the `gpg` and `gpg2` executables normally invoked on the command line (`gpg.exe` and `gpg2.exe` on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the `subprocess` calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those `subprocess` calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The `python-gnupg` package is available under the MIT license.

#### `subsubsection{The gnupg package created and maintained by Isis Lovecruft}` `label{sec:orgdc03987}`

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the `python-gnupg` package as just `gnupg`. This new package also relied on `subprocess` to call the `gpg` or `gpg2` binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original `python-gnupg` and since its functions were called in a different manner to `python-gnupg`, the

release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License version 3.0 (or any later version).

`\subsection{The PyME package maintained by Martin Albrecht}`

`\label{sec:org715600b}`

This package is the origin of these bindings, though they are somewhat different now. For details of when and how the PyME package was folded back into GPGME itself see the `\href{short-history.org}{Short History}` document.`\footnote{\texttt{short-history}}` and/or `\texttt{short-history.html}`.

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the `\texttt{python-gnupg}` or `\texttt{gnupg}` packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

`\section{GPGME Python bindings installation}`

`\label{sec:org73d8d6f}`

`\subsection{No PyPI}`

`\label{sec:org9a038}`

Most third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against `\texttt{gpgme.h}` and `\texttt{gpgme.h}` is generated from `\texttt{gpgme.h.in}` at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require

either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding [CFFI and SWIG](#) at the end of this section for further details.

`\subsection{Requirements}`

`\label{sec:org2f7f06c}`

The

GPGME Python bindings only have three requirements:

`\begin{enumerate}`

`\item` A suitable version of Python 2 or Python 3. With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.

`\item` <https://www.swig.org> {SWIG}.

`\item` GPGME itself. Which also means that all of GPGME's dependencies must be installed too.

`\end{enumerate}`

`\subsubsection{Recommended Additions}`

`\label{sec:org25bd7d4}`

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

`\begin{enumerate}`

`\item` If possible, use Python 3 instead of 2.

`\item` Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.

`\item` If possible add the

following Python modules which are not part of

the standard library: <http://docs.python-requests.org/en/latest/index.html> {Requests},

<https://cython.org/> {Cython}, <https://pendulum.eustace.io/> {Pendulum} and

<https://github.com/Selfnet/hkp4py> {hkp4py}.

`\end{enumerate}`

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many

cases likely to have already been installed on many systems or be familiar to Python programmers.

\subsection{Installation}

\label{sec:orgf1c7587}

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your \texttt{\\$PATH}.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in \texttt{\\$PATH}. It specifically checks for the \texttt{python} and \texttt{python3} executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: \texttt{python}, \texttt{python2} and \texttt{python2.7}.

For Python 3 it checks for these executables in this order: \texttt{python3}, \texttt{python3.7}, \texttt{python3.6}, \texttt{python3.5} and \texttt{python3.4}.<sup>footnote{With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported minor release is quite possible too.}</sup>

On systems where \texttt{python} is actually \texttt{python3} and not \texttt{python2} it may be possible that \texttt{python2} may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred Python versions has been changed to move Python 3.7 ahead of Python 3.6.

\subsubsection{Installing GPGME}

\label{sec:org903bd67}

See the GPGME `\texttt{README}` file for details of how to install GPGME from source.

`\subsection{Known Issues}`

`\label{sec:org0d2a332}`

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should they be encountered.

`\subsubsection{Breaking Builds}`

`\label{sec:orgbac75f3}`

Occasionally when installing GPGME with the Python bindings included it may be observed that the `\texttt{make}` portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with `\texttt{make check}` and `\texttt{make install}` appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce `\texttt{lang/python/python2-gpg/}` and `\texttt{lang/python/python3-gpg/}` directories. These should contain the build output generated during compilation, including the complete bindings and module installed into `\texttt{site-packages}`.

Occasionally the errors in the early part or some other conflict (e.g. not installing as `\textbf{\emph{root}}` or `\textbf{\emph{su}}`) may result in nothing being installed to the relevant `\texttt{site-packages}` directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the `\textbf{root}` user or prepended with `\texttt{sudo -H}`<sup>\footnote{Yes, even if you use virtualenv with everything you do in</sup>

Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the `\emph{entire}` GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it.) in the `\texttt{lang/python/}` directory:

`\begin{verbatim}`

`/path/to/pythonX.Y setup.py build`

`/path/to/pythonX.Y setup.py`

```
build
/path/to/pythonX.Y setup.py install
\end{verbatim}
```

Yes, the build command does need to be run twice. Yes, you still need to run the potentially failing or incomplete steps during the `\texttt{configure}`, `\texttt{make}` and `\texttt{make install}` steps with installing GPGME. This is because those steps generate a lot of essential files needed, both by and in order to create, the bindings (including both the `\texttt{setup.py}` and `\texttt{gpgme.h}` files).

```
\begin{enumerate}
\item IMPORTANT Note
\label{sec:org37f3d4a}
```

If specifying a selected number of languages to create bindings for, try to leave Python last. Currently the majority of the other language bindings are also preceding Python of either version when listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative `\texttt{configure}` steps for GPGME using the `\texttt{-{ }-enable-languages=\$LANGUAGE}` option.

Alternatively `\texttt{make}` (or `\texttt{gmake}`, depending on your platform) may be run with the `\texttt{-k}` option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

```
\end{enumerate}
```

```
\subsubsection{Reinstalling Responsibly}
\label{sec:org21e4dec}
```

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues



observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing the previous version(s) is simply a matter of changing to the relevant `\texttt{site-packages}` directory for the version of Python in question and removing the `\texttt{gpg/}` directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

#### `\subsubsection{Multiple installations}`

`\label{sec:org30b18bd}`

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (`build`, `build`, `install`) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings `\textbf{must}` match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME `\href{https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e}{1.12.1}` the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, 3.6, 3.7 and 3.8 (dev branch) that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the `\texttt{\$PATH}` when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

#### `\subsubsection{Won't Work With Windows}`

\label{sec:org0e3ae3a}

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the [Python website](https://python.org) (i.e. mostly MSI installers, sometimes self-extracting `.exe` files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is *considerably* more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

\begin{enumerate}

\item Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

\item Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

\end{enumerate}

Do **not** use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released [\href{https://www.python.org/downloads/windows/}](https://www.python.org/downloads/windows/){for Windows}:

```
\begin{center}
\begin{tabular}{rll}
CPython & & Microsoft product name & & runtime filename\\
2.7.6 & & Visual Studio 2008 & & MSVCR90.DLL\\
3.4.0 & & Visual Studio 2010 & & MSVCR100.DLL\\
3.5.0 & & Visual Studio 2015 & & \textbf{see below}\\
3.6.0 & & Visual Studio 2015 & & \textbf{see below}\\
3.7.0 & & Visual Studio 2017* & & \textbf{see below}
\end{tabular}
\end{center}
```

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus **incompatible** with all the versions of CPython which can be used with the GPGME Python bindings.

It is

also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [\href{https://matthew-brett.github.io/pydagogue/python\\\_msvc.html}](https://matthew-brett.github.io/pydagogue/python\_msvc.html){Using Microsoft Visual C with Python}. It is also worth reading the Microsoft Developer Network blog post on [\href{http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx}](http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx){the universal CRT} and Steve Dower's blog posts on Python extensions ([\href{http://stevedower.id.au/blog/building-for-python-3-5}](http://stevedower.id.au/blog/building-for-python-3-5){part 1} and [\href{http://stevedower.id.au/blog/building-for-python-3-5-part-two}](http://stevedower.id.au/blog/building-for-python-3-5-part-two){part 2}).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [\href{https://wiki.python.org/moin/WindowsCompilers}](https://wiki.python.org/moin/WindowsCompilers){Windows compilers} wiki page on the CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct

binary installer for Windows users. At

the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare `\textbf{minimum}`, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from `\texttt{python.org}` the advanced options available which utilise `\hyperref[sec:org3b53926]{Cython}` will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

`\begin{enumerate}`

`\item` Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.

`\item`

Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).

`\item` Compile both CPython and GPGME with these bindings using the tools selected in step 2.

`\item` Ignore MingW, Msys2 and the official CPython binary installers.

`\item` Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

`\end{enumerate}`

`\subsubsection{CFFI is the Best and GPGME should use it instead of SWIG}`

`\label{sec:org645735a}`

There are many reasons for favouring `\href{https://cffi.readthedocs.io/en/latest/overview.html}` {CFFI} and

proponents of it are quite happy to repeat these things as if all it would take to switch from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the

bindings to Python using the `gpgme.h` file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable codebase. If there were some means of applying SWIG's dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the `gpgme-tool.c` file in the GPGME `src/` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

`\subsection{Virtualised Environments}`

`\label{sec:orgb0d56f5}`

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with `virtualenv`, the answer is both yes and no.

In general we recommend installing to the relevant path and matching

prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix

like `{usr/local}` or

`{opt/local}` then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a `{sites.pth}` file in the `{site-packages/}` directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. <https://docs.pytest.org/en/latest/index.html> {pytest}) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. <https://www.virtualbox.org/> {VirtualBox}), a hardware emulation layer (e.g. <https://www.qemu.org/> {QEMU}) or an application container (e.g. <https://www.docker.com/why-docker> {Docker}).

Finally it should be noted that the limited tests conducted thus far have been using the `{virtualenv}` command in a new directory to create the virtual python environment. As opposed to the standard `{python3}`

-m venv} and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command `python3 -m virtualenv /path/to/install/virtual/thingy` instead.

## Fundamentals

sec:org832642e

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

### No REST

sec:org3d694ba

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is **not** a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

### Context

sec:org10e4004

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

```
\section{Working with keys}
```

```
\label{sec:orgff114ca}
```

```
\subsection{Key selection}
```

```
\label{sec:org6589217}
```

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
\begin{verbatim}
```

```
import gpg
```

```
k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
```

```
keys = list(k)
```

```
\end{verbatim}
```

This is passable and very likely to be common:

```
\begin{verbatim}
```

```
import gpg
```

```
k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
```

```
keys = list(k)
```

```
\end{verbatim}
```

And this is a really bad idea:

```
\begin{verbatim}
```



```
import
gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
\end{verbatim}
```

Alternatively it may be that the intention is to create a list of keys which all match a particular search string. For instance all the addresses at a particular domain, like this:

```
\begin{verbatim}
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
\end{verbatim}
```

\subsubsection{Counting keys}

\label{sec:org63a3d62}

Counting the number of keys in your public keybox (`\texttt{pubring.kbx}`), the format which has superseded the old keyring format (`\texttt{pubring.gpg}` and `\texttt{secring.gpg}`), or the number of secret keys is a very simple task.

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
Number of secret keys: {0}
Number of public keys: {1}
""".format(secnum, pubnum))
\end{verbatim}
```

NOTE:

The <https://sec.org/3b53926> {Cython} introduction in the <https://sec.org/944cc00> {Advanced and Experimental}

section uses this same key counting code with Cython to demonstrate

some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

```
\subsection{Get key}
\label{sec:org26adb2e}
```

An alternative method of getting a single key via its fingerprint is available directly within a Context with `\texttt{Context().get\_key}`. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

```
\begin{verbatim}
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
\end{verbatim}
```

Whereas this example demonstrates selecting the author's current key with the `\texttt{secret}` key word argument set to `\texttt{True}`:

```
\begin{verbatim}
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
\end{verbatim}
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
\subsection{Importing keys}
```

```
\label{sec:org1ad598a}
```

Importing keys is possible with the `key_import()` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyservers via the web using the requests module. Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
\begin{verbatim}
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
 print(result)
elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scr = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

 Number of keys revoked: {1}
 Number of new signatures: {2}
 Number of new subkeys: {3}
 Number of new user IDs: {4}
 Number of new secret keys: {5}
 Number of unchanged keys: {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scr,
 nochange))
 for i in range(num_keys):
```

```

 print("{}\n".format(result.imports[i].fpr))
else:
 pass
\end{verbatim}

```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading `\texttt{0x}` indicative of hexadecimal be included. Also note that the old short key IDs (e.g. `\texttt{0xDEADBEEF}`) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal value which may be missing the leading `\texttt{0x}` is a simple matter of using a `try/except` statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a `ValueError` simply results in treating the string as a string. This is the method and logic utilised in the `\texttt{import-keys-hkp.py}` script (see below).

\subsubsection{Working with ProtonMail}

\label{sec:org27b0d6f}

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

```

\begin{verbatim}
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
 keyterm = sys.argv[1]
else:
 keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is

```

```

True:
ksearch.append(keyterm[1:])
ksearch.append(keyterm[1:])
ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
ksearch.append("{0}@protonmail.com".format(keyterm))
ksearch.append("{0}@protonmail.ch".format(keyterm))
ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
uidlist = keyterm.split("@")
for uid in uidlist:
ksearch.append("{0}@protonmail.com".format(uid))
ksearch.append("{0}@protonmail.ch".format(uid))
ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
uidlist = keyterm.split("@")
for uid in uidlist:
ksearch.append("{0}@protonmail.com".format(uid))
ksearch.append("{0}@protonmail.ch".format(uid))
ksearch.append("{0}@pm.me".format(uid))
else:
ksearch.append(keyterm)

for k in ksearch:
payload = {"op": "get", "search": k}
try:
r = requests.get(url, verify=True, params=payload)
if r.ok is True:
result = c.key_import(r.content)
elif r.ok is False:
result = r.content
except Exception as e:
result = None

if result is not None and hasattr(result, "considered") is False:
print("{0} for {1}".format(result.decode(), k))
elif result is not None and hasattr(result, "considered") is True:
num_keys = len(result.imports)
new_revs = result.new_revocations
new_sigs = result.new_signatures
new_subs = result.new_sub_keys
new_uids = result.new_user_ids
new_sct = result.secret_imported
nochange = result.unchanged

```

```
print("""
The total number of keys considered for import was: {0}
```

With UIDs wholly or partially matching the following string:

```
{1}
```

```
Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}
```

The key IDs for all considered keys were:

```
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
 nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)
print("")
elif result is None:
 print(e)
\end{verbatim}
```

Both the above example, [./examples/howto/pmkey-import.py](https://github.com/ProtonMail/pmkey-import.py) {pmkey-import.py}, and a version which prompts for an alternative GnuPG home directory, [./examples/howto/pmkey-import-alt.py](https://github.com/ProtonMail/pmkey-import-alt.py) {pmkey-import-alt.py}, are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers, their server is related more to their API and is not feature complete by comparison to the servers in the SKS pool. One notable difference being that the ProtonMail server does not permit non ProtonMail users to update their own keys, which could be a vector for attacking ProtonMail users who may not receive a key's revocation if it had been compromised.

\subsubsection{Importing with HKP for Python}

\label{sec:org592d7ab}

Performing the same tasks with the <https://github.com/Selfnet/hkp4py> {hkp4py module} (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some checks on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The hkp4py module permits such checks prior to the

importing of the keys found.

```
\begin{verbatim}
import gpg
import hkp4py
import sys

c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
 pattern = " ".join(sys.argv[1:])
elif
len(sys.argv) == 2:
 pattern = sys.argv[1]
else:
 pattern = input("Enter the pattern to search for keys or user IDs: ")

if pattern is not None:
 try:
 key = server.search(hex(int(pattern, 16)))
 keyed = True
 except ValueError as ve:
 key = server.search(pattern)
 keyed = False

 if key is not None:
 keys.append(key[0])
 if keyed is True:
 try:
 fob = server.search(pattern)
 except:
 fob = None
 if fob is not None:
 keys.append(fob[0])
 else:
 pass
 else:
 pass

for logrus in pattern.split():
 try:
 key = server.search(hex(int(logrus, 16)))
 hexed = True
 except ValueError as ve:
```

```

 key = server.search(logrus)
 hexed = False

 if key is not None:
 keys.append(key[0])
 if hexed is True:
 try:

fob = server.search(logrus)
 except:
 fob = None
 if fob is not None:
 keys.append(fob[0])
 else:
 pass
else:
 pass

if len(keys) > 0:
 for key in keys:
 import_result = c.key_import(key.key_blob)
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print(result)
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scr = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

 Number of keys revoked: {1}
 Number of new signatures: {2}
 Number of new subkeys: {3}
 Number
of new user IDs: {4}
 Number of new secret keys: {5}
 Number of unchanged keys: {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scr,

```



```

 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
else:
 pass
\end{verbatim}

```

Since the `hkp4py` module handles multiple keys just as effectively as one (`keys` is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

`\subsubsection{Importing from ProtonMail with HKP for Python}`  
`\label{sec:org3966a76}`

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

`\begin{enumerate}`  
`\item Import from ProtonMail via HKP for Python Example no. 1`  
`\label{sec:org6cd15c3}`  
 The following script is available with the rest of the examples under the somewhat less than original name, `\texttt{pmkey-import-hkp.py}`.

```

\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""

```

This script searches the ProtonMail key server for the specified key and imports it.

Usage: pmkey-import-hkp.py [search strings]

```
""")

c
= gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
 keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
 keyterm = sys.argv[1]
 keyterms.append(keyterm)
else:
 key_term = input("Enter the key ID, UID or search string: ")
 keyterms = key_term.split()

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{}@pm.me".format(keyterm[1:]))
 elif keyterm.count("@") == 0:
 ksearch.append("{}@protonmail.com".format(keyterm))
 ksearch.append("{}@protonmail.ch".format(keyterm))
 ksearch.append("{}@pm.me".format(keyterm))
 elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
 ksearch.append("{}@protonmail.ch".format(uid))
 ksearch.append("{}@pm.me".format(uid))
 elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
```

```

 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
 else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking for key for: {0}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)

except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None
except Exception as e:
 import_result = None
results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scr = result.secret_imported
 nochange = result.unchanged
 print("""

```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

{1}

Number of keys revoked: {2}

Number of new signatures: {3}

Number of new subkeys: {4}

Number of new user IDs: {5}

Number of new secret keys: {6}

Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"""
 .format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
 elif result is None:
 pass
\end{verbatim}
```

\item Import from ProtonMail via HKP for Python Example no. 2

\label{sec:org3b674e5}

Like its counterpart above, this script can also be found with the rest of the examples, by the name `pmkey-import-hkp-alt.py`.

With this script a modicum of effort has been made to treat anything passed as a `\texttt{homedir}` which either does not exist or which is not a directory, as also being a possible user ID to check for. It's not guaranteed to pick up on all such cases, but it should cover most of them.

```
\begin{verbatim}
```

```
import gpg
import hkp4py
import os.path
import sys
```

```
print("""
```

```
This script searches the ProtonMail key server
for the specified key and
imports it. Optionally enables specifying a different GnuPG home directory.
```

```
Usage: pmkey-import-hkp.py [homedir] [search string]
```

```
or: pmkey-import-hkp.py [search string]
```

```
""")
```

```
c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None
```

```

if len(sys.argv) > 3:
 homedir = sys.argv[1]
 keyterms = sys.argv[2:]
elif len(sys.argv) == 3:
 homedir = sys.argv[1]
 keyterm = sys.argv[2]
 keyterms.append(keyterm)
elif len(sys.argv) == 2:
 homedir = ""
 keyterm = sys.argv[1]
 keyterms.append(keyterm)
else:
 keyterm = input("Enter the key ID, UID or search string: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
 keyterms.append(keyterm)

if len(homedir) == 0:
 homedir = None
 homeless = False

if homedir is not None:
 if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir))
is True:
 if os.path.isdir(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.realpath(os.path.expanduser(homedir))
 else:
 homeless = True
 else:
 homeless = True
 elif os.path.exists(os.path.realpath(homedir)) is True:
 if os.path.isdir(os.path.realpath(homedir)) is True:
 c.home_dir = os.path.realpath(homedir)
 else:
 homeless = True
 else:
 homeless = True

First check to see if the homedir really is a homedir and if not, treat it as
a search string.
if homeless is True:
 keyterms.append(homedir)
 c.home_dir = None
else:
 pass

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:

```

```

ksearch.append(keyterm[1:])
ksearch.append(keyterm[1:])
ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
 ksearch.append("{}@protonmail.com".format(keyterm))
 ksearch.append("{}@protonmail.ch".format(keyterm))
 ksearch.append("{}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
 ksearch.append("{}@protonmail.ch".format(uid))
 ksearch.append("{}@pm.me".format(uid))
elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
 ksearch.append("{}@protonmail.ch".format(uid))
 ksearch.append("{}@pm.me".format(uid))
else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking
for key for: {}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)
 except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None
 except Exception as e:
 import_result = None
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("{} for {}".format(result.decode(), k))

```

```
elif result is not None and hasattr(result, "considered") is True:
```

```
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scr = result.secret_imported
 nochange = result.unchanged
 print("""
```

```
The total number of keys considered for import was: {0}
```

With UIDs wholly or partially matching the following string:

```
{1}
```

```
Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}
```

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scr,
 nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)
print("")
elif result is None:
 pass
\end{verbatim}
\end{enumerate}
```

\subsection{Exporting keys}

\label{sec:org4596a77}

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

\subsubsection{Exporting public keys}

\label{sec:org873704f}

There are two methods of exporting public keys, both of which are very similar to the other. The default method, \texttt{key\\_export()}, will export a public key or keys matching a specified pattern as normal. The

alternative, the `key\_export\_minimal()` method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

```
\begin{verbatim}
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the
GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif os.path.exists(homedir) is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export(pattern=logrus)
except:
 result = c.key_export(pattern=None)
```



```

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
else:
 pass
\end{verbatim}

```

It should be noted that the result will only return `None` when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to `None` this triggers the exporting of the entire public keybox.

```

\begin{verbatim}
import
 gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif os.path.exists(homedir)

```

```

is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_minimal(pattern=logrus)
except:
 result = c.key_export_minimal(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
else:
 pass
\end{verbatim}

```

\subsubsection{Exporting secret keys}

\label{sec:org6c28d3d}

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of \texttt{pinentry} via \texttt{gpg-agent} in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```

\begin{verbatim}
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

```

The gpg-agent and pinentry are invoked to authorise the export.

```

""")

```

```

c = gpg.Context(armor=True)

```

```

if len(sys.argv) >= 4:
 keyfile
 = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:

```

```

 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
 homedir = None
elif homedir.startswith("~/"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir =
 None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_secret(pattern=logrus)
except:
 result = c.key_export_secret(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
 os.chmod(keyfile, 0o600)
else:
 pass

```

```
\end{verbatim}
```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (`\texttt{.gpg}`) and ASCII armoured (`\texttt{.asc}`) files.

```
\begin{verbatim}
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the
user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
 gpgconfgcmd = "gpgconf.exe --list-dirs homedir"
else:
 gpgconfgcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")

```

```

homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir)
== 0:
 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

if c.home_dir is not None:
 if c.home_dir.endswith("/"):
 gpgfile = "{0}{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}{1}.asc".format(c.home_dir, keyfile)
 else:
 gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
 if os.path.exists(os.environ["GNUPGHOME"]) is True:
 hd = os.environ["GNUPGHOME"]
 else:
 try:
 hd = subprocess.getoutput(gpgconfcmd)
 except:
 process = subprocess.Popen(gpgconfcmd.split(),
 stdout=subprocess.PIPE)
 procom = process.communicate()
 if sys.version_info[0] == 2:
 hd = procom[0].strip()
 else:
 hd = procom[0].decode().strip()

```

```

pgpfile = "{0}/{1}.pgp".format(hd, keyfile)
ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
 a_result = a.key_export_secret(pattern=logrus)
 b_result = b.key_export_secret(pattern=logrus)
except:
 a_result = a.key_export_secret(pattern=None)
 b_result = b.key_export_secret(pattern=None)

if a_result is not None:
 with open(ascfile, "wb") as f:
 f.write(a_result)
 os.chmod(ascfile, 0o600)
else:
 pass

if b_result is not None:
 with open(gpgfile, "wb") as f:
 f.write(b_result)
 os.chmod(gpgfile, 0o600)
else:
 pass
\end{verbatim}

\subsection{Sending public keys to the SKS Keyservers}
\label{sec:org82d4958}
As with the previous section on importing
keys, the \code{hkp4py} module
adds another option with exporting keys in order to send them to the
public keyservers.

The following example demonstrates how this may be done.

\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS keyservers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

```

```

if len(sys.argv) > 2:
 logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
 logrus = sys.argv[1]
else:
 logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
 try:
 export_result = c.key_export(pattern=logrus)
 except Exception as e:
 print(e)
 export_result = None
 else:
 export_result = c.key_export(pattern=None)

if export_result is not None:
 try:
 try:
 send_result = server.add(export_result)
 except:
 send_result = server.add(export_result.decode())
 if send_result is not None:
 print(send_result)
 else:
 pass
 except Exception as e:
 print(e)
 else:
 pass
\end{verbatim}

```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as `\texttt{send-key-to-keyserver.py}`.

The `\texttt{hkp4py}` module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

`\section{Basic Functions}`

`\label{sec:orgb40b488}`

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt

it, sign it and verify signatures.

```
\subsection{Encryption}
```

```
\label{sec:org3170365}
```

Encrypting

is very straight forward. In the first example below the message, `\texttt{text}`, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

```
\subsubsection{Encrypting to one key}
```

```
\label{sec:org8098c64}
```

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the `\texttt{gpg.Context().encrypt()}` method.

Those keyword arguments are: `\texttt{recipients}`, a list of keys encrypted to (covered in greater detail in the following section); `\texttt{sign}`, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to `\texttt{True}`); `\texttt{sink}`, to write results or partial results to a secure sink instead of returning it (defaults to `\texttt{None}`); `\texttt{passphrase}`, only used when utilising symmetric encryption (defaults to `\texttt{None}`); `\texttt{always\_trust}`, used to override the trust model settings for recipient keys (defaults to `\texttt{False}`); `\texttt{add\_encrypt\_to}`, utilises any preconfigured `\texttt{encrypt-to}` or `\texttt{default-key}` settings in the user's `\texttt{gpg.conf}` file (defaults to `\texttt{False}`); `\texttt{prepare}`, prepare for encryption (defaults to `\texttt{False}`); `\texttt{expect\_sign}`, prepare for signing (defaults to `\texttt{False}`); `\texttt{compress}`, compresses the plaintext prior to encryption (defaults to `\texttt{True}`).

```
\begin{verbatim}
```

```
import gpg
```

```
a_key = "0x12345678DEADBEEF"
```

```
text = b"""Some text to test with.
```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```

```
c = gpg.Context(armor=True)
```

```
rkey = list(c.keylist(pattern=a_key, secret=False))
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
```



```
 afile.write(ciphertext)
\end{verbatim}
```

Though this is even more likely to be used like this; with the plaintext input read from a file, the recipient keys used for encryption regardless of key trust status and the encrypted output also encrypted to any preconfigured keys set in the `\texttt{gpg.conf}` file:

```
\begin{verbatim}
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
 text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
 always_trust=True,
 add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
\end{verbatim}
```

If the `\texttt{recipients}` parameter is empty then the plaintext is encrypted symmetrically. If no `\texttt{passphrase}` is supplied as a parameter or via a callback registered with the `\texttt{Context()}` then an out-of-band prompt for the passphrase via `pinentry` will be invoked.

```
\subsection{Encrypting to multiple keys}
\label{sec:orgdcf6e47}
```

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (`\texttt{text}`) to everyone with an email address on the `\texttt{gnupg.org}` domain, \footnote{You probably don't really want to do this. Searching the keyservers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.} but does `\emph{not}` encrypt to a default key or other key which is configured to normally encrypt to.

```
\begin{verbatim}
import gpg
```

```
text = b""Oh look, another test message.
```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an input() prompt.

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```

```
c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 sign=False, always_trust=True)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
\end{verbatim}
```

All it would take to change the above example to sign the message and also encrypt the message to any configured default keys would be to change the `c.encrypt` line to this:

```
\begin{verbatim}
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 always_trust=True,
 add_encrypt_to=True)
\end{verbatim}
```

The only keyword arguments requiring modification are those for which the default values are changing. The default value of `sign` is `True`, the default of `always_trust` is `False`, the default of `add_encrypt_to` is `False`.

If `always_trust` is not set to `True` and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the

encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
\begin{verbatim}
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
 text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])

 try:
 ciphertext, result,
sign_result = c.encrypt(text, recipients=logrus,
 add_encrypt_to=True)
 except gpg.errors.InvalidRecipients as e:
 for i in range(len(e.recipients)):
 for n in range(len(logrus)):
 if logrus[n].fpr == e.recipients[i].fpr:
 logrus.remove(logrus[n])
 else:
 pass
 try:
 ciphertext, result, sign_result = c.encrypt(text,
 recipients=logrus,
 add_encrypt_to=True)
 with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
 except:
 pass
\end{verbatim}
```

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

`\subsection{Decryption}`

`\label{sec:org1282b3d}`

Decrypting something encrypted to a key in one's secret keyring is fairly straight forward.

In this example code, however, preconfiguring either `gpg.Context()` or `gpg.core.Context()` as `c` is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to `c` simply adds lines for no gain.

```
\begin{verbatim}
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
 try:
 plaintext, result, verify_result = gpg.Context().decrypt(cfile)
 except gpg.errors.GPGMEError as e:
 plaintext = None
 print(e)

if plaintext is not None:
 with open(newfile, "wb") as nfile:
 nfile.write(plaintext)
 else:
 pass
\end{verbatim}
```

The data available in `plaintext` in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in `result` and the results of verifying any signatures of the data in `verify_result`.

If `gpg.Context().decrypt(cfile, verify=False)` is called instead, then `verify_result` will be returned as `None` and the rest remains as described here.

### `Signing text and files`

`sec:org59f1262`

The following sections demonstrate how to specify keys to sign with.

#### `Signing key selection`

`sec:org909cb3c`

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign

messages and files.

```
\begin{verbatim}
import gpg

logrus = input("Enter the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
\end{verbatim}
```

The signing examples in the following sections include the explicitly designated `\texttt{signers}` parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the patten expects a string, bytes or None and not a list. A string with two fingerprints won't match any single key.

```
\subsection{Normal or default signing messages or files}
\label{sec:org6ee259d}
```

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of `\texttt{gpg.Context().armor}`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
\begin{verbatim}
import gpg

text0 = """"Declaration of ... something.

""""
```

```
text = text0.encode()
```

```
c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)
```

```
with open("/path/to/statement.txt.asc", "w") as afile:
 afile.write(signed_data.decode())
\end{verbatim}
```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
"rb") as tfile:
 text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
 afile.write(signed_data)
\end{verbatim}
```

```
\subsection{Detached signing messages and files}
\label{sec:org51049d4}
```

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""

text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc", "w") as afile:
 afile.write(signed_data.decode())
\end{verbatim}
```

```
\end{verbatim}
```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```
\begin{verbatim}
```

```
import gpg
```

```
with open("/path/to/statement.txt",
```

```
 "rb") as tfile:
```

```
 text = tfile.read()
```

```
c = gpg.Context(signers=sig_src)
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)
```

```
with open("/path/to/statement.txt.sig", "wb") as afile:
```

```
 afile.write(signed_data)
```

```
\end{verbatim}
```

```
\subsection{Clearsigning messages or text}
```

```
\label{sec:orgf528a20}
```

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

```
\begin{verbatim}
```

```
import gpg
```

```
text0 = ""Declaration of ... something.
```

```
""
```

```
text = text0.encode()
```

```
c = gpg.Context()
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)
```

```
with open("/path/to/statement.txt.asc", "w") as afile:
```

```
 afile.write(signed_data.decode())
```

```
\end{verbatim}
```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```
\begin{verbatim}
```

```
import gpg
```

```
with open("/path/to/statement.txt",
```

```

"rb") as tfile:
 text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
 afile.write(signed_data)
\end{verbatim}

```

```

\subsection{Signature verification}
\label{sec:org6cd81af}

```

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
 data, result = c.verify(open(gpg_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):

 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""").format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp))
 else:

```



```
 pass
\end{verbatim}
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
\end{verbatim}
```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `\texttt{data}` to see if it matches with something like this:

```
\begin{verbatim}
with open(filename, "rb") as afile:
 text = afile.read()

if text == data:
 print("Good signature.")
else:
 pass
\end{verbatim}
```

```
\end{verbatim}
```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `c.verify`. So `data` is `None` and only the information in `result` is available.

```
\begin{verbatim}
```

```
import gpg
import time
```

```
filename = "statement.txt"
sig_file = "statement.txt.sig"
```

```
c = gpg.Context()
```

```
try:
```

```
 data, result = c.verify(open(filename), open(sig_file))
```

```
 verified = True
```

```
except gpg.errors.BadSignatures as e:
```

```
 verified = False
```

```
 print(e)
```

```
if verified is True:
```

```
 for i in range(len(result.signatures)):
```

```
 sign = result.signatures[i]
```

```
 print("""Good signature from:
```

```
{0}
```

```
with
```

```
key {1}
```

```
made at {2}
```

```
""").format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
```

```
else:
```

```
 pass
```

```
\end{verbatim}
```

```
\begin{verbatim}
```

```
import gpg
import time
```

```
filename = "statement.txt"
asc_file = "statement.txt.asc"
```

```
c = gpg.Context()
```

```
try:
```

```

data, result = c.verify(open(filename), open(asc_file))
verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
\end{verbatim}

```

```

\section{Creating keys and subkeys}
\label{sec:org754c6df}

```

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to \texttt{SECRET} level clearance, so his keys will be 3072-bit keys.

The pre-configured \texttt{gpg.conf} file which sets cipher, digest and other preferences contains the following configuration parameters:

```

\begin{verbatim}
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed

```

```
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences
ZLIB BZIP2 ZIP Uncompressed
\end{verbatim}
```

```
\subsection{Primary key}
\label{sec:org0185c23}
```

Generating a primary key uses the `create_key` method in a Context.

It contains multiple arguments and keyword arguments, including:

`userid`, `algorithm`, `expires_in`, `expires`, `sign`, `encrypt`, `certify`, `authenticate`, `passphrase` and `force`. The defaults for all of those except `userid`, `algorithm`, `expires_in`, `expires` and `passphrase` is `False`. The defaults for `algorithm` and `passphrase` is `None`. The default for `expires_in` is `0`. The default for `expires` is `True`. There is no default for `userid`.

If `passphrase` is left as `None` then the key will not be generated with a passphrase, if `passphrase` is set to a string then that will be the passphrase and if

`passphrase` is set to `True` then `gpg-agent` will launch `pinentry` to prompt for a passphrase. For the sake of convenience, these examples will keep `passphrase` set to `None`.

```
\begin{verbatim}
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/.gnupg-dm"
```

```
userid = "Danger Mouse <dm@secret.example.net>"
```

```
dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
 sign=True, certify=True)
```

```
\end{verbatim}
```

One thing to note here is the use of setting the `c.home_dir` parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, `{}/.gnupg`, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The `temp-homedir-config.py` script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned `GenkeyResult` object, which includes the following data:

```
\begin{verbatim}
print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
 dmkey.uid))
\end{verbatim}
```

Alternatively the information can be confirmed using the command line program:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
\end{verbatim}
```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the `gpg.conf` file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own `gpg.conf` file in order to be able to generate this:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

sec rsa3072/026D2F19E99E63AA
 created: 2018-03-15 expires: 2019-03-15 usage: SC
 trust: ultimate validity: ultimate
\end{verbatim}
```

[ultimate] (1). Danger Mouse <dm@secret.example.net>

[ultimate] (1). Danger Mouse <dm@secret.example.net>

Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH, IDEA, CAST5, 3DES

Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1

Compression: ZLIB, BZIP2, ZIP, Uncompressed

Features: MDC, Keyserver no-modify

bash-4.4\$

\end{verbatim}

\subsection{Subkeys}

\label{sec:org5e2acbc}

Adding

subkeys to a primary key is fairly similar to creating the primary key with the `\texttt{create\_subkey}` method. Most of the arguments are the same, but not quite all. Instead of the `\texttt{userid}` argument there is now a `\texttt{key}` argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

\begin{verbatim}

import gpg

c = gpg.Context()

c.home\_dir = "~/gnupg-dm"

key = c.get\_key(dmkey.fpr, secret=True)

dmsub = c.create\_subkey(key, algorithm="rsa3072", expires\_in=15768000,  
encrypt=True)

\end{verbatim}

As with the primary key, the results here can be checked with:

\begin{verbatim}

print("""

Fingerprint: {0}

Primary Key: {1}

Public Key: {2}

Secret Key: {3}

Sub Key: {4}

User IDs: {5}

```
""".format(dmsub.fpr,
dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
dmsub.uid))
\end{verbatim}
```

As well as on the command line with:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
\end{verbatim}
```

\subsection{User IDs}

\label{sec:org4869c58}

\subsubsection{Adding User IDs}

\label{sec:orgebb13ca}

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is

\texttt{key\\_add\\_uid} and the only arguments it takes are for the \texttt{key} and the new \texttt{uid}.

```
\begin{verbatim}
```

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/.gnupg-dm"
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
```

```
key = c.get_key(dmfpr, secret=True)
```

```
uid
```

```
= "Danger Mouse <danger.mouse@secret.example.net>"
```

```
c.key_add_uid(key, uid)
```

```
\end{verbatim}
```

Unsurprisingly the result of this is:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
```

```

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid [ultimate] Danger Mouse <dm@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]
```

```
bash-4.4$
\end{verbatim}
```

```
\subsubsection{Revoking User IDs}
\label{sec:org1683695}
```

Revoking a user ID is a fairly similar process, except that it uses the `\texttt{key\_revoke\_uid}` method.

```
\begin{verbatim}
import gpg
```

```
c = gpg.Context()
c.home_dir = "~/gnupg-dm"
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"
```

```
c.key_revoke_uid(key, uid)
\end{verbatim}
```

```
\subsection{Key certification}
\label{sec:orgf431bf8}
```

Since

key certification is more frequently referred to as key signing, the method used to perform this function is `\texttt{key\_sign}`.

The `\texttt{key\_sign}` method takes four arguments: `\texttt{key}`, `\texttt{uids}`, `\texttt{expires\_in}` and `\texttt{local}`. The default value of `\texttt{uids}` is `\texttt{None}` and which results in all user IDs being selected. The default value of both `\texttt{expires\_in}` and `\texttt{local}` is `\texttt{False}`; which results in the signature never expiring and being able to be exported.

The `\texttt{key}` is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the `\texttt{uids}` value is not `\texttt{None}` then it must either be a string to match a single user ID or a list of strings to match multiple user



IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger

Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
\begin{verbatim}
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
\end{verbatim}
```

```
\subsubsection{Verifying key certifications}
```

```
\label{sec:org87abdd3}
```

```
\begin{verbatim}
```

```
import gpg
```

```
import time
```

```
c = gpg.Context()
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
```

```
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
```

```
key = keys[0]
```

```
for user in key.uids:
```

```
 for sig in user.signatures:
```

```
 print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
```

```
 sig.uid)
```

```
\end{verbatim}
```

Which for Danger Mouse displays the following:

```
\begin{verbatim}
```

```
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@secret.example.net>
```

```
0x321E4E2373590E5D Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@adversary.org>
```

```
\end{verbatim}
```

The

two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year. Note that the second signature was made with the

following code (including the preceding code to display the output of the certifications or key signatures):

```
\begin{verbatim}
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys = list(c.keylist(pattern=dmuid,
 mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
\end{verbatim}
```

Note that this final code block includes the use of a module which is *not* part of Python's standard library, the <https://pendulum.eustace.io/> {pendulum module}. Unlike the standard datetime module, pendulum makes working with dates and times significantly easier in Python; just as the requests module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using the GPGME Python bindings, they are both highly recommended more generally.

\section{Advanced or Experimental Use Cases}

\label{sec:org944cc00}

\subsection{C plus Python plus SWIG plus Cython}

\label{sec:org3b53926}

In spite of the apparent incongruence of using Python bindings to a C interface only to generate

more C from the Python; it is in fact quite

possible to use the GPGME bindings with \href{http://docs.cython.org/en/latest/index.html}{Cython}. Though in many cases

the benefits may not be obvious since the most computationally

intensive work never leaves the level of the C code with which GPGME

itself is interacting with.

Nevertheless, there are some situations where the benefits are

demonstrable. One of the better and easier examples being the one of

the early examples in this HOWTO, the \hyperref[sec:org63a3d62]{key counting} code. Running that

example as an executable Python script, \texttt{keycount.py} (available in

the \texttt{examples/howto/} directory), will take a noticeable amount of time

to run on most systems where the public keybox or keyring contains a

few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that

script on my laptop; as I tend to do periodically and timed it using

\texttt{time} utility, with the following results:

```
\begin{verbatim}
```

```
bash-4.4$
```

```
time keycount.py
```

```
Number of secret keys: 23
```

```
Number of public keys: 12112
```

```
real 11m52.945s
```

```
user 0m0.913s
```

```
sys 0m0.752s
```

```
bash-4.4$
```

```
\end{verbatim}
```

Sometime after that I imported another key and followed it with a

little test of Cython. This test was kept fairly basic, essentially

lifting the material from the \href{http://docs.cython.org/en/latest/src/tutorial/cython\\_tutorial.html}{Cython Basic Tutorial} to demonstrate

compiling Python code to C. The first step was to take the example

key counting code quoted previously, essentially from the importing of

the \texttt{gpg} module to the end of the script:

```
\begin{verbatim}
```

```
import gpg
```

```
c = gpg.Context()
seckey = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)
```

```
seclist = list(seckey)
secnum = len(seclist)
```

```
publist = list(pubkeys)
pubnum = len(publist)
```

```
print("""
 Number of secret keys: {0}
 Number of public keys: {1}
```

```
""").format(secnum, pubnum)
\end{verbatim}
```

Save

that into a file called `keycount.pyx` and then create a `setup.py` file which contains this:

```
\begin{verbatim}
from distutils.core import setup
from Cython.Build import cythonize

setup(
 ext_modules = cythonize("keycount.pyx")
)
\end{verbatim}
```

Compile it:

```
\begin{verbatim}
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
\end{verbatim}
```

Then run it in a similar manner to `keycount.py`:

```
\begin{verbatim}
bash-4.4$ time python3.7 -c "import keycount"
```

```
Number of secret keys: 23
Number of public keys: 12113
```

```
real 6m47.905s
```

```
user 0m0.785s
```

```
sys 0m0.331s
```

```
bash-4.4$
```

```
\end{verbatim}
```

Cython turned `keycount.pyx` into an 81KB `keycount.o` file in the `build/` directory, a 24KB `keycount.cpython-37m-darwin.so` file to be imported into Python 3.7 and a 113KB `keycount.c` generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the `keycount.pyx` file or the full 1,452 bytes of the full executable `keycount.py` example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The `keycount.pyx` and `setup.py` files used to generate this example have been added to the `examples/howto/advanced/cython/` directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the <http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd> {Magic Attributes} section of the Cython documentation.

```
\section{Miscellaneous extras and work-arounds}
```

```
\label{sec:orgd72f7de}
```

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with [group lines](#).

```
\subsection{Group lines}
```

```
\label{sec:org83f4d00}
```

There is not yet an easy way to access groups configured in the `gpg.conf` file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
\begin{verbatim}
```

```
import subprocess
```

```

import sys

if sys.platform == "win32":
 gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
 gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
 lines = procom[0].splitlines()
else:
 lines = procom[0].decode().splitlines()

for line in lines:
 if line.startswith("group") is True:
 break

groups = line.split(":")[-1].replace("'", "").split(',')

group_lines
= []
group_lists = []

for i in range(len(groups)):
 group_lines.append(groups[i].split("="))
 group_lists.append(groups[i].split("="))

for i in range(len(group_lists)):
 group_lists[i][1] = group_lists[i][1].split()
\end{verbatim}

```

The result of that code is that `group_lines` is a list of lists where `group_lines[i][0]` is the name of the group and `group_lines[i][1]` is the key IDs of the group as a string.

The `group_lists` result is very similar in that it is a list of lists. The first part, `group_lists[i][0]` matches `group_lines[i][0]` as the name of the group, but `group_lists[i][1]` is the key IDs of the group as a list.

A demonstration of using the `groups.py` module is also available in the form of the executable `mutt-groups.py` script. This second script reads all the group entries in a user's `gpg.conf` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

\subsection{Keyserver access for Python}

\label{sec:org5ad99aa}

The <https://github.com/Selfnet/hkp4py> {hkp4py} module by Marcel Fest was originally a port of the old <https://github.com/dgladkov/python-hkp> {python-hkp} module from Python 2 to Python 3 and updated to use the <http://docs.python-requests.org/en/latest/index.html> {requests} module instead. It has since been modified to provide support for Python 2.7 as well and is available via PyPI.

Since it rewrites the `{hkp}` protocol prefix as `{http}` and `{hkps}` as `{https}`, the module is able to be used even with servers which do not support the full scope of keyserver functions.<sup>\footnote{Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as HKP or HKPS within the Python Code. The `{hkp4py}` module will rewrite these appropriately when the connection is made to the server.}</sup> It also works quite readily when incorporated into a [sec:org3b53926](https://pypi.org/project/Cython/) {Cython} generated and compiled version of any code.

\subsubsection{Key import format}

\label{sec:org1e47c97}

The `hkp4py` module returns key data via requests as string literals (`{r.text}`) instead of byte literals (`{r.content}`). This means that the returned key data must be encoded to UTF-8 when importing that key material using a `{gpg.Context().key_import()}` method.

For this reason an alternative method has been added to the `{search}` function of `{hkp4py.KeyServer()}` which returns the key in the correct format as expected by `{key_import}`. When importing using this module, it is now possible to import with this:

```
\begin{verbatim}
for key in keys:
 if key.revoked is False:
 gpg.Context().key_import(key.key_blob)
 else:
 pass
\end{verbatim}
```

Without that recent addition it would have been necessary to encode the contents of each `{hkp4py.KeyServer().search()[i].key}` in `{hkp4py.KeyServer().search()}` before trying to import it.

An example of this is included in the [\hyperref\[sec:org1ad598a\]{Importing Keys}](#) section of this HOWTO and the corresponding executable version of that example is available in the `\texttt{lang/python/examples/howto}` directory as normal; the executable version is the `\texttt{import-keys-hkp.py}` file.

`\subsection{GPGME version checking}`

`\label{sec:org18b8ef8}`

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the `\texttt{gpg.version.versionstr}` and `\texttt{gpg.version.versionlist}` methods have been quite sufficient. The former returns the same string as `\texttt{gpgme-config -{ }-version}`, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

```
\begin{verbatim}
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
 stdout=subprocess.PIPE,
 stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
 gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0] >= 3:
 gpgme_version = gpgme_version_str[0].decode().strip()
else:
 gpgme_version = None

if gpgme_version is not None:
 if gpgme_version == gpg.version.versionstr:
 print("The GPGME Python bindings match libgpgme.")
 else:
 print("The GPGME Python bindings do NOT match libgpgme.")
else:
 print("Upgrade Python and reinstall the GPGME Python bindings.")
\end{verbatim}
```

For many developers, however, the preferred checking means checking



for a minimum version or point release. This is now readily available via the `gpg.version.versionintlist` method (added in version `1.12.1-beta79`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```
\begin{verbatim}
import gpg

try:
 if gpg.version.is_beta is True:
 print("The installed GPGME Python bindings were built from beta code.")
 else:
 print("The installed GPGME Python bindings are a released version.")
except Exception as e:
 print(e)

try:
 if gpg.version.versionintlist[0] == 1:
 if gpg.version.versionintlist[1] == 12:
 if gpg.version.versionintlist[2] == 1:
 print("This is the minimum version for using versionintlist.")
 elif gpg.version.versionintlist[2] > 1:
 print("The versionintlist method is available.")

 else:
 pass
 elif gpg.version.versionintlist[1] > 12:
 print("The versionintlist method is available.")
 else:
 pass
 elif gpg.version.versionintlist[0] > 1:
 print("The versionintlist method is available.")
 else:
 pass
except Exception as e:
 print(e)
\end{verbatim}
```

The points where `pass` is used in the above example will most likely also produce an `Exception` error since those results should only occur in versions which do not have the `gpgme.version.is_beta` and `gpgme.version.versionintlist` methods available.

\section{Copyright and Licensing}

\label{sec:org9d52a23}

\subsection{Copyright}

\label{sec:org26ed04d}

Copyright The GnuPG Project, 2018.

Copyright (C) The GnuPG Project, 2018.

\subsection{Draft Editions of this HOWTO}

\label{sec:org080a94a}

Draft editions of this HOWTO may be periodically available directly from the author at any of the following URLs:

\begin{itemize}

\item

\href{https://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 SSL)}

\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 no SSL)}

\item \href{https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 SSL)}

\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 no SSL)}

\end{itemize}

All of these draft versions except for one have been generated from this document via GNU Emacs \href{https://orgmode.org/}{Org mode} and \href{https://www.gnu.org/software/texinfo/}{GNU Texinfo}. Though it is likely that the specific \href{https://files.au.adversary.org/crypto/gpgme-python-howto}{file} \href{http://files.au.adversary.org/crypto/gpgme-python-howto.org}{version} used will be on the same server with the generated output formats.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

\begin{verbatim}

```
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
```

```
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
```

\end{verbatim}

The reStructuredText format is also generated from the Org-mode source file, except it is generated using \href{https://pandoc.org}{Pandoc} with either of the following

commands:

```
\begin{verbatim}
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
\end{verbatim}
```

In addition to these there is

a significantly less frequently updated version as a HTML [\href{https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html}](https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html) {WebHelp site} (AWS S3 SSL); generated from DITA XML source files, which can be found in [\href{https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/}](https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/) {an alternative branch} of the GPGME git repository.

Various generated output formats may occasionally be found in subdirectories of the [\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python}](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python) {gpgme-python} directory. In particular within the [\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita}](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita) {DITA}, [\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst}](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst) {reStructuredText} and [\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo}](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo) {Texinfo} subdirectories. The [\texttt{rst}](#) directory contains output files generated with Sphinx and may include a considerable number of its possible output formats.

These

draft editions are not official documents and the version of documentation in the master branch or which ships with released versions is the only official documentation. Nevertheless, these draft editions may occasionally be of use by providing more accessible web versions which are updated between releases. They are provided on the understanding that they may contain errors or may contain content subject to change prior to an official release.

[\subsection{License GPL compatible}](#)

[\label{sec:orge78f3b7}](#)

This file is free software; as a special exception the author gives unlimited permission to copy and/or distribute it, with or without modifications, as long as this notice is preserved.

This file is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY, to the extent permitted by law; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

[\end{document}](#)

# This is a template. The dist target uses it to create the real file.

Summary: GPGME - GnuPG Made Easy

Name: gpgme  
Version: 1.15.1  
Release: 1  
URL: <https://gnupg.org/gpgme.html>  
Source: <https://www.gnupg.org/ftp/gcrypt/gpgme/%{name}-%{version}.tar.gz>  
Group: Development/Libraries  
Copyright: GPL  
BuildRoot: %{\_tmppath}/%{name}-%{version}  
BuildRequires: make  
Prereq: /sbin/ldconfig /sbin/install-info  
Requires: gnupg

%description

GnuPG Made Easy (GPGME) is a library designed to make access to GnuPG easier for applications. It provides a High-Level Crypto API for encryption, decryption, signing, signature verification and key management.

%prep

%setup -q

%build

CFLAGS="\$RPM\_OPT\_FLAGS"; export CFLAGS

./configure --prefix=/usr

make

%install

rm -fr \$RPM\_BUILD\_ROOT

mkdir -p \$RPM\_BUILD\_ROOT

make install prefix=\$RPM\_BUILD\_ROOT/usr infodir=\$RPM\_BUILD\_ROOT%{\_infodir}

rm -f \$RPM\_BUILD\_ROOT%{\_infodir}/dir

%clean

rm -fr \$RPM\_BUILD\_ROOT

make distclean

%post

/sbin/ldconfig

/sbin/install-info %{\_infodir}/gpgme.info.gz

%{\_infodir}/dir

/sbin/install-info %{\_infodir}/gpgme-python-howto.info.gz %{\_infodir}/dir

%preun

if [ "\$1" = 0 ]; then

/sbin/install-info --delete %{\_infodir}/gpgme.info.gz %{\_infodir}/dir

/sbin/install-info --delete %{\_infodir}/gpgme-python-howto.info.gz %{\_infodir}/dir

fi

%postun

/sbin/ldconfig

%files

%defattr(-,root,root)

%doc COPYING COPYING.LESSER AUTHORS README INSTALL NEWS ChangeLog TODO THANKS

%attr(0755,root,root) % {\_bindir}/gpgme-config

%attr(0755,root,root) % {\_libdir}/\*gpgme.so\*

%attr(0755,root,root) % {\_libdir}/\*gpgme.la

%attr(0644,root,root) % {\_libdir}/\*gpgme.a

% {\_includedir}/gpgme.h

% {\_datadir}/aclocal/gpgme.m4

% {\_infodir}/gpgme.info\*

% {\_infodir}/gpgme-python-howto.info\*

%changelog

\* Sat Aug 30 2003 Robert Schiele <rschiele@uni-mannheim.de>

- % {\_infodir}/dir is not packaged, remove to prevent checking failure

\* Mon Jul 01 2002 Wojciech Polak <polak@lodz.pdi.net>

- initial specfile release for GPGME.

# EOF

# 1.107 npth 1.6-8.el9

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Version 2.1, February 1999

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## 1.108 cracklib 2.9.6-27.el9

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^L

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the

source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

^L

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You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the

copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2)

will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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^L

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a) Accompany the combined library with a copy of the same work based on the Library, uncombined

with any other library

facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

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<one line to give the library's name and a brief idea of what it does.>

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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

That's all there is to it!

-----  
EFFECTIVE OCT 2008, LICENSE IS BEING CHANGED TO LGPL-2.1 (though not reflected  
in released code until Nov 2009 - slow release cycle...)  
-----

Discussion thread from mailing list archive, with approval from everyone actively  
involved or holding original licensing rights included.

[Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:16

Attachments: Message as HTML

looks like 2.8.11 is out and marked as "GPL-2" ... releasing libraries unde=  
r=20

GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists  
=2Dmike

Re: [Cracklib-devel] cracklib license

From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:18

I understand that, and you're welcome to bring it up with Alec directly  
and see if he wants to relicense his code as LGPL... but at this point,  
it was enough to just get it consistent and documented as to what it was  
released under. This wasn't actually a license change, just a  
clarification of the licensing that was already in place.=20

-- Nathan

=20

-----  
Nathan Neulinger EMail: nneul@um...

University of Missouri - Rolla Phone: (573) 341-6679

UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----

> From: cracklib-devel-bounces@li...

> [mailto:cracklib-devel-bounces@li...] On Behalf Of

> Mike Frysinger

> Sent: Monday, October 01, 2007 8:15 PM

> To: cracklib-devel@li...

> Subject: [Cracklib-devel] cracklib license

>=20

> looks like 2.8.11 is out and marked as "GPL-2" ... releasing

> libraries under

> GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists

> -mike

Re: [Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:33

Attachments: Message as HTML

On Monday 01 October 2007, Neulinger, Nathan

wrote:

> I understand that, and you're welcome to bring it up with Alec directly  
> and see if he wants to relicense his code as LGPL... but at this point,  
> it was enough to just get it consistent and documented as to what it was  
> released under. This wasn't actually a license change, just a  
> clarification of the licensing that was already in place.

the original license (before moving to sourceforge -- aka, 2.7) was not=20  
GPL-2 ... it was a modified artistic license ... i didnt notice the license=  
=20  
change until it was mentioned in the latest notes.

unlike the old license, GPL-2 prevents people from using cracklib unless th=  
eir=20  
applications are also GPL-2 which imo is just wrong. it isnt the place of =  
a=20  
library to dictact to application writes what license they should be using.=  
=20  
thus LGPL-2.1 enters to fill this void.  
=20  
=20mike

Re: [Cracklib-devel]

cracklib license

From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:46

Seems like the ideal thing here would be for you and the other distro  
maintainers to get together with Alec in a conversation and come to a  
decision as to what licensing scheme y'all want. I haven't really done  
much other than cleaning up the packaging and patches and a small bit of  
additional code, so whatever licensing y'all come up with is fine by me.

-- Nathan

=20

-----  
Nathan Neulinger EMail: nneul@um...

University of Missouri - Rolla Phone: (573) 341-6679

UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----

> From: cracklib-devel-bounces@li...

> [mailto:cracklib-devel-bounces@li...] On Behalf Of

> Mike Frysinger

> Sent: Monday, October 01, 2007 8:33 PM  
> To: Neulinger, Nathan  
> Cc: cracklib-devel@li...; Alec Muffett  
> Subject: Re: [Cracklib-devel] cracklib license

>=20

> On Monday 01 October 2007, Neulinger, Nathan wrote:  
>> I understand that, and you're welcome to bring it up with Alec  
> directly  
>> and see if he wants to relicense his code as LGPL... but at this  
> point,  
>> it was enough to just get it consistent and documented as to what  
> it was  
>> released under. This wasn't actually a license change, just a  
>> clarification of the licensing that was already in place.

>=20

> the original license (before moving to sourceforge -- aka, 2.7) was  
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> GPL-2 ... it was a modified artistic license ... i didnt notice the  
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> change until it was mentioned in the latest notes.

>=20

> unlike the old license, GPL-2 prevents people from using cracklib  
> unless their  
> applications are also GPL-2 which imo is just wrong. it isnt the  
> place of a  
> library

to dictact to application writes what license they should

> be using.  
> thus LGPL-2.1 enters to fill this void.  
> -mike

Re: [Cracklib-devel] cracklib license

From: Alec Muffett <alecm@cr...> - 2007-10-02 08:57

> Seems like the ideal thing here would be for you and the other distro  
> maintainers to get together with Alec in a conversation and come to a  
> decision as to what licensing scheme y'all want. I haven't really done  
> much other than cleaning up the packaging and patches and a small  
> bit of  
> additional code, so whatever licensing y'all come up with is fine  
> by me.

I am sympathetic. Guys, what do you reckon?

What I am hearing so far is that LGPL makes sense, since it can be  
linked with any code, not just GPL...

-a

Re: [Cracklib-devel] cracklib license

From: Devin Reade <gdr@gn...> - 2007-10-02 15:04

I would like to see it under LGPL as well. I

think it is in everyone's

best interests to have as secure systems as possible, and I think tainting it via GPL will just make it less likely that the library gets used, and will not usually cause companies/developers to GPL the dependent code (where it is not already GPL).

I like GPL, I use it when I can, but I don't think that it's the correct license in this situation.

Devin

--

If it's sinful, it's more fun.

Re: [Cracklib-devel] cracklib license

From: Nalin Dahyabhai <nalin@re...> - 2008-01-28 16:32

On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:

>> Seems like the ideal thing here would be for you and the other distro  
>> maintainers to get together with Alec in a conversation and come to a  
>> decision as to what licensing scheme y'all want. I haven't really done  
>> much other than cleaning up the packaging and patches and a small  
>> bit of  
>> additional

code, so whatever licensing y'all come up with is fine

>> by me.

>

> I am sympathetic. Guys, what do you reckon?

>

> What I am hearing so far is that LGPL makes sense, since it can be  
> linked with any code, not just GPL...

My apologies for not chiming in in anything resembling a reasonable timeframe.

I'd also suggest the LGPL, for the reason you noted above. Alternately, GPLv2 with the option of using the library under a later version of the GPL would permit applications which were released under version 3 of the GPL to use the library, too, which would be sufficient for the packages which are included in Fedora. FWIW, I'd personally lean toward LGPL.

In any case, I thank you both for working on sorting this out.

Cheers,

Nalin

Re: [Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2008-10-05 21:27

Attachments: Message as HTML

On Monday 28 January 2008, Nalin Dahyabhai wrote:

> On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:  
>>> Seems like the ideal thing here would be for you and the other distro  
>>> maintainers to get together with Alec in a conversation and come to a  
>>> decision as to what licensing scheme y'all want. I haven't really done  
>>> much other than cleaning up the packaging and patches and a small  
>>> bit of  
>>> additional code, so whatever licensing y'all come up with is fine  
>>> by me.  
>>  
>> I am sympathetic. Guys, what do you reckon?  
>>  
>> What I am hearing so far is that LGPL makes sense, since it can be  
>> linked with any code, not just GPL...  
>  
> My apologies for not chiming in in anything resembling a reasonable  
> timeframe.  
>  
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the library under a later version of the  
> GPL would permit applications which were released under version 3 of the  
> GPL to use the library, too, which would be sufficient for the packages  
> which are included in Fedora. FWIW, I'd personally lean toward LGPL.  
>  
> In any case, I thank you both for working on sorting this out.

looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make  
the change now ?

-mike

Re: [Cracklib-devel] cracklib license

From: Alec Muffett <alecm@cr...> - 2008-10-05 23:18

>> In any case, I thank you both for working on sorting this out.  
>  
> looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make  
> the change now ?



yes. go for it. thanks++

-a

Re: [Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2008-10-25 22:34

Attachments: Message as HTML

On Sunday 05 October

2008, Alec Muffett wrote:

> >> In any case, I thank you both for working on sorting this out.

> >

> > looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we

> > make the change now ?

>

> yes. go for it. thanks++

Nathan Neulinger is the only one who can actually make said change ...

-mike

-----

BELOW IS ORIGINAL LICENSING DISCUSSION RE CHANGING TO GPL from Artistic.

-----

CrackLib was originally licensed with a variant of the Artistic license. In the interests of wider acceptance and more modern licensing, it was switched with the original author's blessing to GPL v2.

This approval was carried out in email discussions in 2005, and has been reconfirmed as of 2007-10-01 with the following email from Alec Muffett.

The below email references nneul@umr.edu address, as that is the address that was used at the time. For any future emails regarding this, please use nneul@neulinger.org.

-----

From

alecm@crypticide.com Mon Oct 1 12:26:03 2007

Received: from umr-exproto2.cc.umr.edu ([131.151.0.192]) by UMR-CMAIL1.umr.edu with Microsoft SMTPSVC(6.0.3790.3959);

Mon, 1 Oct 2007 12:26:03 -0500

Received: from scansrv2.srv.mst.edu ([131.151.1.114]) by umr-exproto2.cc.umr.edu with Microsoft

SMTPSVC(6.0.3790.3959);  
Mon, 1 Oct 2007 12:26:02 -0500  
Received: (qmail 8022 invoked from network); 1 Oct 2007 16:59:55 -0000  
Received: from smtp1.srv.mst.edu (131.151.1.43)  
by scanin-ipvs.cc.umar.edu with SMTP; 1 Oct 2007 16:59:55 -0000  
Received: from spunkymail-mx8.g.dreamhost.com (mx1.spunky.mail.dreamhost.com [208.97.132.47])  
by smtp1.srv.mst.edu (8.13.1/8.13.1) with ESMTP id 191Gxtpr020623  
for <nneul@umar.edu>; Mon, 1 Oct 2007 11:59:55 -0500  
Received: from rutherford.zen.co.uk (rutherford.zen.co.uk [212.23.3.142])  
by spunkymail-mx8.g.dreamhost.com (Postfix) with ESMTP id 2C7734D311  
for <nneul@neulinger.org>; Mon, 1 Oct 2007 09:59:50 -0700 (PDT)  
Received: from  
[82.68.43.14] (helo=[192.168.1.3])  
by rutherford.zen.co.uk with esmtp (Exim 4.50)  
id 1IcOcX-0004Qt-6L  
for nneul@neulinger.org; Mon, 01 Oct 2007 16:59:49 +0000  
Mime-Version: 1.0 (Apple Message framework v752.2)  
In-Reply-To: <1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>  
References: <1190922867.3457.147.camel@localhost.localdomain>  
<EC90713277D2BE41B7110CCD74E235CEF44F38@UMR-CMAIL1.umr.edu>  
<1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>  
Content-Type: text/plain; charset=US-ASCII; delsp=yes; format=flowed  
Message-Id: <117A1264-F6DC-4E25-B0DD-56FBFE6E9F@crypticide.com>  
Content-Transfer-Encoding: 7bit  
From: Alec Muffett <alecm@crypticide.com>  
Subject: Re: cracklib license  
Date: Mon, 1 Oct 2007 17:59:46 +0100  
To: Nathan Neulinger <nneul@neulinger.org>  
X-Mailer: Apple Mail (2.752.2)  
X-Originating-Rutherford-IP: [82.68.43.14]  
Return-Path: alecm@crypticide.com  
X-OriginalArrivalTime: 01 Oct 2007 17:26:03.0008 (UTC) FILETIME=[2420C000:01C80450]  
Status: RO  
Content-Length:  
585  
Lines: 21

>  
> ----- Forwarded message -----  
> From: Neulinger, Nathan <nneul@umar.edu>  
> Date: Sep 27, 2007 2:58 PM  
> Subject: RE: cracklib license  
> To: alecm@crypto.dircon.co.uk  
>  
> Any chance you could write me a self-contained email stating clearly  
> that the license is being changed to GPL, so I could include that  
> email  
> in the repository and clean up the repository/tarballs? I have all the

- > original discussion, but something succinct and self contained
- > would be
- > ideal.

The license for my code in the Cracklib distribution is henceforth GPL.

Happy now? :-)

-a

# 1.109 xz 5.2.5-8.el9\_0

## 1.109.1 Available under license :

GNU GENERAL PUBLIC LICENSE

Version 2, June 1991

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## 1.112 gobject-introspection 1.68.0-11.e19

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```
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```

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## 1.113 keyutils 1.6.3-1.el9

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## 1.114 cyrus-sasl 2.1.27-21.el9

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## 1.115 keyutils-libs 1.6.3-1.el9

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<one line to give the program's name and a brief idea of what it does.>  
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```
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Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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software

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```

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```
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library `Frob' (a library for tweaking knobs) written by James Random Hacker.
```

```
<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice
```

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## 1.117 systemd-python 234

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Version 2.1, February 1999

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## 1.118 zap 1.26.0

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## 1.119 go-restful 3.11.0

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## 1.125 python-pip 21.3.1

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ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#

This is a bundle of X.509 certificates of public Certificate Authorities (CA). These were automatically extracted from Mozilla's root certificates file (certdata.txt). This file can be found in the mozilla source tree:

<http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#>

It contains the certificates in PEM format and therefore can be directly used with curl / libcurl / php\_curl, or with an Apache+mod\_ssl webserver for SSL client authentication.

Just configure this file as the SSLCACertificateFile.#

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### A. HISTORY OF THE SOFTWARE

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Python was created in the early 1990s by Guido van Rossum at Stichting  
Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands  
as a successor of a language called ABC. Guido remains Python's  
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for  
National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>)  
in Reston, Virginia where he released several versions of the  
software.

In May 2000, Guido and the Python core development team moved to  
BeOpen.com to form the BeOpen PythonLabs team. In October of the same  
year, the PythonLabs team moved to Digital Creations (now Zope  
Corporation, see <http://www.zope.com>). In 2001, the Python Software  
Foundation (PSF, see <http://www.python.org/psf/>) was formed, a  
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All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3				
2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes

3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
3.1.1	3.1	2009	PSF	yes
3.1.2	3.1	2010	PSF	yes
3.2	3.1	2010	PSF	yes

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## 1.129 google-go-cmp 0.6.0

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3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

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b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

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```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) 19yy <name of author>
```

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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19yy name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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---

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Version 2, June 1991

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

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Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work.

(Executables containing this object code plus portions of the Library will still fall under Section 6.)

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<one line to give the library's name and a brief idea of what it does.>  
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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the  
library  
'Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990  
Ty Coon, President of Vice

That's all there is to it!

## 1.132 basesystem 11-13.el9

### 1.132.1 Available under license :

No license file was found, but licenses were detected in source scan.

```
%global distroname %(source /etc/os-release; echo ${REDHAT_SUPPORT_PRODUCT})
```

Summary: The skeleton package which defines a simple %{distroname} system

Name: basesystem

Version: 11

Release: 13%{?dist}

License: Public Domain

Requires(pre): setup filesystem

BuildArch: noarch

```
%description
```

Basesystem defines the components of a basic %{distroname} system  
(for example, the package installation order to use during bootstrapping).  
Basesystem should be in every installation of a system, and it  
should never be removed.

```
%prep
```

```
%build
```

```
%install
```

```
%files
```

```
%changelog
```

```
* Mon Aug 09 2021 Mohan Boddu <mboddu@redhat.com> - 11-13
- Rebuilt for IMA sigs, glibc 2.34, aarch64 flags
Related: rhbz#1991688
```

- \* Thu Apr 15 2021 Mohan Boddu <mboddu@redhat.com> - 11-12  
- Rebuilt for RHEL 9 BETA on Apr 15th 2021. Related: rhbz#1947937
- \* Tue Jan 26 2021 Fedora Release Engineering <releng@fedoraproject.org> - 11-11  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_34\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_34_Mass_Rebuild)
- \*  
Mon Jul 27 2020 Fedora Release Engineering <releng@fedoraproject.org> - 11-10  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_33\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_33_Mass_Rebuild)
- \* Tue Jan 28 2020 Fedora Release Engineering <releng@fedoraproject.org> - 11-9  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_32\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_32_Mass_Rebuild)
- \* Wed Jul 24 2019 Fedora Release Engineering <releng@fedoraproject.org> - 11-8  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_31\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_31_Mass_Rebuild)
- \* Thu Jan 31 2019 Fedora Release Engineering <releng@fedoraproject.org> - 11-7  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_30\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_30_Mass_Rebuild)
- \* Thu Jul 12 2018 Fedora Release Engineering <releng@fedoraproject.org> - 11-6  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_29\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_29_Mass_Rebuild)
- \* Wed Feb 07 2018 Fedora Release Engineering <releng@fedoraproject.org> - 11-5  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_28\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_28_Mass_Rebuild)
- \* Wed Jul 26 2017 Fedora Release Engineering <releng@fedoraproject.org>  
- 11-4  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_27\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_27_Mass_Rebuild)
- \* Fri Feb 10 2017 Fedora Release Engineering <releng@fedoraproject.org> - 11-3  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_26\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_26_Mass_Rebuild)
- \* Wed Feb 03 2016 Fedora Release Engineering <releng@fedoraproject.org> - 11-2  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_24\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_24_Mass_Rebuild)
- \* Thu Jul 09 2015 Ondrej Vasik <ovasik@redhat.com> 11-1  
- automatically determine OS name at build time (#1195396)
- \* Wed Jun 17 2015 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 10.0-11  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_23\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_23_Mass_Rebuild)
- \* Sat Jun 07 2014 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 10.0-10  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_21\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_21_Mass_Rebuild)
- \* Sat Aug 03 2013 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 10.0-9  
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_20\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_20_Mass_Rebuild)
- \* Wed Feb 13 2013 Fedora Release Engineering

- <rel-eng@lists.fedoraproject.org> - 10.0-8
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_19\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_19_Mass_Rebuild)
  
- \* Wed Jul 18 2012 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 10.0-7
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_18\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_18_Mass_Rebuild)
  
- \* Thu Jan 12 2012 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 10.0-6
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_17\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_17_Mass_Rebuild)
  
- \* Thu Jun 23 2011 Ondrej Vasik <ovasik@redhat.com> 10.0-5
- fix FTBFS typo (#715640), add disttag
  
- \* Mon Feb 07 2011 Fedora Release Engineering <rel-eng@lists.fedoraproject.org>
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_15\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_15_Mass_Rebuild)
  
- \* Fri Jul 24 2009 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 10.0-3
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_12\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_12_Mass_Rebuild)
  
- \* Mon Feb 23 2009 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 10.0-2
- Rebuilt for [https://fedoraproject.org/wiki/Fedora\\_11\\_Mass\\_Rebuild](https://fedoraproject.org/wiki/Fedora_11_Mass_Rebuild)
  
- \* Mon
- Oct 20 2008 Phil Knirsch <pknirsch@redhat.com> 10.0-1
- Bump version and rebuild for Fedora 10 (#451289)
  
- \* Fri Mar 02 2007 Phil Knirsch <pknirsch@redhat.com> - 8.1-1
- Cleanup per package review (#225608)
  
- \* Wed Jul 12 2006 Jesse Keating <jkeating@redhat.com> - 8.0-5.1.1
- rebuild
  
- \* Fri Dec 09 2005 Jesse Keating <jkeating@redhat.com>
- rebuilt
  
- \* Wed Sep 22 2004 Bill Nottingham <notting@redhat.com>
- rebuilt
  
- \* Fri Feb 13 2004 Elliot Lee <sopwith@redhat.com>
- rebuilt
  
- \* Wed Jan 22 2003 Tim Powers <timp@redhat.com>
- rebuilt
  
- \* Wed Aug 21 2002 Bill Nottingham <notting@redhat.com>
- bump rev
  
- \* Fri Jun 21 2002 Tim Powers <timp@redhat.com>
- automated rebuild

- \* Thu May 23 2002 Tim Powers <timp@redhat.com>  
- automated rebuild
- \* Wed Jan 09 2002 Tim Powers <timp@redhat.com>  
- automated rebuild
- \* Wed Jul 12 2000 Prospector <bugzilla@redhat.com>  
- automatic rebuild
- \* Tue Jun 6 2000 Bill Nottingham <notting@redhat.com>  
- rebuild. Wheee.
- \* Sun Mar 21 1999 Cristian Gafton <gafton@redhat.com>  
  
- auto rebuild in the new build environment (release 4)
- \* Tue Mar 16 1999 Cristian Gafton <gafton@redhat.com>  
- don't require rpm (breaks dependency chain)
- \* Tue Mar 16 1999 Erik Troan <ewt@redhat.com>  
- require rpm
- \* Wed Dec 30 1998 Cristian Gafton <gafton@redhat.com>  
- build for 6.0
- \* Tue Aug 11 1998 Jeff Johnson <jbj@redhat.com>  
- build root
- \* Mon Apr 27 1998 Prospector System <bugs@redhat.com>  
- translations modified for de, fr, tr
- \* Tue Sep 23 1997 Erik Troan <ewt@redhat.com>  
- made a noarch package

Found in path(s):

\* /opt/cola/permits/1839138005\_1698981692.2472556/0/basesystem-11-13.el9.src.rpm-cosi-expand-archive-DT4885Gu/basesystem.spec

## 1.133 dbus-python 1.2.18

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## 1.134 python-dbus 1.2.18-2.el9

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```
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it
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```
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>
```

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```
<program> Copyright (C) <year> <name of author>
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```

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## 1.137 ncurses 6.2-10.20210508.el9

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## 1.138 python-dateutil 2.8.1-7.el9

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#+TITLE: List of code with permissive licenses as used by GnuPG.
#+STARTUP: showall
```

\* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.

-----  
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\* Regular  
expression support

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Subsequently modified by:

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1993 Christopher Seiwald seiwald@vix.com  
2000, 2002 Christopher Seiwald <seiwald@perforce.com>  
2010 Steve Bennett <steveb@workware.net.au>  
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## 1.141 libffi 3.4.2-8.el9

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## 1.145 ncurses-libs 6.2-10.20210508.el9

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Upstream source <https://invisible-island.net/ncurses/ncurses.html>

This package is used for testing builds of ncurses.

Current ncurses maintainer: Thomas Dickey <[dickey@invisible-island.net](mailto:dickey@invisible-island.net)>

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-- \$Id: COPYING,v 1.10 2021/01/01 09:54:30 tom Exp \$  
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-- vile: txtmode file-encoding=utf-8

## 1.146 go-logr-zapr 1.3.0

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## 1.147 yaml 1.4.0

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## 1.148 structured-merge-diff 4.4.1

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# 1.149 kubernetes-klog 2.110.1

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Metadata-Version: 1.1

Name: prometheus-client

Version: 0.5.0

Summary: Python client for the Prometheus monitoring system.

Home-page: [https://github.com/prometheus/client\\_python](https://github.com/prometheus/client_python)

Author: Brian Brazil

Author-email: [brian.brazil@robustperception.io](mailto:brian.brazil@robustperception.io)

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Description: See [https://github.com/prometheus/client\\_python/blob/master/README.md](https://github.com/prometheus/client_python/blob/master/README.md) for documentation.

Keywords: prometheus monitoring instrumentation client

Platform: UNKNOWN

Classifier: Development Status :: 4 - Beta

Classifier: Intended Audience :: Developers

Classifier: Intended Audience :: Information Technology

Classifier: Intended Audience :: System Administrators

Classifier: Programming Language :: Python

Classifier: Programming Language :: Python :: 2

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Classifier: Programming Language :: Python :: 3

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Metadata-Version: 1.1

Name: prometheus\_client

Version: 0.5.0

Summary: Python client for the Prometheus monitoring system.

Home-page: [https://github.com/prometheus/client\\_python](https://github.com/prometheus/client_python)

Author: Brian Brazil

Author-email: [brian.brazil@robustperception.io](mailto:brian.brazil@robustperception.io)

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Description: See [https://github.com/prometheus/client\\_python/blob/master/README.md](https://github.com/prometheus/client_python/blob/master/README.md) for documentation.

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Platform: UNKNOWN

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# 1.151 prometheus-client 1.18.0

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## 1.153 sqlite 3.34.1-7.el9\_3

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## 1.154 x-oauth2 0.17.0

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## 1.163 libcom-err 1.46.5-5.el9

### 1.163.1 Available under license :

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It is part of the main e2fsprogs distribution, which can be found at:

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Sources were obtained from <http://sourceforge.net/projects/e2fsprogs>

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#

# This is a Makefile stub which handles the creation of BSD shared # libraries.

#

# In order to use this stub, the following makefile variables must be defined.

#

# BSDLIB\_VERSION = 1.0

# BSDLIB\_IMAGE = libce

# BSDLIB\_MYDIR = et

# BSDLIB\_INSTALL\_DIR = \$(SHLIBDIR)

```

#

all:: image

real-subdirs:: Makefile
@echo " MKDIR pic"
@mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image: $(BSD_LIB)

$(BSD_LIB): $(OBJS)
(cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
$(MV) pic/$(BSD_LIB) .
$(RM) -f ../$(BSD_LIB)
(cd ..; $(LN) $(LINK_BUILD_FLAGS) \
`echo $(my_dir) | sed -e 's;lib/;;' /$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
@echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
@$(INSTALL_PROGRAM) $(BSD_LIB) \
$(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
@-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
$(RM) -f $(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
$(RM)
-rf pic
$(RM) -f $(BSD_LIB)
$(RM) -f ../$(BSD_LIB)

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Index: tdbsa/tdb.c

=====

--- tdbsa.orig/tdb.c

+++ tdbsa/tdb.c

@@ -4,11 +4,11 @@ Rev: 23371

Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)

\*/

/\*

- Unix SMB/CIFS implementation.
- + trivial database library - standalone version
  
- trivial database library - private includes
- 
- Copyright (C) Andrew Tridgell           2005
- + Copyright (C) Andrew Tridgell           1999-2005

- + Copyright (C) Jeremy Allison 2000-2006
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Gadi Oxman, August 1995

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```
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```

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```

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Theodore Ts'o

23-June-2007

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```

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That's all there is to it!

This is the Debian GNU/Linux prepackaged version of the EXT2 file system utilities (e2fsck, mke2fs, etc.). The EXT2 utilities were written by Theodore Ts'o <tytso@mit.edu> and Remy Card <card@masi.ibp.fr>.

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This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

<http://sourceforge.net/projects/e2fsprogs>

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This package was put together by Yann Dirson <dirson@debian.org>, from sources obtained from a mirror of:  
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@end enumerate

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@heading Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the ``copyright" line and a pointer to where the full notice is found.

@smallexample

@var{one line to give the program's name  
and a brief idea of what it does.}

Copyright (C) @var{yyyy} @var{name of author}

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@end smallexample

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
@smallexample
Gnomovision version
69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample
```

The hypothetical commands @samp{show w} and @samp{show c} should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than @samp{show w} and @samp{show c}; they could even be mouse-clicks or menu items---whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a ``copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

```
@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example
```

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The gettext-runtime package is partially under the LGPL and partially under the GPL.

The following parts are under the LGPL, see file intl/COPYING.LIB:

- the libintl and libasprintf libraries and their header files,
- the libintl.jar Java library,
- the GNU.Gettext.dll C# library,
- the gettext.sh shells script function library.

The following parts are under the GPL, see file COPYING in the toplevel directory:

- the \_programs\_ gettext, ngettext, envsubst,
- the documentation.

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Version 2.1, February 1999

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For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

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## 1.173 go-uber-org-multierr 1.11.0

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line to give the program's name and a brief idea of what it does.>

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```
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## 1.181 python3-librepo 1.14.5-2.el9

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## 1.182 e2fsprogs 1.46.5-5.el9

### 1.182.1 Available under license :

This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

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#

# This is a Makefile stub which handles the creation of BSD shared # libraries.

#

# In order to use this stub, the following makefile variables must be defined.

#

# BSDLIB\_VERSION = 1.0



```

BSDLIB_IMAGE = libce
BSDLIB_MYDIR = et
BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

real-subdirs:: Makefile
@echo " MKDIR pic"
@mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image: $(BSD_LIB)

$(BSD_LIB): $(OBJS)
(cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
$(MV) pic/$(BSD_LIB) .
$(RM) -f ../$(BSD_LIB)
(cd ..; $(LN) $(LINK_BUILD_FLAGS) \
`echo $(my_dir) | sed -e 's;lib/;;'"/$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
@echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
@$(INSTALL_PROGRAM) $(BSD_LIB) \
$(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
@-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
$(RM) -f $(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
$(RM)
-rf pic
$(RM) -f $(BSD_LIB)
$(RM) -f ../$(BSD_LIB)

```

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This is the Debian GNU/Linux prepackaged version of the translation files of the EXT2 file system utilities. The EXT2 utilities were written by Theodore Ts'o <tytso@mit.edu> and Remy Card <card@masi.ibp.fr>.

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Index: tdbsa/tdb.c

-----  
--- tdbsa.orig/tdb.c

+++ tdbsa/tdb.c

@@ -4,11 +4,11 @@ Rev: 23371

Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)

\*/

/\*

- Unix SMB/CIFS implementation.
- + trivial database library - standalone version
  
- trivial database library - private includes

- 
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Gadi Oxman, August 1995

-----  
  
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Theodore Ts'o  
23-June-2007

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```

```
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This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

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## 1.183 bash 5.1.8-9.el9

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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## 1.186 libsepol 3.6-1.el9

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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# 1.188 gnutls 3.8.3-4.e19\_4

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For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes



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The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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- a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)
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- d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
- e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the

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Version 3, 29 June 2007

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The

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Constant-time SSSE3 AES core implementation.
version 0.1

By Mike Hamburg (Stanford University), 2009
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## 1.193 sigs.k8s.io-json 0.0.0-20221116044647-bc3834ca7abd

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## 1.194 pep517 0.12.0

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## 1.195 pyinotify 0.9.6

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## 1.196 systemd-python 234-8.e18



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<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

That's all there is to it!

# 1.197 alpine-baselayout 3.6.5-r0

## 1.197.1 Available under license :

```
Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.22
pkgrel=1
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt; do
 local
 license=${i##*/}
 echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}
```

```

sha512sums="
b213fe66699770d75a4c994a01a5c08325751423516c2fb871088a47e7e7ce605736064f5ce3a63dc1d3c462271832db
7bc464ac968df1888f9823787964c786 license-list-data-3.22.tar.gz
"
Contributor: Maxim Karasev <begs@disroot.org>
Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=1
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz"
options="!check" # no tests

build() {
some GNU autoconf options are ignored, but it works
./configure \
--build=$CBUILD \
--host=$CHOST \
--prefix=/usr \
--sysconfdir=/etc \
--mandir=/usr/share/man \
--localstatedir=/var/lib # it really shouldn't be in /var
make
}

package() {
make DESTDIR="$pkgdir" install
install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
bsd-games-3.3.tar.gz
"
Contributor: Dhruvin Gandhi <contact@dhruvin.dev>
Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license-expression
pkgver=30.3.0
pkgrel=1
pkgdesc="Library to parse, compare, simplify and normalize license expressions"

```

```

url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/${_pkgname}/${_pkgname}-${pkgver}.tar.gz"
builddir="$srcdir/${_pkgname}-${pkgver}"

build() {
 gpep517 build-wheel \
 --wheel-dir .dist \
 --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
 .dist/*.whl
}

sha512sums="
3fe4ac8830085fe38d8ee713a332047941b2a7a8ff5f31810b124c5903335a8343a222926aefe00da66a49b4d6f8b934
af3cc350448b075a4ec6aa1fdb51aef
 license-expression-30.3.0.tar.gz
"
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```

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```
Automatically generated by apkgbuild-cpan, template 4
Contributor: Valery Kartel <valery.kartel@gmail.com>
Maintainer: Celeste <cielesti@protonmail.com>
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=9
#_pkgreal is used by apkgbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/${_pkgreal}-${pkgver}"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
 INSTALLDIRS=vendor \
 NO_PACKLIST=1 \
 NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
 BSD-Resource-1.2911.tar.gz
"
```

Vintage Dreams Waves v 2.0. for Creative Labs' AWE Soundcards  
(EMU Soundfont 2 Format)

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Any feedback, contact Ian Wilson.

[vintagedreamworks@hotmail.com](mailto:vintagedreamworks@hotmail.com)

<http://www.geocities.com/SiliconValley/Campus/8645/index.html>

<http://members.nbc.com/silicon39/>

<http://www.mp3.com/silicon39>

<https://analoguesque.x10host.com/>

mini\_sendmail - accept email on behalf of real sendmail

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```

Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-igpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check" # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_igpl/2.3/libart_igpl-$pkgver.tar.bz2"
"

builddir="$srcdir"/libart_igpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
 --build=$CBUILD \
 --host=$CHOST \
 --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020 libart_igpl-2.3.21.tar.bz2"
Automatically generated by apkbuild-cpan, template 3
Contributor: Valery Kartel <valery.kartel@gmail.com>
Maintainer: Celeste <cielesti@protonmail.com>
pkgname=perl-bsd-resource
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgver=1.2911
pkgrel=9
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"

```

```

subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL INSTALLDIRS=vendor
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
 find "$pkgdir" \(-name perllocal.pod -o -name .packlist \) -delete
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
 BSD-Resource-1.2911.tar.gz
"
Contributor: Patrycja Rosa <alpine@ptrcnll.me>
Maintainer: Patrycja Rosa <alpine@ptrcnll.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
cdefs.h
queue.h
tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
 cdefs.h queue.h tree.h
}
sha512sums="

```

37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312  
7006442c3f019b6447a620c0cae73178 cdefs.h  
2f0d5e6e4dc3350285cf17009265dddcbel2431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86  
11ea33987d4faba37dde5ce6da0750 queue.h  
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da  
cef2092881eded0a2e94f6a07752ef3 tree.h  
"

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The Kohonen neural network code for color optimization was written by Anthony Dekker.

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The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:

"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95  
<http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html>

# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>

# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>

pkgname=py3-flake8-copyright

\_pkgname=flake8-copyright

pkgver=0.2.4

pkgrel=3

pkgdesc="Extension for flake8 which checks for copyrights"

options="!check" # No testsuite

url="https://github.com/savoirfairelinux/flake8-copyright"

arch="noarch"

license="MIT"

depends="py3-flake8 py3-setuptools"

```

makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/${_pkgname}/${_pkgname}-${pkgver}.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright" # Backwards compatibility
provides="py-flake8-copyright=${pkgver-r$pkgrel}" # Backwards compatibility

build() {
 gpep517 build-wheel \
 --wheel-dir .dist \
 --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
 .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
flake8-copyright-0.2.4.tar.gz
"

Maintainer: fossdd <fossdd@pwned.life>
pkgname=cargo-license
pkgver=0.6.1
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

```

```
package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}
```

```
sha512sums="
36215145e79965be090ae2f5ce6f5eb208465eb67a94c26bed1fe70a131c46c6dc35695e30852759b7366883fbc3caf00
272d796ac634f0a5e1d49232b6b29d5 cargo-license-0.6.1.tar.gz
"
```

## 1.198 libxml2 2.9.13-6.el9\_4

### 1.198.1 Available under license :

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## 1.199 protobuf 1.34.1

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## 1.200 busybox 1.36.1-r29

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Julian Seward, Cambridge, UK.

jseward@bzip.org

bzip2/libbzip2 version 1.0.4 of 20 December 2006

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## 1.201 setools 4.4.4

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## 1.203 python3-idna 2.10-7.el9\_4.1

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Metadata-Version: 1.2

Name: idna

Version: 2.10

Summary: Internationalized Domain Names in Applications (IDNA)

Home-page: <https://github.com/kjd/idna>

Author: Kim Davies

Author-email: [kim@cynosure.com.au](mailto:kim@cynosure.com.au)

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Description: Internationalized Domain Names in Applications (IDNA)

=====  
Support for the Internationalised Domain Names in Applications (IDNA) protocol as specified in `RFC 5891 <<http://tools.ietf.org/html/rfc5891>>`. This is the latest version of the protocol and is sometimes referred to as "IDNA 2008".

This library also provides support for Unicode Technical Standard 46,  
`Unicode IDNA Compatibility Processing <<http://unicode.org/reports/tr46/>>`\_.

This acts as a suitable replacement for the “encodings.idna” module that  
comes with the Python standard library,  
but only supports the  
old, deprecated IDNA specification (RFC 3490 <<http://tools.ietf.org/html/rfc3490>>`\_).

Basic functions are simply executed:

```
.. code-block:: pycon

Python 3
>>> import idna
>>> idna.encode('.')
b'xn--eckwd4c7c.xn--zckzah'
>>> print(idna.decode('xn--eckwd4c7c.xn--zckzah'))
.

Python 2
>>> import idna
>>> idna.encode(u'.')
'xn--eckwd4c7c.xn--zckzah'
>>> print idna.decode('xn--eckwd4c7c.xn--zckzah')
.
```

## Packages

-----

The latest tagged release version is published in the PyPI repository:

```
.. image:: https://badge.fury.io/py/idna.svg
:target: http://badge.fury.io/py/idna
```

## Installation

-----

To install this library,  
you can use pip:

```
.. code-block:: bash

$ pip install idna
```

Alternatively, you can install the package using the bundled setup script:

```
.. code-block:: bash
```

```
$ python setup.py install
```

This library works with Python 2.7 and Python 3.4 or later.

## Usage

-----

For typical usage, the `encode` and `decode` functions will take a domain name argument and perform a conversion to A-labels or U-labels respectively.

```
.. code-block:: pycon
```

```
Python 3
>>> import idna
>>> idna.encode('.')
b'xn--eckwd4c7c.xn--zckzah'
>>> print(idna.decode('xn--eckwd4c7c.xn--zckzah'))
.
```

You may use the codec encoding and decoding methods using the `idna.codec` module:

```
.. code-block:: pycon
```

```
Python 2
>>> import idna.codec
>>> print u'.'.encode('idna')
xn--80ahd1agd.xn--80akhbyknj4f
>>> print 'xn--80ahd1agd.xn--80akhbyknj4f'.decode('idna')
.
```

Conversions can be applied at a per-label basis using the `ulabel` or `alabel` functions if necessary:

```
.. code-block:: pycon
```

```
Python 2
>>> idna.alabel(u")
'xn--0zwm56d'
```

## Compatibility Mapping (UTS #46)

```
+++++
```

As described in [RFC 5895](http://tools.ietf.org/html/rfc5895) `<http://tools.ietf.org/html/rfc5895>`, the IDNA specification no longer normalizes input from different potential ways a user

may input a domain name. This functionality, known as a “mapping”, is now considered by the specification to be a local user-interface issue distinct from IDNA conversion functionality.

This library provides one such mapping, that was developed by the Unicode Consortium. Known as `Unicode IDNA Compatibility Processing` <http://unicode.org/reports/tr46/>, it provides for both a regular mapping for typical applications, as well as a transitional mapping to help migrate from older IDNA 2003 applications.

For example, “Königsgäßchen” is not a permissible label as \*LATIN CAPITAL LETTER K\* is not allowed (nor are capital letters in general). UTS 46 will convert this into lower case prior to applying the IDNA conversion.

```
.. code-block:: pycon
```

```
Python 3
>>> import idna
>>> idna.encode(u'Königsgäßchen')
...
idna.core.InvalidCodepoint: Codepoint U+004B at position 1 of 'Königsgäßchen' not allowed
>>> idna.encode('Königsgäßchen', uts46=True)
b'xn--knigsgchen-b4a3dun'
>>> print(idna.decode('xn--knigsgchen-b4a3dun'))
königsgäßchen
```

Transitional processing provides conversions to help transition from the older 2003 standard to the current standard. For example, in the original IDNA specification, the \*LATIN SMALL LETTER SHARP S\* (ß) was converted into two \*LATIN SMALL LETTER S\* (ss), whereas in the current IDNA specification this conversion is not performed.

```
.. code-block:: pycon
```

```
Python 2
>>> idna.encode(u'Königsgäßchen', uts46=True, transitional=True)
'xn--knigsgsschen-lcb0w'
```

Implementors should use transitional processing with caution, only in rare cases where conversion from legacy labels to current labels must be performed (i.e. IDNA implementations that pre-date 2008). For typical applications that just need to convert labels, transitional processing is unlikely to be beneficial and could produce unexpected incompatible results.

```
``encodings.idna`` Compatibility
+++++
```



Function calls from the Python built-in `encodings.idna` module are mapped to their IDNA 2008 equivalents using the `idna.compat` module. Simply substitute the `import` clause in your code to refer to the new module name.

## Exceptions

-----

All errors raised during the conversion following the specification should raise an exception derived from the `idna.IDNAError` base class.

More specific exceptions that may be generated as `idna.IDNABidiError` when the error reflects an illegal combination of left-to-right and right-to-left characters in a label; `idna.InvalidCodepoint` when a specific codepoint is an illegal character in an IDN label (i.e. INVALID); and `idna.InvalidCodepointContext` when the codepoint is illegal based on its positional context (i.e. it is CONTEXTO or CONTEXTJ but the contextual requirements are not satisfied.)

## Building and Diagnostics

-----

The IDNA and UTS 46 functionality relies upon pre-calculated lookup tables for performance. These tables are derived from computing against eligibility criteria in the respective standards. These tables are computed using the command-line script `tools/idna-data`.

This tool will fetch relevant tables from the Unicode Consortium and perform the required calculations to identify eligibility. It has three main modes:

- \* `idna-data make-libdata`. Generates `idnadata.py` and `uts46data.py`, the pre-calculated lookup tables used for IDNA and UTS 46 conversions. Implementors who wish to track this library against a different Unicode version may use this tool to manually generate a different version of the `idnadata.py` and `uts46data.py` files.
- \* `idna-data make-table`. Generate a table of the IDNA disposition (e.g. PVALID, CONTEXTJ, CONTEXTO) in the format found in Appendix B.1 of RFC 5892 and the pre-computed tables published by IANA <<http://iana.org/>>.
- \* `idna-data U+0061`. Prints debugging output on the various properties associated with an individual Unicode codepoint (in this case, U+0061), that are used to assess the IDNA and UTS 46 status of a codepoint. This is helpful in debugging or analysis.

The tool accepts a number of arguments, described using `idna-data -h`. Most notably, the `--version` argument allows the specification of the version of Unicode to use

in computing the table data. For example, ``idna-data --version 9.0.0 make-libdata`` will generate library data against Unicode 9.0.0.

Note that this script requires Python 3, but all generated library data will work in Python 2.7.

## Testing

-----

The library has a test suite based on each rule of the IDNA specification, as well as tests that are provided as part of the Unicode Technical Standard 46, `Unicode IDNA Compatibility Processing <<http://unicode.org/reports/tr46/>>`.

The tests are run automatically on each commit at Travis CI:

```
.. image:: https://travis-ci.org/kjd/idna.svg?branch=master
 :target: https://travis-ci.org/kjd/idna
```

Platform: UNKNOWN

Classifier: Development Status :: 5 - Production/Stable

Classifier: Intended Audience :: Developers

Classifier: Intended Audience :: System Administrators

Classifier: License :: OSI Approved :: BSD License

Classifier: Operating System :: OS Independent

Classifier: Programming Language :: Python

Classifier: Programming Language

:: Python :: 2

Classifier: Programming Language :: Python :: 2.7

Classifier: Programming Language :: Python :: 3

Classifier: Programming Language :: Python :: 3.4

Classifier: Programming Language :: Python :: 3.5

Classifier: Programming Language :: Python :: 3.6

Classifier: Programming Language :: Python :: 3.7

Classifier: Programming Language :: Python :: 3.8

Classifier: Programming Language :: Python :: Implementation :: CPython

Classifier: Programming Language :: Python :: Implementation :: PyPy

Classifier: Topic :: Internet :: Name Service (DNS)

Classifier: Topic :: Software Development :: Libraries :: Python Modules

Classifier: Topic :: Utilities

Requires-Python: >=2.7, !=3.0.\*, !=3.1.\*, !=3.2.\*, !=3.3.\*

Found in path(s):

\* /opt/cola/permits/2062156612\_1719246046.7170713/0/python-idna-2.10-7.el9\_4.1.src.rpm-cosi-expand-archive-KKOLoBKF/idna-2.10.tar.gz-cosi-expand-archive-laCYPWuD/idna-2.10/idna.egg-info/PKG-INFO

\* /opt/cola/permits/2062156612\_1719246046.7170713/0/python-idna-2.10-7.el9\_4.1.src.rpm-cosi-expand-archive-KKOLoBKF/idna-2.10.tar.gz-cosi-expand-archive-laCYPWuD/idna-2.10/PKG-INFO

No license file was found, but licenses were detected in source scan.

```
"""
```

```
A library to support the Internationalised Domain Names in Applications (IDNA) protocol as specified in RFC 5890 et.al. This new methodology, known as IDNA 2008, can generate materially different results to the previous standard. The library can act as a drop-in replacement for the "encodings.idna" module.
```

```
"""
```

```
import io, sys
```

```
from setuptools import setup
```

```
def main():
```

```
 python_version = sys.version_info[:2]
```

```
 if python_version < (2,7):
```

```
 raise SystemExit("Sorry, Python 2.7 or newer required")
```

```
 package_data = { }
```

```
 exec(open('idna/package_data.py').read(), package_data)
```

```
 arguments = {
```

```
 'name': 'idna',
```

```
 'packages': ['idna'],
```

```
 'version': package_data['__version__'],
```

```
 'description': 'Internationalized Domain Names in Applications (IDNA)',
```

```
 'long_description': io.open("README.rst", encoding="UTF-8").read(),
```

```
 'author': 'Kim Davies',
```

```
 'author_email': 'kim@cynosure.com.au',
```

```
 'license': 'BSD-like',
```

```
 'url': 'https://github.com/kjd/idna',
```

```
 'classifiers': [
```

```
 'Development Status :: 5 - Production/Stable',
```

```
 'Intended Audience :: Developers',
```

```
 'Intended Audience :: System Administrators',
```

```
 'License :: OSI Approved :: BSD License',
```

```
 'Operating System :: OS Independent',
```

```
 'Programming Language :: Python',
```

```
 'Programming Language :: Python :: 2',
```

```
 'Programming Language :: Python :: 2.7',
```

```
 'Programming Language :: Python :: 3',
```

```
 'Programming Language :: Python :: 3.4',
```

```
 'Programming Language :: Python :: 3.5',
```

```
 'Programming Language :: Python :: 3.6',
```

```
 'Programming Language :: Python :: 3.7',
```

```
 'Programming Language :: Python :: 3.8',
```

```

'Programming Language :: Python :: Implementation :: CPython',
'Programming Language :: Python :: Implementation :: PyPy',
'Topic :: Internet :: Name Service (DNS)',
'Topic :: Software Development :: Libraries :: Python Modules',
'Topic :: Utilities',
],
'python_requires': '>=2.7, !=3.0.*, !=3.1.*, !=3.2.*, !=3.3.*',
}

setup(**arguments)

if __name__ == '__main__':
 main()

```

Found in path(s):

```

* /opt/cola/permits/2062156612_1719246046.7170713/0/python-idna-2.10-7.el9_4.1.src.rpm-cosi-expand-archive-
KKOLoBKF/idna-2.10.tar.gz-cosi-expand-archive-laCYPWuD/idna-2.10/setup.py

```

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Found in path(s):

\* /opt/cola/permits/2062156612\_1719246046.7170713/0/python-idna-2.10-7.el9\_4.1.src.rpm-cosi-expand-archive-KKOLoBKF/idna-2.10.tar.gz-cosi-expand-archive-laCYPWuD/idna-2.10/LICENSE.rst

## 1.204 python-idna 2.10-7.el9\_4.1

### 1.204.1 Available under license :

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License: BSD and Python and Unicode

Found in path(s):

\* /opt/cola/permits/2062156618\_1719243206.3991675/0/python-idna-2.10-7.el9\_4.1.src.rpm-cosi-expand-archive-cA6S7p0p/python-idna.spec

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-----

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Found in path(s):

```
* /opt/cola/permits/2062156618_1719243206.3991675/0/python-idna-2.10-7.el9_4.1.src.rpm-cosi-expand-archive-cA6S7p0p/idna-2.10.tar.gz-cosi-expand-archive-QFYAkURt/idna-2.10/LICENSE.rst
```

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Metadata-Version: 1.2

Name: idna

Version: 2.10

Summary: Internationalized Domain Names in Applications (IDNA)

Home-page: <https://github.com/kjd/idna>

Author: Kim Davies

Author-email: [kim@cynosure.com.au](mailto:kim@cynosure.com.au)

License: BSD-like

Description: Internationalized Domain Names in Applications (IDNA)

=====

Support for the Internationalised Domain Names in Applications (IDNA) protocol as specified in `RFC 5891 <<http://tools.ietf.org/html/rfc5891>>`. This is the latest version of the protocol and is sometimes referred to as “IDNA 2008”.

This library also provides support for Unicode Technical Standard 46, `Unicode IDNA Compatibility Processing <<http://unicode.org/reports/tr46/>>`.

This acts as a suitable replacement for the “encodings.idna” module that comes with the Python standard library, but only supports the old, deprecated IDNA specification (`RFC 3490 <<http://tools.ietf.org/html/rfc3490>>`).

Basic functions are simply executed:

```
.. code-block:: pycon
```

```
Python 3
>>> import idna
>>> idna.encode('.')
```

```
b'xn--eckwd4c7c.xn--zckzah'
>>> print(idna.decode('xn--eckwd4c7c.xn--zckzah'))
.

Python 2
>>> import idna
>>> idna.encode(u'.')
'xn--eckwd4c7c.xn--zckzah'
>>> print idna.decode('xn--eckwd4c7c.xn--zckzah')
.
```

## Packages

-----

The latest tagged release version is published in the PyPI repository:

```
.. image:: https://badge.fury.io/py/idna.svg
:target: http://badge.fury.io/py/idna
```

## Installation

-----

To install this library,  
you can use pip:

```
.. code-block:: bash

$ pip install idna
```

Alternatively, you can install the package using the bundled setup script:

```
.. code-block:: bash

$ python setup.py install
```

This library works with Python 2.7 and Python 3.4 or later.

## Usage

-----

For typical usage, the ``encode`` and ``decode`` functions will take a domain name argument and perform a conversion to A-labels or U-labels respectively.

```
.. code-block:: pycon
```

```
Python 3
```

```
>>> import idna
>>> idna.encode('.')
b'xn--eckwd4c7c.xn--zckzah'
>>> print(idna.decode('xn--eckwd4c7c.xn--zckzah'))
.
```

You may use the codec encoding and decoding methods using the ``idna.codec`` module:

.. code-block:: pycon

```
Python 2
>>> import idna.codec
>>> print u'.'.encode('idna')
xn--80ahd1agd.xn--80akhbyknj4f
>>> print 'xn--80ahd1agd.xn--80akhbyknj4f'.decode('idna')
.
```

Conversions can be applied at a per-label basis using the ``ulabel`` or ``alabel`` functions if necessary:

.. code-block:: pycon

```
Python 2
>>> idna.alabel(u")
'xn--0zwm56d'
```

#### Compatibility Mapping (UTS #46)

+++++

As described in `RFC 5895 <<http://tools.ietf.org/html/rfc5895>>`\_, the IDNA specification no longer normalizes input from different potential ways a user may input a domain name. This functionality, known as a “mapping”, is now considered by the specification to be a local user-interface issue distinct from IDNA conversion functionality.

This library provides one such mapping, that was developed by the Unicode Consortium. Known as `Unicode IDNA Compatibility Processing <<http://unicode.org/reports/tr46/>>`\_, it provides for both a regular mapping for typical applications, as well as a transitional mapping to help migrate from older IDNA 2003 applications.

For example, “Königsgäßchen” is not a permissible label as \*LATIN CAPITAL LETTER K\* is not allowed (nor are capital letters in general). UTS 46 will convert this into lower case prior to applying the IDNA conversion.

.. code-block:: pycon



```

Python 3
>>> import idna
>>> idna.encode(u'Königsgäßchen')
...
idna.core.InvalidCodepoint: Codepoint U+004B at position 1 of 'Königsgäßchen' not allowed
>>> idna.encode('Königsgäßchen', uts46=True)
b'xn--knigsgchen-b4a3dun'
>>> print(idna.decode('xn--knigsgchen-b4a3dun'))
königsgäßchen

```

Transitional processing provides conversions to help transition from the older 2003 standard to the current standard. For example, in the original IDNA specification, the \*LATIN SMALL LETTER SHARP S\* (ß) was converted into two \*LATIN SMALL LETTER S\* (ss), whereas in the current IDNA specification this conversion is not performed.

.. code-block:: pycon

```

Python 2
>>> idna.encode(u'Königsgäßchen', uts46=True, transitional=True)
'xn--knigsgsschen-lcb0w'

```

Implementors should use transitional processing with caution, only in rare cases where conversion from legacy labels to current labels must be performed (i.e. IDNA implementations that pre-date 2008). For typical applications that just need to convert labels, transitional processing is unlikely to be beneficial and could produce unexpected incompatible results.

```

``encodings.idna`` Compatibility
+++++

```

Function calls from the Python built-in ``encodings.idna`` module are mapped to their IDNA 2008 equivalents using the ``idna.compat`` module. Simply substitute the ``import`` clause in your code to refer to the new module name.

Exceptions

-----

All errors raised during the conversion following the specification should raise an exception derived from the ``idna.IDNAError`` base class.

More specific exceptions that may be generated as ``idna.IDNABidiError`` when the error reflects an illegal combination of left-to-right and right-to-left characters in a label; ``idna.InvalidCodepoint`` when a specific codepoint is an illegal character in an IDN label (i.e. INVALID); and ``idna.InvalidCodepointContext`` when the codepoint is

illegal based on its positional context (i.e. it is CONTEXTO or CONTEXTJ but the contextual requirements are not satisfied.)

## Building and Diagnostics

-----

The IDNA and UTS 46 functionality relies upon pre-calculated lookup tables for performance. These tables are derived from computing against eligibility criteria in the respective standards. These tables are computed using the command-line script `tools/idna-data`.

This tool will fetch relevant tables from the Unicode Consortium and perform the required calculations to identify eligibility. It has three main modes:

\* `idna-data make-libdata`. Generates `idnadata.py` and `uts46data.py`, the pre-calculated lookup tables used for IDNA and UTS 46 conversions. Implementors who wish to track this library against a different Unicode version may use this tool to manually generate a different version of the `idnadata.py` and `uts46data.py` files.

\* `idna-data make-table`. Generate a table of the IDNA disposition (e.g. PVALID, CONTEXTJ, CONTEXTO) in the format found in Appendix B.1 of RFC 5892 and the pre-computed tables published by IANA <<http://iana.org/>>.

\* `idna-data U+0061`. Prints debugging output on the various properties associated with an individual Unicode codepoint (in this case, U+0061), that are used to assess the IDNA and UTS 46 status of a codepoint. This is helpful in debugging or analysis.

The tool accepts a number of arguments, described using `idna-data -h`. Most notably, the `--version` argument allows the specification of the version of Unicode to use in computing the table data. For example, `idna-data --version 9.0.0 make-libdata` will generate library data against Unicode 9.0.0.

Note that this script requires Python 3, but all generated library data will work in Python 2.7.

## Testing

-----

The library has a test suite based on each rule of the IDNA specification, as well as tests that are provided as part of the Unicode Technical Standard 46, 'Unicode IDNA Compatibility Processing' <<http://unicode.org/reports/tr46/>>.

The tests are run automatically on each commit at Travis CI:

```
.. image:: https://travis-ci.org/kjd/idna.svg?branch=master
 :target: https://travis-ci.org/kjd/idna
```

```
Platform: UNKNOWN
Classifier: Development Status :: 5 - Production/Stable
Classifier: Intended Audience :: Developers
Classifier: Intended Audience :: System Administrators
Classifier: License :: OSI Approved :: BSD License
Classifier: Operating System :: OS Independent
Classifier: Programming Language :: Python
Classifier: Programming Language
:: Python :: 2
Classifier: Programming Language :: Python :: 2.7
Classifier: Programming Language :: Python :: 3
Classifier: Programming Language :: Python :: 3.4
Classifier: Programming Language :: Python :: 3.5
Classifier: Programming Language :: Python :: 3.6
Classifier: Programming Language :: Python :: 3.7
Classifier: Programming Language :: Python :: 3.8
Classifier: Programming Language :: Python :: Implementation :: CPython
Classifier: Programming Language :: Python :: Implementation :: PyPy
Classifier: Topic :: Internet :: Name Service (DNS)
Classifier: Topic :: Software Development :: Libraries :: Python Modules
Classifier: Topic :: Utilities
Requires-Python: >=2.7, !=3.0.*, !=3.1.*, !=3.2.*, !=3.3.*
```

Found in path(s):

```
* /opt/cola/permits/2062156618_1719243206.3991675/0/python-idna-2.10-7.el9_4.1.src.rpm-cosi-expand-archive-cA6S7p0p/idna-2.10.tar.gz-cosi-expand-archive-QFYAkuRt/idna-2.10/idna.egg-info/PKG-INFO
```

```
* /opt/cola/permits/2062156618_1719243206.3991675/0/python-idna-2.10-7.el9_4.1.src.rpm-cosi-expand-archive-cA6S7p0p/idna-2.10.tar.gz-cosi-expand-archive-QFYAkuRt/idna-2.10/PKG-INFO
```

No license file was found, but licenses were detected in source scan.

```
"""
```

A library to support the Internationalised Domain Names in Applications (IDNA) protocol as specified in RFC 5890 et.al. This new methodology, known as IDNA 2008, can generate materially different results to the previous standard. The library can act as a drop-in replacement for the "encodings.idna" module.

```
"""
```

```
import io, sys
from setuptools import setup
```

```
def main():
```

```
 python_version = sys.version_info[:2]
```

```

if python_version < (2,7):
 raise SystemExit("Sorry, Python 2.7 or newer required")

package_data = {}
exec(open('idna/package_data.py').read(), package_data)

arguments = {
 'name': 'idna',
 'packages': ['idna'],
 'version': package_data['__version__'],
 'description': 'Internationalized Domain Names in Applications (IDNA)',
 'long_description': io.open("README.rst", encoding="UTF-8").read(),
 'author': 'Kim Davies',
 'author_email': 'kim@cynosure.com.au',
 'license': 'BSD-like',
 'url': 'https://github.com/kjd/idna',
 'classifiers': [
 'Development Status :: 5 - Production/Stable',
 'Intended Audience :: Developers',
 'Intended Audience :: System Administrators',
 'License :: OSI Approved :: BSD License',
 'Operating System :: OS Independent',
 'Programming Language :: Python',
 'Programming Language :: Python :: 2',
 'Programming Language :: Python :: 2.7',
 'Programming Language :: Python :: 3',
 'Programming Language :: Python :: 3.4',
 'Programming Language :: Python :: 3.5',
 'Programming Language :: Python :: 3.6',
 'Programming Language :: Python :: 3.7',
 'Programming Language :: Python :: 3.8',
 'Programming Language :: Python :: Implementation :: CPython',
 'Programming Language :: Python :: Implementation :: PyPy',
 'Topic :: Internet :: Name Service (DNS)',
 'Topic :: Software Development :: Libraries :: Python Modules',
 'Topic :: Utilities',
],
 'python_requires': '>=2.7, !=3.0.*, !=3.1.*, !=3.2.*, !=3.3.*',
}

setup(**arguments)

if __name__ == '__main__':
 main()

```

Found in path(s):

```

* /opt/cola/permits/2062156618_1719243206.3991675/0/python-idna-2.10-7.el9_4.1.src.rpm-cosi-expand-archive-
cA6S7p0p/idna-2.10.tar.gz-cosi-expand-archive-QFYAkURt/idna-2.10/setup.py

```

# 1.205 apk-tools 2.14.4-r1

## 1.205.1 Available under license :

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## 1.206 cracklib 2.9.11-r7

### 1.206.1 Available under license :

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Version 2.1, February 1999

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Discussion thread from mailing list archive, with approval from everyone actively involved or holding original licensing rights included.

[Cracklib-devel] cracklib license  
From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:16

Attachments: Message as HTML  
looks like 2.8.11 is out and marked as "GPL-2" ... releasing libraries unde=  
r=20  
GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists  
=2Dmike

Re: [Cracklib-devel] cracklib license  
From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:18  
I understand that, and you're welcome to bring it up with Alec directly and see if he wants to relicense his code as LGPL... but at this point,

it was enough to just get it consistent and documented as to what it was released under. This wasn't actually a license change, just a clarification of the licensing that was already in place.=20

-- Nathan

=20

-----  
Nathan Neulinger EMail: nneul@um...  
University of Missouri - Rolla Phone: (573) 341-6679  
UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----

> From: cracklib-devel-bounces@li...  
> [mailto:cracklib-devel-bounces@li...] On Behalf Of  
> Mike Frysinger  
> Sent: Monday, October 01, 2007 8:15 PM  
> To: cracklib-devel@li...  
> Subject: [Cracklib-devel] cracklib license

>=20

> looks like 2.8.11 is out and marked as "GPL-2" ... releasing  
> libraries under  
> GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists  
> -mike

Re: [Cracklib-devel] cracklib license  
From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:33

Attachments: Message as HTML  
On Monday 01 October 2007, Neulinger, Nathan

wrote:

> I understand that, and you're welcome to bring it up with Alec directly  
> and see if he wants to relicense his code as LGPL... but at this point,  
> it was enough to just get it consistent and documented as to what it was  
> released under. This wasn't actually a license change, just a  
> clarification of the licensing that was already in place.

the original license (before moving to sourceforge -- aka, 2.7) was not=20  
GPL-2 ... it was a modified artistic license ... i didnt notice the license=  
=20  
change until it was mentioned in the latest notes.

unlike the old license, GPL-2 prevents people from using cracklib unless th=  
eir=20  
applications are also GPL-2 which imo is just wrong. it isnt the place of =  
a=20  
library to dictact to application writes what license they should be using.=  
=20



thus LGPL-2.1 enters to fill this void.

=2Dmike

Re: [Cracklib-devel]

cracklib license

From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:46

Seems like the ideal thing here would be for you and the other distro maintainers to get together with Alec in a conversation and come to a decision as to what licensing scheme y'all want. I haven't really done much other than cleaning up the packaging and patches and a small bit of additional code, so whatever licensing y'all come up with is fine by me.

-- Nathan

=20

-----  
Nathan Neulinger EMail: nneul@um...

University of Missouri - Rolla Phone: (573) 341-6679

UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----

> From: cracklib-devel-bounces@li...

> [mailto:cracklib-devel-bounces@li...] On Behalf Of

> Mike Frysinger

> Sent: Monday, October 01, 2007 8:33 PM

> To: Neulinger, Nathan

> Cc: cracklib-devel@li...; Alec Muffett

> Subject: Re: [Cracklib-devel] cracklib license

>=20

> On Monday 01 October 2007, Neulinger, Nathan wrote:

> > I understand that, and you're welcome to bring it up with Alec

> > directly

> > and see if he wants to relicense his code as LGPL... but at this

> > point,

> > it was enough to just get it consistent and documented as to what

> > it was

> > released under. This wasn't actually a license change, just a

> > clarification of the licensing that was already in place.

>=20

> the original license (before moving to sourceforge -- aka, 2.7) was

> not

> GPL-2 ... it was a modified artistic license ... i didnt notice the

> license

> change until it was mentioned in the latest notes.

>=20

> unlike the old license, GPL-2 prevents people from using cracklib

> unless their

> applications are also GPL-2 which imo is just wrong. it isnt the

> place of a  
> library  
to dictact to application writes what license they should  
> be using.  
> thus LGPL-2.1 enters to fill this void.  
> -mike

Re: [Cracklib-devel] cracklib license

From: Alec Muffett <alecm@cr...> - 2007-10-02 08:57

> Seems like the ideal thing here would be for you and the other distro  
> maintainers to get together with Alec in a conversation and come to a  
> decision as to what licensing scheme y'all want. I haven't really done  
> much other than cleaning up the packaging and patches and a small  
> bit of  
> additional code, so whatever licensing y'all come up with is fine  
> by me.

I am sympathetic. Guys, what do you reckon?

What I am hearing so far is that LGPL makes sense, since it can be  
linked with any code, not just GPL...

-a

Re: [Cracklib-devel] cracklib license

From: Devin Reade <gdr@gn...> - 2007-10-02 15:04

I would like to see it under LGPL as well. I  
think it is in everyone's  
best interests to have as secure systems as possible, and I think tainting  
it via GPL will just make it less likely that the library gets used, and  
will not usually cause companies/developers to GPL the dependent code  
(where it is not already GPL).

I like GPL, I use it when I can, but I don't think that it's the correct  
license in this situation.

Devin

--

If it's sinful, it's more fun.

Re: [Cracklib-devel] cracklib license

From: Nalin Dahyabhai <nalin@re...> - 2008-01-28 16:32

On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:

>> Seems like the ideal thing here would be for you and the other distro  
>> maintainers to get together with Alec in a conversation and come to a

>> decision as to what licensing scheme y'all want. I haven't really done  
>> much other than cleaning up the packaging and patches and a small  
>> bit of  
>> additional  
code, so whatever licensing y'all come up with is fine  
>> by me.  
>  
> I am sympathetic. Guys, what do you reckon?  
>  
> What I am hearing so far is that LGPL makes sense, since it can be  
> linked with any code, not just GPL...

My apologies for not chiming in in anything resembling a reasonable  
timeframe.

I'd also suggest the LGPL, for the reason you noted above. Alternately,  
GPLv2 with the option of using the library under a later version of the  
GPL would permit applications which were released under version 3 of the  
GPL to use the library, too, which would be sufficient for the packages  
which are included in Fedora. FWIW, I'd personally lean toward LGPL.

In any case, I thank you both for working on sorting this out.

Cheers,

Nalin

Re: [Cracklib-devel] cracklib license  
From: Mike Frysinger <vapier@ge...> - 2008-10-05 21:27

Attachments: Message as HTML

On Monday 28 January 2008, Nalin Dahyabhai wrote:

> On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:  
>>> Seems like the ideal thing here would be for you and the other distro  
>>> maintainers to get together with Alec in a conversation and come to a  
>>> decision as to what licensing scheme y'all want. I haven't really done  
>>> much other than cleaning up the packaging and patches and a small  
>>> bit of  
>>> additional code, so whatever licensing y'all come up with is fine  
>>> by me.  
>>  
>> I am sympathetic. Guys, what do you reckon?  
>>  
>> What I am hearing so far is that LGPL makes sense, since it can be  
>> linked with any code, not just GPL...  
>

> My apologies for not chiming in in anything resembling a reasonable  
> timeframe.  
>  
> I'd also suggest the LGPL, for the reason you noted above. Alternately,  
> GPLv2 with the option of using  
the library under a later version of the  
> GPL would permit applications which were released under version 3 of the  
> GPL to use the library, too, which would be sufficient for the packages  
> which are included in Fedora. FWIW, I'd personally lean toward LGPL.  
>  
> In any case, I thank you both for working on sorting this out.

looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make  
the change now ?

-mike

Re: [Cracklib-devel] cracklib license

From: Alec Muffett <alecm@cr...> - 2008-10-05 23:18

>> In any case, I thank you both for working on sorting this out.

>

> looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make  
> the change now ?

yes. go for it. thanks++

-a

Re: [Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2008-10-25 22:34

Attachments: Message as HTML

On Sunday 05 October

2008, Alec Muffett wrote:

> >> In any case, I thank you both for working on sorting this out.

> >

> > looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we  
> > make the change now ?

>

> yes. go for it. thanks++

Nathan Neulinger is the only one who can actually make said change ...

-mike

-----

BELOW IS ORIGINAL LICENSING DISCUSSION RE CHANGING TO GPL from Artistic.

-----

CrackLib was originally licensed with a variant of the Artistic license. In the interests of wider acceptance and more modern licensing, it was switched with the original author's blessing to GPL v2.

This approval was carried out in email discussions in 2005, and has been reconfirmed as of 2007-10-01 with the following email from Alec Muffett.

The below email references nneul@umr.edu address, as that is the address that was used at the time. For any future emails regarding this, please use nneul@neulinger.org.

-----

From

alecm@crypticide.com Mon Oct 1 12:26:03 2007

Received: from umr-exproto2.cc.umr.edu ([131.151.0.192]) by UMR-CMAIL1.umr.edu with Microsoft SMTPSVC(6.0.3790.3959);

Mon, 1 Oct 2007 12:26:03 -0500

Received: from scansrv2.srv.mst.edu ([131.151.1.114]) by umr-exproto2.cc.umr.edu with Microsoft SMTPSVC(6.0.3790.3959);

Mon, 1 Oct 2007 12:26:02 -0500

Received: (qmail 8022 invoked from network); 1 Oct 2007 16:59:55 -0000

Received: from smtp1.srv.mst.edu (131.151.1.43)

by scanin-ipvs.cc.umr.edu with SMTP; 1 Oct 2007 16:59:55 -0000

Received: from spunkymail-mx8.g.dreamhost.com (mx1.spunky.mail.dreamhost.com [208.97.132.47])

by smtp1.srv.mst.edu (8.13.1/8.13.1) with ESMTP id 191Gxtp020623

for <nneul@umr.edu>; Mon, 1 Oct 2007 11:59:55 -0500

Received: from rutherford.zen.co.uk (rutherford.zen.co.uk [212.23.3.142])

by spunkymail-mx8.g.dreamhost.com (Postfix) with ESMTP id 2C7734D311

for <nneul@neulinger.org>; Mon, 1 Oct 2007 09:59:50 -0700 (PDT)

Received: from

[82.68.43.14] (helo=[192.168.1.3])

by rutherford.zen.co.uk with esmtp (Exim 4.50)

id 1IcOcX-0004Qt-6L

for nneul@neulinger.org; Mon, 01 Oct 2007 16:59:49 +0000

Mime-Version: 1.0 (Apple Message framework v752.2)

In-Reply-To: <1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>

References: <1190922867.3457.147.camel@localhost.localdomain>

<EC90713277D2BE41B7110CCD74E235CEF44F38@UMR-CMAIL1.umr.edu>

<1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>

Content-Type: text/plain; charset=US-ASCII; delsp=yes; format=flowed

Message-Id: <117A1264-F6DC-4E25-B0DD-56FBFE6E9F@crypticide.com>

Content-Transfer-Encoding: 7bit

From: Alec Muffett <alecm@crypticide.com>  
Subject: Re: cracklib license  
Date: Mon, 1 Oct 2007 17:59:46 +0100  
To: Nathan Neulinger <nneul@neulinger.org>  
X-Mailer: Apple Mail (2.752.2)  
X-Originating-Rutherford-IP: [82.68.43.14]  
Return-Path: alecm@crypticide.com  
X-OriginalArrivalTime: 01 Oct 2007 17:26:03.0008 (UTC) FILETIME=[2420C000:01C80450]  
Status: RO  
Content-Length:  
585  
Lines: 21

>  
> ----- Forwarded message -----  
> From: Neulinger, Nathan <nneul@umr.edu>  
> Date: Sep 27, 2007 2:58 PM  
> Subject: RE: cracklib license  
> To: alecm@crypto.dircon.co.uk  
>  
> Any chance you could write me a self-contained email stating clearly  
> that the license is being changed to GPL, so I could include that  
> email  
> in the repository and clean up the repository/tarballs? I have all the  
> original discussion, but something succinct and self contained  
> would be  
> ideal.

The license for my code in the Cracklib distribution is henceforth GPL.

Happy now? :-)

-a

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-----  
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```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>
```

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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
'Gnomovision' (which makes passes at compilers) written by James Hacker.
```

<signature of Ty Coon>, 1 April 1989

Ty Coon, President of Vice

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## 1.208 libselinux-utils 3.6-1.el9

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## 1.209 python3-setools 4.4.4-1.el9

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Version 2.1, February 1999

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```
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```

The hypothetical commands

```
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```
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```

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Any executables

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# 1.212 python3-distro 1.5.0-7.el9

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## 1.213 python3-policycoreutils 3.6-2.1.el9

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Version 2.1, February 1999

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## 1.216 setools 4.4.4-1.el9

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## 1.217 checkpolicy 3.6-1.el9

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## 1.219 polycoreutils 3.6-2.1.el9

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## 1.220 logr 1.4.2

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## 1.221 gofuzz 1.2.0

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```

```
package spec
```

```
// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL string `json:"url,omitempty"`
}
This source code was written by the Go contributors.
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```

```
package spec
```

```
import "testing"
```

```
func TestIntegrationLicense(t *testing.T) {
 license := License{Name: "the name", URL: "the url"}
 const licenseJSON = `{"name":"the name","url":"the url"}`
 const licenseYAML = "name: the name\nurl: the url\n"

 assertSerializeJSON(t, license, licenseJSON)
 assertParsesJSON(t, licenseJSON, license)
}
```

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# 1.227 logrus 1.9.3

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# 1.228 mergo 0.3.12

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```
import: ../../../../fossene/db/schema/thing.yml
```

fields:

site: string

author: root

## 1.229 gopkg.in-inf 0.9.1

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# 1.230 ca-certificates 2024.2.69\_v8.0.303-91.4.el9\_4

## 1.230.1 Available under license :

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```
#
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file, You can obtain one at http://mozilla.org/MPL/2.0/.
#
certdata.txt
#
This file contains the object definitions for the certs and other
information "built into" NSS.
#
Object definitions:
#
Certificates
#
-- Attribute -- -- type -- -- value --
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 (varies)
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT DER+base64 (varies)
CKA_ID byte array (varies)
#
CKA_ISSUER DER+base64 (varies)
CKA_SERIAL_NUMBER DER+base64 (varies)
CKA_VALUE DER+base64 (varies)
CKA_NSS_EMAIL ASCII7 (unused here)
CKA_NSS_SERVER_DISTRUST_AFTER DER+base64 (varies)
CKA_NSS_EMAIL_DISTRUST_AFTER DER+base64 (varies)
#
Trust
#
-- Attribute -- -- type -- -- value --
CKA_CLASS CK_OBJECT_CLASS CKO_TRUST
```

```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 (varies)
CKA_ISSUER DER+base64 (varies)
CKA_SERIAL_NUMBER DER+base64 (varies)
CKA_CERT_HASH binary+base64 (varies)
CKA_EXPIRES CK_DATE
(not used here)
CKA_TRUST_DIGITAL_SIGNATURE CK_TRUST (varies)
CKA_TRUST_NON_REPUDIATION CK_TRUST (varies)
CKA_TRUST_KEY_ENCIPHERMENT CK_TRUST (varies)
CKA_TRUST_DATA_ENCIPHERMENT CK_TRUST (varies)
CKA_TRUST_KEY_AGREEMENT CK_TRUST (varies)
CKA_TRUST_KEY_CERT_SIGN CK_TRUST (varies)
CKA_TRUST_CRL_SIGN CK_TRUST (varies)
CKA_TRUST_SERVER_AUTH CK_TRUST (varies)
CKA_TRUST_CLIENT_AUTH CK_TRUST (varies)
CKA_TRUST_CODE_SIGNING CK_TRUST (varies)
CKA_TRUST_EMAIL_PROTECTION CK_TRUST (varies)
CKA_TRUST_IPSEC_END_SYSTEM CK_TRUST (varies)
CKA_TRUST_IPSEC_TUNNEL CK_TRUST (varies)
CKA_TRUST_IPSEC_USER CK_TRUST (varies)
CKA_TRUST_TIME_STAMPING CK_TRUST (varies)
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL (varies)
(other
trust attributes can be defined)
#

#
The object to tell NSS that this is a root list and we don't
have to go looking for others.
#
BEGINDATA
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_BUILTIN_ROOT_LIST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Mozilla Builtin Roots"

#
Certificate "GlobalSign Root CA"
#
Issuer: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
Serial Number:04:00:00:00:00:01:15:4b:5a:c3:94
Subject: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
Not Valid Before: Tue Sep 01 12:00:00 1998
Not Valid After : Fri Jan 28 12:00:00 2028

```

```
Fingerprint (SHA-256):
EB:D4:10:40:E4:BB:3E:C7:42:C9:E3:81:D3:1E:F2:A4:1A:48:B6:68:5C:96:E7:CE:F3:C1:DF:6C:D4:33:1C:99
Fingerprint (SHA1): B1:BC:96:8B:D4:F4:9D:62:2A:A8:9A:81:F2:15:01:52:A4:1D:82:9C
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign
Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\020\060\016\006\003
\125\004\013\023\007\122\157\157\164\040\103\101\061\033\060\031
\006\003\125\004\003\023\022\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\020\060\016\006\003
\125\004\013\023\007\122\157\157\164\040\103\101\061\033\060\031
\006\003\125\004\003\023\022\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\025\113\132\303\224
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\165\060\202\002\135\240\003\002\001\002\002\013\004
\000\000\000\000\001\025\113\132\303\224\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\127\061\013\060\011\006
\003\125\004\006\023\002\102\105\061\031\060\027\006\003\125\004
\012\023\020\107\154\157\142\141\154\123\151\147\156\040\156\166
\055\163\141\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\033\060\031\006\003\125\004\003\023\022
\107\154\157\142\141\154\123\151\147\156\040\122\157\157\164\040
\103\101\060\036\027\015\071\070\060\071\060\061\061\062\060\060
\060\060\132\027\015\062\070\060\061\062\070\061\062\060\060\060
\060\132\060\127\061\013\060\011\006\003\125\004\006\023\002\102
\105\061\031\060\027\006\003\125\004\012\023\020\107\154\157\142
\141\154\123\151\147\156\040\156\166\055\163\141\061\020\060\016
\006\003\125\004\013\023\007\122\157\157\164\040\103\101\061\033
\060\031\006\003\125\004\003\023\022\107\154\157\142\141\154\123
\151\147\156\040\122\157\157\164\040\103\101\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
```



\001\017\000\060\202\001\012\002\202\001\001\000\332\016\346\231  
\215\316\243\343\117\212\176\373\361\213\203\045\153\352\110\037  
\361\052\260\271\225\021\004\275\360\143\321\342\147\146\317\034  
\335\317\033\110\053\356\215\211\216\232\257\051\200\145\253\351  
\307\055\022\313\253\034\114\160\007\241\075\012\060\315\025\215  
\117\370\335\324\214\120\025\034\357\120\356\304\056\367\374\351  
\122\362\221\175\340\155\325\065\060\216\136\103\163\362\101\351  
\325\152\343\262\211\072\126\071\070\157\006\074\210\151\133\052  
\115\305\247\124\270\154\211\314\233\371\074\312\345\375\211\365  
\022\074\222\170\226\326\334\164\156\223\104\141\321\215\307\106  
\262\165\016\206\350\031\212\325\155\154\325\170\026\225\242\351  
\310\012\070\353\362\044\023\117\163\124\223\023\205\072\033\274  
\036\064\265\213\005\214\271\167\213\261\333\037\040\221\253\011  
\123\156\220\316\173\067\164\271\160\107\221\042\121\143\026\171  
\256\261\256\101\046\010\310\031\053\321\106\252\110\326\144\052  
\327\203\064\377\054\052\301\154\031\103\112\007\205\347\323\174  
\366\041\150\357\352\362\122\237\177\223\220\317\002\003\001\000  
\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004  
\024\140\173\146\032\105\015\227\312\211\120\057\175\004\315\064  
\250\377\374\375\113\060\015\006\011\052\206\110\206\367\015\001  
\001\005\005\000\003\202\001\001\000\326\163\347\174\117\166\320  
\215\277\354\272\242\276\064\305\050\062\265\174\374\154\234\054  
\053\275\011\236\123\277\153\136\252\021\110\266\345\010\243\263  
\312\075\141\115\323\106\011\263\076\303\240\343\143\125\033\362  
\272\357\255\071\341\103\271\070\243\346\057\212\046\073\357\240  
\120\126\371\306\012\375\070\315\304\013\160\121\224\227\230\004  
\337\303\137\224\325\025\311\024\101\234\304\135\165\144\025\015  
\377\125\060\354\206\217\377\015\357\054\271\143\106\366\252\374  
\337\274\151\375\056\022\110\144\232\340\225\360\246\357\051\217  
\001\261\025\265\014\035\245\376\151\054\151\044\170\036\263\247  
\034\161\142\356\312\310\227\254\027\135\212\302\370\107\206\156  
\052\304\126\061\225\320\147\211\205\053\371\154\246\135\106\235  
\014\252\202\344\231\121\335\160\267\333\126\075\141\344\152\341  
\134\326\366\376\075\336\101\314\007\256\143\122\277\123\123\364  
\053\351\307\375\266\367\202\137\205\322\101\030\333\201\263\004  
\034\305\037\244\200\157\025\040\311\336\014\210\012\035\326\146  
\125\342\374\110\311\051\046\151\340

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GlobalSign Root CA"

# Issuer: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE

# Serial Number:04:00:00:00:00:01:15:4b:5a:c3:94

```

Subject: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
Not Valid Before: Tue Sep 01 12:00:00 1998
#
Not Valid After : Fri Jan 28 12:00:00 2028
Fingerprint (SHA-256):
EB:D4:10:40:E4:BB:3E:C7:42:C9:E3:81:D3:1E:F2:A4:1A:48:B6:68:5C:96:E7:CE:F3:C1:DF:6C:D4:33:1C:99
Fingerprint (SHA1): B1:BC:96:8B:D4:F4:9D:62:2A:A8:9A:81:F2:15:01:52:A4:1D:82:9C
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\261\274\226\213\324\364\235\142\052\250\232\201\362\025\001\122
\244\035\202\234
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\076\105\122\025\011\121\222\341\267\135\067\237\261\207\051\212
END
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\020\060\016\006\003
\125\004\013\023\007\122\157\157\164\040\103\101\061\033\060\031
\006\003\125\004\003\023\022\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\025\113\132\303\224
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Entrust.net Premium 2048 Secure Server CA"
#
Issuer: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net
Serial Number: 946069240 (0x3863def8)
Subject: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net
Not Valid Before: Fri Dec 24 17:50:51 1999
Not Valid After : Tue Jul 24 14:15:12 2029
Fingerprint (SHA-256):
6D:C4:71:72:E0:1C:BC:B0:BF:62:58:0D:89:5F:E2:B8:AC:9A:D4:F8:73:80:1E:0C:10:B9:C8:37:D2:1E:B1:77

```

```
Fingerprint (SHA1):
50:30:06:09:1D:97:D4:F5:AE:39:F7:CB:E7:92:7D:7D:65:2D:34:31
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust.net Premium 2048 Secure Server CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\264\061\024\060\022\006\003\125\004\012\023\013\105\156
\164\162\165\163\164\056\156\145\164\061\100\060\076\006\003\125
\004\013\024\067\167\167\167\056\145\156\164\162\165\163\164\056
\156\145\164\057\103\120\123\137\062\060\064\070\040\151\156\143
\157\162\160\056\040\142\171\040\162\145\146\056\040\050\154\151
\155\151\164\163\040\154\151\141\142\056\051\061\045\060\043\006
\003\125\004\013\023\034\050\143\051\040\061\071\071\071\040\105
\156\164\162\165\163\164\056\156\145\164\040\114\151\155\151\164
\145\144\061\063\060\061\006\003\125\004\003\023\052\105\156\164
\162\165\163\164\056\156\145\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\050\062\060\064\070\051
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\264\061\024\060\022\006\003\125\004\012\023\013\105\156
\164\162\165\163\164\056\156\145\164\061\100\060\076\006\003\125
\004\013\024\067\167\167\167\056\145\156\164\162\165\163\164\056
\156\145\164\057\103\120\123\137\062\060\064\070\040\151\156\143
\157\162\160\056\040\142\171\040\162\145\146\056\040\050\154\151
\155\151\164\163\040\154\151\141\142\056\051\061\045\060\043\006
\003\125\004\013\023\034\050\143\051\040\061\071\071\071\040\105
\156\164\162\165\163\164\056\156\145\164\040\114\151\155\151\164
\145\144\061\063\060\061\006\003\125\004\003\023\052\105\156\164
\162\165\163\164\056\156\145\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\050\062\060\064\070\051
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\070\143\336\370
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\052\060\202\003\022\240\003\002\001\002\002\004\070
\143\336\370\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\201\264\061\024\060\022\006\003\125\004\012\023\013
\105\156\164\162\165\163\164\056\156\145\164\061\100\060\076\006
\003\125\004\013\024\067\167\167\167\056\145\156\164\162\165\163
\164\056\156\145\164\057\103\120\123\137\062\060\064\070\040\151
```

\156\143\157\162\160\056\040\142\171\040\162\145\146\056\040\050  
\154\151\155\151\164\163\040\154\151\141\142\056\051\061\045\060  
\043\006\003\125\004\013\023\034\050\143\051\040\061\071\071\071  
\040\105\156\164\162\165\163\164\056\156\145\164\040\114\151\155  
\151\164\145\144\061\063\060\061\006\003\125\004\003\023\052\105  
\156\164\162\165\163\164\056\156\145\164\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\040\050\062\060\064\070\051\060\036\027\015\071\071\061  
\062\062\064\061\067\065\060\065\061\132\027\015\062\071\060\067  
\062\064\061\064\061\065\061\062\132\060\201\264\061\024\060\022  
\006\003\125\004\012\023\013\105\156\164\162\165\163\164\056\156  
\145\164\061\100\060\076\006\003\125\004\013\024\067\167\167\167  
\056\145\156\164\162\165\163\164\056\156\145\164\057\103\120\123  
\137\062\060\064\070\040\151\156\143\157\162\160\056\040\142\171  
\040\162\145\146\056\040\050\154\151\155\151\164\163\040\154\151  
\141\142\056\051\061\045\060\043\006\003\125\004\013\023\034\050  
\143\051\040\061\071\071\071\040\105\156\164\162\165\163\164\056  
\156\145\164\040\114\151\155\151\164\145\144\061\063\060\061\006  
\003\125\004\003\023\052\105\156\164\162\165\163\164\056\156\145  
\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040  
\101\165\164\150\157\162\151\164\171\040\050\062\060\064\070\051  
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001  
\000\255\115\113\251\022\206\262\352\243\040\007\025\026\144\052  
\053\113\321\277\013\112\115\216\355\200\166\245\147\267\170\100  
\300\163\102\310\150\300\333\123\053\335\136\270\166\230\065\223  
\213\032\235\174\023\072\016\037\133\267\036\317\345\044\024\036  
\261\201\251\215\175\270\314\153\113\003\361\002\014\334\253\245  
\100\044\000\177\164\224\241\235\010\051\263\210\013\365\207\167  
\235\125\315\344\303\176\327\152\144\253\205\024\206\225\133\227  
\062\120\157\075\310\272\146\014\343\374\275\270\111\301\166\211  
\111\031\375\300\250\275\211\243\147\057\306\237\274\161\031\140  
\270\055\351\054\311\220\166\146\173\224\342\257\170\326\145\123  
\135\074\326\234\262\317\051\003\371\057\244\120\262\324\110\316  
\005\062\125\212\375\262\144\114\016\344\230\007\165\333\177\337  
\271\010\125\140\205\060\051\371\173\110\244\151\206\343\065\077  
\036\206\135\172\172\025\275\357\000\216\025\042\124\027\000\220  
\046\223\274\016\111\150\221\277\370\107\323\235\225\102\301\016  
\115\337\157\046\317\303\030\041\142\146\103\160\326\325\300\007  
\341\002\003\001\000\001\243\102\060\100\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125  
\035\016\004\026\004\024\125\344\201\321\021\200\276\330\211\271  
\010\243\061\371\241\044\011\026\271\160\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\073\233  
\217\126\233\060\347\123\231\174\172\171\247\115\227\327\031\225  
\220\373\006\037\312\063\174\106\143\217\226\146\044\372\100\033  
\041\047\312\346\162\163\362\117\376\061\231\375\310\014\114\150

```
\123\306\200\202\023\230\372\266\255\332\135\075\361\316\156\366
\025\021\224\202\014\356\077\225\257\021\253\017\327\057\336\037
\003\217\127\054\036\311\273\232\032\104\225\353\030\117\246\037
\315\175\127\020\057\233\004\011\132\204\265\156\330\035\072\341
\326\236\321\154\171\136\171\034\024\305\343\320\114\223\073\145
\074\355\337\075\276\246\345\225\032\303\265\031\303\275\136\133
\273\377\043\357\150\031\313\022\223\047\134\003\055\157\060\320
\036\266\032\254\336\132\367\321\252\250\047\246\376\171\201\304
\171\231\063\127\272\022\260\251\340\102\154\223\312\126\336\376
\155\204\013\010\213\176\215\352\327\230\041\306\363\347\074\171
\057\136\234\321\114\025\215\341\354\042\067\314\232\103\013\227
\334\200\220\215\263\147\233\157\110\010\025\126\317\277\361\053
\174\136\232\166\351\131\220\305\174\203\065\021\145\121
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Entrust.net Premium 2048 Secure Server CA"

# Issuer: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net Limited,OU=www.entrust.net/CPS\_2048 incorp. by ref. (limits liab.),O=Entrust.net

# Serial Number: 946069240 (0x3863def8)

# Subject: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net Limited,OU=www.entrust.net/CPS\_2048 incorp. by ref. (limits liab.),O=Entrust.net

# Not Valid Before: Fri Dec 24 17:50:51 1999

# Not Valid After : Tue Jul 24 14:15:12 2029

# Fingerprint (SHA-256):

6D:C4:71:72:E0:1C:BC:B0:BF:62:58:0D:89:5F:E2:B8:AC:9A:D4:F8:73:80:1E:0C:10:B9:C8:37:D2:1E:B1:77

#

Fingerprint (SHA1): 50:30:06:09:1D:97:D4:F5:AE:39:F7:CB:E7:92:7D:7D:65:2D:34:31

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Entrust.net Premium 2048 Secure Server CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\120\060\006\011\035\227\324\365\256\071\367\313\347\222\175\175
\145\055\064\061
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\356\051\061\274\062\176\232\346\350\265\367\121\264\064\161\220
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\264\061\024\060\022\006\003\125\004\012\023\013\105\156
\164\162\165\163\164\056\156\145\164\061\100\060\076\006\003\125
\004\013\024\067\167\167\167\056\145\156\164\162\165\163\164\056
\156\145\164\057\103\120\123\137\062\060\064\070\040\151\156\143
```

```
\157\162\160\056\040\142\171\040\162\145\146\056\040\050\154\151
\155\151\164\163\040\154\151\141\142\056\051\061\045\060\043\006
\003\125\004\013\023\034\050\143\051\040\061\071\071\071\040\105
\156\164\162\165\163\164\056\156\145\164\040\114\151\155\151\164
\145\144\061\063\060\061\006\003\125\004\003\023\052\105\156\164
\162\165\163\164\056\156\145\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\050\062\060\064\070\051
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\004\070\143\336\370
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Baltimore CyberTrust Root"

#

# Issuer: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE

# Serial Number: 33554617 (0x20000b9)

# Subject: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE

# Not Valid Before: Fri May 12 18:46:00 2000

# Not Valid After : Mon May 12 23:59:00 2025

# Fingerprint (SHA-256):

16:AF:57:A9:F6:76:B0:AB:12:60:95:AA:5E:BA:DE:F2:2A:B3:11:19:D6:44:AC:95:CD:4B:93:DB:F3:F2:6A:EB

#

Fingerprint (SHA1): D4:DE:20:D0:5E:66:FC:53:FE:1A:50:88:2C:78:DB:28:52:CA:E4:74

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Baltimore CyberTrust Root"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\111\105\061
\022\060\020\006\003\125\004\012\023\011\102\141\154\164\151\155
\157\162\145\061\023\060\021\006\003\125\004\013\023\012\103\171
\142\145\162\124\162\165\163\164\061\042\060\040\006\003\125\004
\003\023\031\102\141\154\164\151\155\157\162\145\040\103\171\142
\145\162\124\162\165\163\164\040\122\157\157\164
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\111\105\061
\022\060\020\006\003\125\004\012\023\011\102\141\154\164\151\155
```

\157\162\145\061\023\060\021\006\003\125\004\013\023\012\103\171  
\142\145\162\124\162\165\163\164\061\042\060\040\006\003\125\004  
\003\023\031\102\141\154\164\151\155\157\162\145\040\103\171\142  
\145\162\124\162\165\163\164\040\122\157\157\164

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\004\002\000\000\271

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\167\060\202\002\137\240\003\002\001\002\002\004\002  
\000\000\271\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\060\132\061\013\060\011\006\003\125\004\006\023\002\111  
\105\061\022\060\020\006\003\125\004\012\023\011\102\141\154\164  
\151\155\157\162\145\061\023\060\021\006\003\125\004\013\023\012  
\103\171\142\145\162\124\162\165\163\164\061\042\060\040\006\003  
\125\004\003\023\031\102\141\154\164\151\155\157\162\145\040\103  
\171\142\145\162\124\162\165\163\164\040\122\157\157\164\060\036  
\027\015\060\060\060\065\061\062\061\070\064\066\060\060\132\027  
\015\062\065\060\065\061\062\062\063\065\071\060\060\132\060\132  
\061\013\060\011\006\003\125\004\006\023\002\111\105\061\022\060  
\020\006\003\125\004\012\023\011\102\141\154\164\151\155\157\162  
\145\061\023\060\021\006\003\125\004\013\023\012\103\171\142\145  
\162\124\162\165\163\164\061\042\060\040\006\003\125\004\003\023  
\031\102\141\154\164\151\155\157\162\145\040\103\171\142\145\162  
\124\162\165\163\164\040\122\157\157\164\060\202\001\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001  
\017\000\060\202\001\012\002\202\001\001\000\243\004\273\042\253  
\230\075\127\350\046\162\232\265\171\324\051\342\341\350\225\200  
\261\260\343\133\216\053\051\232\144\337\241\135\355\260\011\005  
\155\333\050\056\316\142\242\142\376\264\210\332\022\353\070\353  
\041\235\300\101\053\001\122\173\210\167\323\034\217\307\272\271  
\210\265\152\011\347\163\350\021\100\247\321\314\312\142\215\055  
\345\217\013\246\120\322\250\120\303\050\352\365\253\045\207\212  
\232\226\034\251\147\270\077\014\325\367\371\122\023\057\302\033  
\325\160\160\360\217\300\022\312\006\313\232\341\331\312\063\172  
\167\326\370\354\271\361\150\104\102\110\023\322\300\302\244\256  
\136\140\376\266\246\005\374\264\335\007\131\002\324\131\030\230  
\143\365\245\143\340\220\014\175\135\262\006\172\363\205\352\353  
\324\003\256\136\204\076\137\377\025\355\151\274\371\071\066\162  
\165\317\167\122\115\363\311\220\054\271\075\345\311\043\123\077  
\037\044\230\041\134\007\231\051\275\306\072\354\347\156\206\072  
\153\227\164\143\063\275\150\030\061\360\170\215\166\277\374\236  
\216\135\052\206\247\115\220\334\047\032\071\002\003\001\000\001  
\243\105\060\103\060\035\006\003\125\035\016\004\026\004\024\345  
\235\131\060\202\107\130\314\254\372\010\124\066\206\173\072\265  
\004\115\360\060\022\006\003\125\035\023\001\001\377\004\010\060  
\006\001\001\377\002\001\003\060\016\006\003\125\035\017\001\001

```
\377\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\001\001\000\205\014\135\216\344
\157\121\150\102\005\240\335\273\117\047\045\204\003\275\367\144
\375\055\327\060\343\244\020\027\353\332\051\051\266\171\077\166
\366\031\023\043\270\020\012\371\130\244\324\141\160\275\004\141
\152\022\212\027\325\012\275\305\274\060\174\326\351\014\045\215
\206\100\117\354\314\243\176\070\306\067\021\117\355\335\150\061
\216\114\322\263\001\164\356\276\165\136\007\110\032\177\160\377
\026\134\204\300\171\205\270\005\375\177\276\145\021\243\017\300
\002\264\370\122\067\071\004\325\251\061\172\030\277\240\052\364
\022\231\367\243\105\202\343\074\136\365\235\236\265\310\236\174
\056\310\244\236\116\010\024\113\155\375\160\155\153\032\143\275
\144\346\037\267\316\360\362\237\056\273\033\267\362\120\210\163
\222\302\342\343\026\215\232\062\002\253\216\030\335\351\020\021
\356\176\065\253\220\257\076\060\224\172\320\063\075\247\145\017
\365\374\216\236\142\317\107\104\054\001\135\273\035\265\062\322
\107\322\070\056\320\376\201\334\062\152\036\265\356\074\325\374
\347\201\035\031\303\044\102\352\143\071\251
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL

CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Baltimore CyberTrust Root"

# Issuer: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE

# Serial Number: 33554617 (0x20000b9)

# Subject: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE

# Not Valid Before: Fri May 12 18:46:00 2000

# Not Valid After : Mon May 12 23:59:00 2025

# Fingerprint (SHA-256):

16:AF:57:A9:F6:76:B0:AB:12:60:95:AA:5E:BA:DE:F2:2A:B3:11:19:D6:44:AC:95:CD:4B:93:DB:F3:F2:6A:EB

# Fingerprint (SHA1): D4:DE:20:D0:5E:66:FC:53:FE:1A:50:88:2C:78:DB:28:52:CA:E4:74

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Baltimore CyberTrust Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\324\336\040\320\136\146\374\123\376\032\120\210\054\170\333\050
\122\312\344\164
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\254\266\224\245\234\027\340\327\221\122\233\261\227\006\246\344
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\111\105\061
```



```
\022\060\020\006\003\125\004\012\023\011\102\141\154\164\151\155
\157\162\145\061\023\060\021\006\003\125\004\013\023\012\103\171
\142\145\162\124\162\165\163\164\061\042\060\040\006\003\125\004
\003\023\031\102\141\154\164\151\155\157\162\145\040\103\171\142
\145\162\124\162\165\163\164\040\122\157\157\164
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\004\002\000\000\271
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Entrust Root Certification Authority"

#

# Issuer: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is incorporated by reference,O="Entrust, Inc.",C=US

# Serial Number: 1164660820 (0x456b5054)

# Subject: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is incorporated by reference,O="Entrust, Inc.",C=US

# Not Valid Before: Mon Nov 27 20:23:42 2006

# Not Valid After : Fri Nov 27 20:53:42 2026

# Fingerprint (SHA-256):

73:C1:76:43:4F:1B:C6:D5:AD:F4:5B:0E:76:E7:27:28:7C:8D:E5:76:16:C1:E6:E6:14:1A:2B:2C:BC:7D:8E:4C

# Fingerprint (SHA1): B3:1E:B1:B7:40:E3:6C:84:02:DA:DC:37:D4:4D:F5:D4:67:49:52:F9

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Entrust Root Certification Authority"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\201\260\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\167\167\167\056\145\156\164\162\165\163\164\056\156
\145\164\057\103\120\123\040\151\163\040\151\156\143\157\162\160
\157\162\141\164\145\144\040\142\171\040\162\145\146\145\162\145
\156\143\145\061\037\060\035\006\003\125\004\013\023\026\050\143
\051\040\062\060\060\066\040\105\156\164\162\165\163\164\054\040
\111\156\143\056\061\055\060\053\006\003\125\004\003\023\044\105
\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171
```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\260\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165  
\163\164\054\040\111\156\143\056\061\071\060\067\006\003\125\004  
\013\023\060\167\167\167\056\145\156\164\162\165\163\164\056\156  
\145\164\057\103\120\123\040\151\163\040\151\156\143\157\162\160  
\157\162\141\164\145\144\040\142\171\040\162\145\146\145\162\145  
\156\143\145\061\037\060\035\006\003\125\004\013\023\026\050\143  
\051\040\062\060\060\066\040\105\156\164\162\165\163\164\054\040  
\111\156\143\056\061\055\060\053\006\003\125\004\003\023\044\105  
\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\004\105\153\120\124

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\221\060\202\003\171\240\003\002\001\002\002\004\105  
\153\120\124\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\060\201\260\061\013\060\011\006\003\125\004\006\023\002  
\125\123\061\026\060\024\006\003\125\004\012\023\015\105\156\164  
\162\165\163\164\054\040\111\156\143\056\061\071\060\067\006\003  
\125\004\013\023\060\167\167\167\056\145\156\164\162\165\163\164  
\056\156\145\164\057\103\120\123\040\151\163\040\151\156\143\157  
\162\160\157\162\141\164\145\144\040\142\171\040\162\145\146\145  
\162\145\156\143\145\061\037\060\035\006\003\125\004\013\023\026  
\050\143\051\040\062\060\060\066\040\105\156\164\162\165\163\164  
\054\040\111\156\143\056\061\055\060\053\006\003\125\004\003\023  
\044\105\156\164\162\165\163\164\040\122\157\157\164\040\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150  
\157\162\151\164\171\060\036\027\015\060\066\061\061\062\067\062  
\060\062\063\064\062\132\027\015\062\066\061\061\062\067\062\060  
\065\063\064\062\132\060\201\260\061\013\060\011\006\003\125\004  
\006\023\002\125\123\061\026\060\024\006\003\125\004\012\023\015  
\105\156\164\162\165\163\164\054\040\111\156\143\056\061\071\060  
\067\006\003\125\004\013\023\060\167\167\167\056\145\156\164\162  
\165\163\164\056\156\145\164\057\103\120\123\040\151\163\040\151  
\156\143\157\162\160\157\162\141\164\145\144\040\142\171\040\162  
\145\146\145\162\145\156\143\145\061\037\060\035\006\003\125\004  
\013\023\026\050\143\051\040\062\060\060\066\040\105\156\164\162  
\165\163\164\054\040\111\156\143\056\061\055\060\053\006\003\125  
\004\003\023\044\105\156\164\162\165\163\164\040\122\157\157\164  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171\060\202\001\042\060\015\006\011

\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000  
\060\202\001\012\002\202\001\001\000\266\225\266\103\102\372\306  
\155\052\157\110\337\224\114\071\127\005\356\303\171\021\101\150  
\066\355\354\376\232\001\217\241\070\050\374\367\020\106\146\056  
\115\036\032\261\032\116\306\321\300\225\210\260\311\377\061\213  
\063\003\333\267\203\173\076\040\204\136\355\262\126\050\247\370  
\340\271\100\161\067\305\313\107\016\227\052\150\300\042\225\142  
\025\333\107\331\365\320\053\377\202\113\311\255\076\336\114\333  
\220\200\120\077\011\212\204\000\354\060\012\075\030\315\373\375  
\052\131\232\043\225\027\054\105\236\037\156\103\171\155\014\134  
\230\376\110\247\305\043\107\134\136\375\156\347\036\264\366\150  
\105\321\206\203\133\242\212\215\261\343\051\200\376\045\161\210  
\255\276\274\217\254\122\226\113\252\121\215\344\023\061\031\350  
\116\115\237\333\254\263\152\325\274\071\124\161\312\172\172\177  
\220\335\175\035\200\331\201\273\131\046\302\021\376\346\223\342  
\367\200\344\145\373\064\067\016\051\200\160\115\257\070\206\056  
\236\177\127\257\236\027\256\353\034\313\050\041\137\266\034\330  
\347\242\004\042\371\323\332\330\313\002\003\001\000\001\243\201  
\260\060\201\255\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\053\006\003\125\035\020\004\044\060\042  
\200\017\062\060\060\066\061\061\062\067\062\060\062\063\064\062  
\132\201\017\062\060\062\066\061\061\062\067\062\060\065\063\064  
\062\132\060\037\006\003\125\035\043\004\030\060\026\200\024\150  
\220\344\147\244\246\123\200\307\206\146\244\361\367\113\103\373  
\204\275\155\060\035\006\003\125\035\016\004\026\004\024\150\220  
\344\147\244\246\123\200\307\206\146\244\361\367\113\103\373\204  
\275\155\060\035\006\011\052\206\110\206\366\175\007\101\000\004  
\020\060\016\033\010\126\067\056\061\072\064\056\060\003\002\004  
\220\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000  
\003\202\001\001\000\223\324\060\260\327\003\040\052\320\371\143  
\350\221\014\005\040\251\137\031\312\173\162\116\324\261\333\320  
\226\373\124\132\031\054\014\010\367\262\274\205\250\235\177\155  
\073\122\263\052\333\347\324\204\214\143\366\017\313\046\001\221  
\120\154\364\137\024\342\223\164\300\023\236\060\072\120\343\264  
\140\305\034\360\042\104\215\161\107\254\310\032\311\351\233\232  
\000\140\023\377\160\176\137\021\115\111\033\263\025\122\173\311  
\124\332\277\235\225\257\153\232\330\236\351\361\344\103\215\342  
\021\104\072\277\257\275\203\102\163\122\213\252\273\247\051\317  
\365\144\034\012\115\321\274\252\254\237\052\320\377\177\177\332  
\175\352\261\355\060\045\301\204\332\064\322\133\170\203\126\354  
\234\066\303\046\342\021\366\147\111\035\222\253\214\373\353\377  
\172\356\205\112\247\120\200\360\247\134\112\224\056\137\005\231  
\074\122\101\340\315\264\143\317\001\103\272\234\203\334\217\140  
\073\363\132\264\264\173\256\332\013\220\070\165\357\201\035\146  
\322\367\127\160\066\263\277\374\050\257\161\045\205\133\023\376  
\036\177\132\264\074

END

```

CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "Entrust Root Certification Authority"
Issuer: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is
incorporated by reference,O="Entrust, Inc.",C=US
Serial Number: 1164660820 (0x456b5054)
Subject: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is
incorporated by reference,O="Entrust, Inc.",C=US
Not Valid Before: Mon Nov 27 20:23:42 2006
Not Valid After : Fri Nov 27 20:53:42 2026
Fingerprint (SHA-256):
73:C1:76:43:4F:1B:C6:D5:AD:F4:5B:0E:76:E7:27:28:7C:8D:E5:76:16:C1:E6:E6:14:1A:2B:2C:BC:7D:8E:4C
Fingerprint (SHA1): B3:1E:B1:B7:40:E3:6C:84:02:DA:DC:37:D4:4D:F5:D4:67:49:52:F9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority"
CKA_CERT_SHA1_HASH
MULTILINE_OCTAL
\263\036\261\267\100\343\154\204\002\332\334\067\324\115\365\324
\147\111\122\371
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\326\245\303\355\135\335\076\000\301\075\207\222\037\035\077\344
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\260\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\167\167\167\056\145\156\164\162\165\163\164\056\156
\145\164\057\103\120\123\040\151\163\040\151\156\143\157\162\160
\157\162\141\164\145\144\040\142\171\040\162\145\146\145\162\145
\156\143\145\061\037\060\035\006\003\125\004\013\023\026\050\143
\051\040\062\060\060\066\040\105\156\164\162\165\163\164\054\040
\111\156\143\056\061\055\060\053\006\003\125\004\003\023\044\105
\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\105\153\120\124
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

```

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Certum Root CA"

#

# Issuer: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL

# Serial Number: 65568 (0x10020)

# Subject: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL

# Not Valid Before: Tue Jun 11 10:46:39 2002

# Not Valid After : Fri Jun 11 10:46:39 2027

# Fingerprint (SHA-256):

D8:E0:FE:BC:1D:B2:E3:8D:00:94:0F:37:D2:7D:41:34:4D:99:3E:73:4B:99:D5:65:6D:97:78:D4:D8:14:36:24

# Fingerprint (SHA1): 62:52:DC:40:F7:11:43:A2:2F:DE:9E:F7:34:8E:06:42:51:B1:81:18

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certum Root CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114\061  
\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145\164  
\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060\020  
\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103\101

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114\061  
\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145\164  
\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060\020  
\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\003\001\000\040

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\014\060\202\001\364\240\003\002\001\002\002\003\001  
\000\040\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114  
\061\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145  
\164\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060  
\020\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103  
\101\060\036\027\015\060\062\060\066\061\061\061\060\064\066\063  
\071\132\027\015\062\067\060\066\061\061\061\060\064\066\063\071  
\132\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114

\061\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145  
\164\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060  
\020\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103  
\101\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001  
\001\000\316\261\301\056\323\117\174\315\045\316\030\076\117\304  
\214\157\200\152\163\310\133\121\370\233\322\334\273\000\134\261  
\240\374\165\003\356\201\360\210\356\043\122\351\346\025\063\215  
\254\055\011\305\166\371\053\071\200\211\344\227\113\220\245\250  
\170\370\163\103\173\244\141\260\330\130\314\341\154\146\176\234  
\363\011\136\125\143\204\325\250\357\363\261\056\060\150\263\304  
\074\330\254\156\215\231\132\220\116\064\334\066\232\217\201\210  
\120\267\155\226\102\011\363\327\225\203\015\101\113\260\152\153  
\370\374\017\176\142\237\147\304\355\046\137\020\046\017\010\117  
\360\244\127\050\316\217\270\355\105\366\156\356\045\135\252\156  
\071\276\344\223\057\331\107\240\162\353\372\246\133\257\312\123  
\077\342\016\306\226\126\021\156\367\351\146\251\046\330\177\225  
\123\355\012\205\210\272\117\051\245\102\214\136\266\374\205\040  
\000\252\150\013\241\032\205\001\234\304\106\143\202\210\266\042  
\261\356\376\252\106\131\176\317\065\054\325\266\332\135\367\110  
\063\024\124\266\353\331\157\316\315\210\326\253\033\332\226\073  
\035\131\002\003\001\000\001\243\023\060\021\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\015\006\011  
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000  
\270\215\316\357\347\024\272\317\356\260\104\222\154\264\071\076  
\242\204\156\255\270\041\167\322\324\167\202\207\346\040\101\201  
\356\342\370\021\267\143\321\027\067\276\031\166\044\034\004\032  
\114\353\075\252\147\157\055\324\315\376\145\061\160\305\033\246  
\002\012\272\140\173\155\130\302\232\111\376\143\062\013\153\343  
\072\300\254\253\073\260\350\323\011\121\214\020\203\306\064\340  
\305\053\340\032\266\140\024\047\154\062\167\214\274\262\162\230  
\317\315\314\077\271\310\044\102\024\326\127\374\346\046\103\251  
\035\345\200\220\316\003\124\050\076\367\077\323\370\115\355\152  
\012\072\223\023\233\073\024\043\023\143\234\077\321\207\047\171  
\345\114\121\343\001\255\205\135\032\073\261\325\163\020\244\323  
\362\274\156\144\365\132\126\220\250\307\016\114\164\017\056\161  
\073\367\310\107\364\151\157\025\362\021\136\203\036\234\174\122  
\256\375\002\332\022\250\131\147\030\333\274\160\335\233\261\151  
\355\200\316\211\100\110\152\016\065\312\051\146\025\041\224\054  
\350\140\052\233\205\112\100\363\153\212\044\354\006\026\054\163  
END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Certum Root CA"

# Issuer:

```

CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL
Serial Number: 65568 (0x10020)
Subject: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL
Not Valid Before: Tue Jun 11 10:46:39 2002
Not Valid After : Fri Jun 11 10:46:39 2027
Fingerprint (SHA-256):
D8:E0:FE:BC:1D:B2:E3:8D:00:94:0F:37:D2:7D:41:34:4D:99:3E:73:4B:99:D5:65:6D:97:78:D4:D8:14:36:24
Fingerprint (SHA1): 62:52:DC:40:F7:11:43:A2:2F:DE:9E:F7:34:8E:06:42:51:B1:81:18
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\142\122\334\100\367\021\103\242\057\336\236\367\064\216\006\102
\121\261\201\030
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\054\217\237\146\035\030\220\261\107\046\235\216\206\202\214\251
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145\164
\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060\020
\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\001\000\040
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Comodo AAA Services root"
#
Issuer: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
Serial Number: 1 (0x1)
Subject: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
Not Valid Before: Thu Jan 01 00:00:00 2004
Not Valid After : Sun Dec 31 23:59:59 2028
Fingerprint (SHA-256):
D7:A7:A0:FB:5D:7E:27:31:D7:71:E9:48:4E:BC:DE:F7:1D:5F:0C:3E:0A:29:48:78:2B:C8:3E:E0:EA:69:9E:F4
Fingerprint (SHA1): D1:EB:23:A4:6D:17:D6:8F:D9:25:64:C2:F1:F1:60:17:64:D8:E3:49
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

```

```
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Comodo AAA Services root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\033\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145
\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016
\006\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032
\060\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040
\103\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003
\125\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\033\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145
\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016
\006\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032
\060\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040
\103\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003
\125\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\062\060\202\003\032\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061\033
\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145\162
\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016\006
\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032\060
\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040\103
\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003\125
\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151\143
\141\164\145\040\123\145\162\166\151\143\145\163\060\036\027\015
\060\064\060\061\060\061\060\060\060\060\060\060\132\027\015\062
\070\061\062\063\061\062\063\065\071\065\071\132\060\173\061\013
\060\011\006\003\125\004\006\023\002\107\102\061\033\060\031\006
\003\125\004\010\014\022\107\162\145\141\164\145\162\040\115\141
\156\143\150\145\163\164\145\162\061\020\060\016\006\003\125\004
\007\014\007\123\141\154\146\157\162\144\061\032\060\030\006\003
\125\004\012\014\021\103\157\155\157\144\157\040\103\101\040\114
```



\151\155\151\164\145\144\061\041\060\037\006\003\125\004\003\014  
\030\101\101\101\040\103\145\162\164\151\146\151\143\141\164\145  
\040\123\145\162\166\151\143\145\163\060\202\001\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017  
\000\060\202\001\012\002\202\001\001\000\276\100\235\364\156\341  
\352\166\207\034\115\105\104\216\276\106\310\203\006\235\301\052  
\376\030\037\216\344\002\372\363\253\135\120\212\026\061\013\232  
\006\320\305\160\042\315\111\055\124\143\314\266\156\150\106\013  
\123\352\313\114\044\300\274\162\116\352\361\025\256\364\124\232  
\022\012\303\172\262\063\140\342\332\211\125\363\042\130\363\336  
\334\317\357\203\206\242\214\224\117\237\150\362\230\220\106\204  
\047\307\166\277\343\314\065\054\213\136\007\144\145\202\300\110  
\260\250\221\371\141\237\166\040\120\250\221\307\146\265\353\170  
\142\003\126\360\212\032\023\352\061\243\036\240\231\375\070\366  
\366\047\062\130\157\007\365\153\270\373\024\053\257\267\252\314  
\326\143\137\163\214\332\005\231\250\070\250\313\027\170\066\121  
\254\351\236\364\170\072\215\317\017\331\102\342\230\014\253\057  
\237\016\001\336\357\237\231\111\361\055\337\254\164\115\033\230  
\265\107\305\345\051\321\371\220\030\307\142\234\276\203\307\046  
\173\076\212\045\307\300\335\235\346\065\150\020\040\235\217\330  
\336\322\303\204\234\015\136\350\057\311\002\003\001\000\001\243  
\201\300\060\201\275\060\035\006\003\125\035\016\004\026\004\024  
\240\021\012\043\076\226\361\007\354\342\257\051\357\202\245\177  
\320\060\244\264\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\173\006\003\125\035\037\004\164\060\162  
\060\070\240\066\240\064\206\062\150\164\164\160\072\057\057\143  
\162\154\056\143\157\155\157\144\157\143\141\056\143\157\155\057  
\101\101\101\103\145\162\164\151\146\151\143\141\164\145\123\145  
\162\166\151\143\145\163\056\143\162\154\060\066\240\064\240\062  
\206\060\150\164\164\160\072\057\057\143\162\154\056\143\157\155  
\157\144\157\056\156\145\164\057\101\101\101\103\145\162\164\151  
\146\151\143\141\164\145\123\145\162\166\151\143\145\163\056\143  
\162\154\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\003\202\001\001\000\010\126\374\002\360\233\350\377\244\372  
\326\173\306\104\200\316\117\304\305\366\000\130\314\246\266\274  
\024\111\150\004\166\350\346\356\135\354\002\017\140\326\215\120  
\030\117\046\116\001\343\346\260\245\356\277\274\164\124\101\277  
\375\374\022\270\307\117\132\364\211\140\005\177\140\267\005\112  
\363\366\361\302\277\304\271\164\206\266\055\175\153\314\322\363  
\106\335\057\306\340\152\303\303\064\003\054\175\226\335\132\302  
\016\247\012\231\301\005\213\253\014\057\363\134\072\317\154\067  
\125\011\207\336\123\100\154\130\357\374\266\253\145\156\004\366  
\033\334\074\340\132\025\306\236\331\361\131\110\060\041\145\003  
\154\354\351\041\163\354\233\003\241\340\067\255\240\025\030\217  
\372\272\002\316\247\054\251\020\023\054\324\345\010\046\253\042  
\227\140\370\220\136\164\324\242\232\123\275\362\251\150\340\242  
\156\302\327\154\261\243\017\236\277\353\150\347\126\362\256\362

```
\343\053\070\072\011\201\265\153\205\327\276\055\355\077\032\267
\262\143\342\365\142\054\202\324\152\000\101\120\361\071\203\237
\225\351\066\226\230\156
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Comodo AAA Services root"

# Issuer: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB

# Serial Number:

1 (0x1)

# Subject: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB

# Not Valid Before: Thu Jan 01 00:00:00 2004

# Not Valid After : Sun Dec 31 23:59:59 2028

# Fingerprint (SHA-256):

D7:A7:A0:FB:5D:7E:27:31:D7:71:E9:48:4E:BC:DE:F7:1D:5F:0C:3E:0A:29:48:78:2B:C8:3E:E0:EA:69:9E:F4

# Fingerprint (SHA1): D1:EB:23:A4:6D:17:D6:8F:D9:25:64:C2:F1:F1:60:17:64:D8:E3:49

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Comodo AAA Services root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\321\353\043\244\155\027\326\217\331\045\144\302\361\361\140\027
\144\330\343\111
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\111\171\004\260\353\207\031\254\107\260\274\021\121\233\164\320
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\033\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145
\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016
\006\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032
\060\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040
\103\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003
\125\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\001\001
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

```

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "QuoVadis Root CA 2"
#
Issuer: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM
Serial Number: 1289 (0x509)
Subject: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM
Not Valid Before: Fri Nov 24 18:27:00 2006
Not Valid After : Mon Nov 24 18:23:33 2031
Fingerprint (SHA-256):
85:A0:DD:7D:D7:20:AD:B7:FF:05:F8:3D:54:2B:20:9D:C7:FF:45:28:F7:D6:77:B1:83:89:FE:A5:E5:C4:9E:86
#
Fingerprint (SHA1): CA:3A:FB:CF:12:40:36:4B:44:B2:16:20:88:80:48:39:19:93:7C:F7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\005\011
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\267\060\202\003\237\240\003\002\001\002\002\002\005
\011\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\060\036\027\015\060\066\061\061\062
\064\061\070\062\067\060\060\132\027\015\063\061\061\061\062\064

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\061\070\062\063\063\063\132\060\105\061\013\060\011\006\003\125  
\004\006\023\002\102\115\061\031\060\027\006\003\125\004\012\023  
\020\121\165\157\126\141\144\151\163\040\114\151\155\151\164\145  
\144\061\033\060\031\006\003\125\004\003\023\022\121\165\157\126  
\141\144\151\163\040\122\157\157\164\040\103\101\040\062\060\202  
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\232  
\030\312\113\224\015\000\055\257\003\051\212\360\017\201\310\256  
\114\031\205\035\010\237\253\051\104\205\363\057\201\255\062\036  
\220\106\277\243\206\046\032\036\376\176\034\030\072\134\234\140  
\027\052\072\164\203\063\060\175\141\124\021\313\355\253\340\346  
\322\242\176\365\153\157\030\267\012\013\055\375\351\076\357\012  
\306\263\020\351\334\302\106\027\370\135\375\244\332\377\236\111  
\132\234\346\063\346\044\226\367\077\272\133\053\034\172\065\302  
\326\147\376\253\146\120\213\155\050\140\053\357\327\140\303\307  
\223\274\215\066\221\363\177\370\333\021\023\304\234\167\166\301  
\256\267\002\152\201\172\251\105\203\342\005\346\271\126\301\224  
\067\217\110\161\143\042\354\027\145\007\225\212\113\337\217\306  
\132\012\345\260\343\137\136\153\021\253\014\371\205\353\104\351  
\370\004\163\362\351\376\134\230\214\365\163\257\153\264\176\315  
\324\134\002\053\114\071\341\262\225\225\055\102\207\327\325\263  
\220\103\267\154\023\361\336\335\366\304\370\211\077\321\165\365  
\222\303\221\325\212\210\320\220\354\334\155\336\211\302\145\161  
\226\213\015\003\375\234\277\133\026\254\222\333\352\376\171\174  
\255\353\257\367\026\313\333\315\045\053\345\037\373\232\237\342  
\121\314\072\123\014\110\346\016\275\311\264\166\006\122\346\021  
\023\205\162\143\003\004\340\004\066\053\040\031\002\350\164\247  
\037\266\311\126\146\360\165\045\334\147\301\016\141\140\210\263  
\076\321\250\374\243\332\035\260\321\261\043\124\337\104\166\155  
\355\101\330\301\262\042\266\123\034\337\065\035\334\241\167\052  
\061\344\055\365\345\345\333\310\340\377\345\200\327\013\143\240  
\377\063\241\017\272\054\025\025\352\227\263\322\242\265\276\362  
\214\226\036\032\217\035\154\244\141\067\271\206\163\063\327\227  
\226\236\043\175\202\244\114\201\342\241\321\272\147\137\225\007  
\243\047\021\356\026\020\173\274\105\112\114\262\004\322\253\357  
\325\375\014\121\316\120\152\010\061\371\221\332\014\217\144\134  
\003\303\072\213\040\077\156\215\147\075\072\326\376\175\133\210  
\311\136\373\314\141\334\213\063\167\323\104\062\065\011\142\004  
\222\026\020\330\236\047\107\373\073\041\343\370\353\035\133\002  
\003\001\000\001\243\201\260\060\201\255\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\013\006\003\125  
\035\017\004\004\003\002\001\006\060\035\006\003\125\035\016\004  
\026\004\024\032\204\142\274\110\114\063\045\004\324\356\320\366  
\003\304\031\106\321\224\153\060\156\006\003\125\035\043\004\147  
\060\145\200\024\032\204\142\274\110\114\063\045\004\324\356\320  
\366\003\304\031\106\321\224\153\241\111\244\107\060\105\061\013  
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006  
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114

\151\155\151\164\145\144\061\033\060\031\006\003\125\004\003\023  
\022\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103  
\101\040\062\202\002\005\011\060\015\006\011\052\206\110\206\367  
\015\001\001\005\005\000\003\202\002\001\000\076\012\026\115\237  
\006\133\250\256\161\135\057\005\057\147\346\023\105\203\304\066  
\366\363\300\046\014\015\265\107\144\135\370\264\162\311\106\245  
\003\030\047\125\211\170\175\166\352\226\064\200\027\040\334\347  
\203\370\215\374\007\270\332\137\115\056\147\262\204\375\331\104  
\374\167\120\201\346\174\264\311\015\013\162\123\370\166\007\007  
\101\107\226\014\373\340\202\046\223\125\214\376\042\037\140\145  
\174\137\347\046\263\367\062\220\230\120\324\067\161\125\366\222  
\041\170\367\225\171\372\370\055\046\207\146\126\060\167\246\067  
\170\063\122\020\130\256\077\141\216\362\152\261\357\030\176\112  
\131\143\312\215\242\126\325\247\057\274\126\037\317\071\301\342  
\373\012\250\025\054\175\115\172\143\306\154\227\104\074\322\157  
\303\112\027\012\370\220\322\127\242\031\121\245\055\227\101\332  
\007\117\251\120\332\220\215\224\106\341\076\360\224\375\020\000  
\070\365\073\350\100\341\264\156\126\032\040\314\157\130\215\355  
\056\105\217\326\351\223\077\347\261\054\337\072\326\042\214\334  
\204\273\042\157\320\370\344\306\071\351\004\210\074\303\272\353  
\125\172\155\200\231\044\365\154\001\373\370\227\260\224\133\353  
\375\322\157\361\167\150\015\065\144\043\254\270\125\241\003\321  
\115\102\031\334\370\165\131\126\243\371\250\111\171\370\257\016  
\271\021\240\174\267\152\355\064\320\266\046\142\070\032\207\014  
\370\350\375\056\323\220\177\007\221\052\035\326\176\134\205\203  
\231\260\070\010\077\351\136\371\065\007\344\311\142\156\127\177  
\247\120\225\367\272\310\233\346\216\242\001\305\326\146\277\171  
\141\363\074\034\341\271\202\134\135\240\303\351\330\110\275\031  
\242\021\024\031\156\262\206\033\150\076\110\067\032\210\267\135  
\226\136\234\307\357\047\142\010\342\221\031\134\322\361\041\335  
\272\027\102\202\227\161\201\123\061\251\237\366\175\142\277\162  
\341\243\223\035\314\212\046\132\011\070\320\316\327\015\200\026  
\264\170\245\072\207\114\215\212\245\325\106\227\362\054\020\271  
\274\124\042\300\001\120\151\103\236\364\262\357\155\370\354\332  
\361\343\261\357\337\221\217\124\052\013\045\301\046\031\304\122  
\020\005\145\325\202\020\352\302\061\315\056

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "QuoVadis Root CA 2"

# Issuer: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM

# Serial Number: 1289 (0x509)

# Subject: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM

# Not Valid Before: Fri Nov 24 18:27:00 2006

# Not Valid After : Mon Nov 24 18:23:33 2031

```

Fingerprint (SHA-256):
85:A0:DD:7D:D7:20:AD:B7:FF:05:F8:3D:54:2B:20:9D:C7:FF:45:28:F7:D6:77:B1:83:89:FE:A5:E5:C4:9E:86
Fingerprint (SHA1): CA:3A:FB:CF:12:40:36:4B:44:B2:16:20:88:80:48:39:19:93:7C:F7
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\312\072\373\317\022\100\066\113\104\262\026\040\210\200\110\071
\031\223\174\367
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\136\071\173\335\370\272\354\202\351\254\142\272\014\124\000\053
END
CKA_ISSUER
MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\005\011
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "QuoVadis Root CA 3"
#
Issuer: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM
Serial Number: 1478 (0x5c6)
Subject: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM
Not Valid Before: Fri Nov 24 19:11:23 2006
Not Valid After : Mon Nov 24 19:06:44 2031
Fingerprint (SHA-256):
18:F1:FC:7F:20:5D:F8:AD:DD:EB:7F:E0:07:DD:57:E3:AF:37:5A:9C:4D:8D:73:54:6B:F4:F1:FE:D1:E1:8D:35
Fingerprint
(SHA1): 1F:49:14:F7:D8:74:95:1D:DD:AE:02:C0:BE:FD:3A:2D:82:75:51:85
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 3"

```

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061  
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144  
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003  
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157  
\157\164\040\103\101\040\063

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061  
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144  
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003  
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157  
\157\164\040\103\101\040\063

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\002\005\306

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\006\235\060\202\004\205\240\003\002\001\002\002\002\005  
\306\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000  
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061  
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144  
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003  
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157  
\157\164\040\103\101\040\063\060\036\027\015\060\066\061\061\062  
\064\061\071\061\061\062\063\132\027\015\063\061\061\061\062\064  
\061\071\060\066\064\064\132\060\105\061\013\060\011\006\003\125  
\004\006\023\002\102\115\061\031\060\027\006\003\125\004\012\023  
\020\121\165\157\126\141\144\151\163\040\114\151\155\151\164\145  
\144\061\033\060\031\006\003\125\004\003\023\022\121\165\157\126  
\141\144\151\163\040\122\157\157\164\040\103\101\040\063\060\202  
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\314  
\127\102\026\124\234\346\230\323\323\115\356\376\355\307\237\103  
\071\112\145\263\350\026\210\064\333\015\131\221\164\317\222\270  
\004\100\255\002\113\061\253\274\215\221\150\330\040\016\032\001  
\342\032\173\116\027\135\342\212\267\077\231\032\315\353\141\253  
\302\145\246\037\267\267\275\267\217\374\375\160\217\013\240\147  
\276\001\242\131\317\161\346\017\051\166\377\261\126\171\105\053  
\037\236\172\124\350\243\051\065\150\244\001\117\017\244\056\067  
\357\033\277\343\217\020\250\162\253\130\127\347\124\206\310\311  
\363\133\332\054\332\135\216\156\074\243\076\332\373\202\345\335  
\362\134\262\005\063\157\212\066\316\320\023\116\377\277\112\014  
\064\114\246\303\041\275\120\004\125\353\261\273\235\373\105\036  
\144\025\336\125\001\214\002\166\265\313\241\077\102\151\274\057

\275\150\103\026\126\211\052\067\141\221\375\246\256\116\300\313  
\024\145\224\067\113\222\006\357\004\320\310\234\210\333\013\173  
\201\257\261\075\052\304\145\072\170\266\356\334\200\261\322\323  
\231\234\072\356\153\132\153\263\215\267\325\316\234\302\276\245  
\113\057\026\261\236\150\073\006\157\256\175\237\370\336\354\314  
\051\247\230\243\045\103\057\357\361\137\046\341\210\115\370\136  
\156\327\331\024\156\031\063\151\247\073\204\211\223\304\123\125  
\023\241\121\170\100\370\270\311\242\356\173\272\122\102\203\236  
\024\355\005\122\132\131\126\247\227\374\235\077\012\051\330\334  
\117\221\016\023\274\336\225\244\337\213\231\276\254\233\063\210  
\357\265\201\257\033\306\042\123\310\366\307\356\227\024\260\305  
\174\170\122\310\360\316\156\167\140\204\246\351\052\166\040\355  
\130\001\027\060\223\351\032\213\340\163\143\331\152\222\224\111  
\116\264\255\112\205\304\243\042\060\374\011\355\150\042\163\246  
\210\014\125\041\130\305\341\072\237\052\335\312\341\220\340\331  
\163\253\154\200\270\350\013\144\223\240\234\214\031\377\263\322  
\014\354\221\046\207\212\263\242\341\160\217\054\012\345\315\155  
\150\121\353\332\077\005\177\213\062\346\023\134\153\376\137\100  
\342\042\310\264\264\144\117\326\272\175\110\076\250\151\014\327  
\273\206\161\311\163\270\077\073\235\045\113\332\377\100\353\002  
\003\001\000\001\243\202\001\225\060\202\001\221\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\201\341  
\006\003\125\035\040\004\201\331\060\201\326\060\201\323\006\011  
\053\006\001\004\001\276\130\000\003\060\201\305\060\201\223\006  
\010\053\006\001\005\005\007\002\002\060\201\206\032\201\203\101  
\156\171\040\165\163\145\040\157\146\040\164\150\151\163\040\103  
\145\162\164\151\146\151\143\141\164\145\040\143\157\156\163\164  
\151\164\165\164\145\163\040\141\143\143\145\160\164\141\156\143  
\145\040\157\146\040\164\150\145\040\121\165\157\126\141\144\151  
\163\040\122\157\157\164\040\103\101\040\063\040\103\145\162\164  
\151\146\151\143\141\164\145\040\120\157\154\151\143\171\040\057  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\120  
\162\141\143\164\151\143\145\040\123\164\141\164\145\155\145\156  
\164\056\060\055\006\010\053\006\001\005\005\007\002\001\026\041  
\150\164\164\160\072\057\057\167\167\167\056\161\165\157\166\141  
\144\151\163\147\154\157\142\141\154\056\143\157\155\057\143\160  
\163\060\013\006\003\125\035\017\004\004\003\002\001\006\060\035  
\006\003\125\035\016\004\026\004\024\362\300\023\340\202\103\076  
\373\356\057\147\062\226\065\134\333\270\313\002\320\060\156\006  
\003\125\035\043\004\147\060\145\200\024\362\300\023\340\202\103  
\076\373\356\057\147\062\226\065\134\333\270\313\002\320\241\111  
\244\107\060\105\061\013\060\011\006\003\125\004\006\023\002\102  
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126  
\141\144\151\163\040\114\151\155\151\164\145\144\061\033\060\031  
\006\003\125\004\003\023\022\121\165\157\126\141\144\151\163\040  
\122\157\157\164\040\103\101\040\063\202\002\005\306\060\015\006  
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\002\001  
\000\117\255\240\054\114\372\300\362\157\367\146\125\253\043\064



\356\347\051\332\303\133\266\260\203\331\320\320\342\041\373\363  
\140\247\073\135\140\123\047\242\233\366\010\042\052\347\277\240  
\162\345\234\044\152\061\261\220\172\047\333\204\021\211\047\246  
\167\132\070\327\277\254\206\374\356\135\203\274\006\306\321\167  
\153\017\155\044\057\113\172\154\247\007\226\312\343\204\237\255  
\210\213\035\253\026\215\133\146\027\331\026\364\213\200\322\335  
\370\262\166\303\374\070\023\252\014\336\102\151\053\156\363\074  
\353\200\047\333\365\246\104\015\237\132\125\131\013\325\015\122  
\110\305\256\237\362\057\200\305\352\062\120\065\022\227\056\301  
\341\377\361\043\210\121\070\237\362\146\126\166\347\017\121\227  
\245\122\014\115\111\121\225\066\075\277\242\113\014\020\035\206  
\231\114\252\363\162\021\223\344\352\366\233\332\250\135\247\115  
\267\236\002\256\163\000\310\332\043\003\350\371\352\031\164\142  
\000\224\313\042\040\276\224\247\131\265\202\152\276\231\171\172  
\251\362\112\044\122\367\164\375\272\116\346\250\035\002\156\261  
\015\200\104\301\256\323\043\067\137\273\205\174\053\222\056\350  
\176\245\213\335\231\341\277\047\157\055\135\252\173\207\376\012  
\335\113\374\216\365\046\344\156\160\102\156\063\354\061\236\173  
\223\301\344\311\151\032\075\300\153\116\042\155\356\253\130\115  
\306\320\101\301\053\352\117\022\207\136\353\105\330\154\365\230  
\002\323\240\330\125\212\006\231\031\242\240\167\321\060\236\254  
\314\165\356\203\365\260\142\071\317\154\127\342\114\322\221\013  
\016\165\050\033\232\277\375\032\103\361\312\167\373\073\217\141  
\270\151\050\026\102\004\136\160\052\034\041\330\217\341\275\043  
\133\055\164\100\222\331\143\031\015\163\335\151\274\142\107\274  
\340\164\053\262\353\175\276\101\033\265\300\106\305\241\042\313  
\137\116\301\050\222\336\030\272\325\052\050\273\021\213\027\223  
\230\231\140\224\134\043\317\132\047\227\136\013\005\006\223\067  
\036\073\151\066\353\251\236\141\035\217\062\332\216\014\326\164  
\076\173\011\044\332\001\167\107\304\073\315\064\214\231\365\312  
\341\045\141\063\262\131\033\342\156\327\067\127\266\015\251\022  
\332

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "QuoVadis Root CA 3"

# Issuer: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM

# Serial Number: 1478 (0x5c6)

# Subject: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM

# Not Valid Before: Fri Nov 24 19:11:23 2006

# Not Valid After : Mon Nov 24 19:06:44 2031

# Fingerprint (SHA-256):

18:F1:FC:7F:20:5D:F8:AD:DD:EB:7F:E0:07:DD:57:E3:AF:37:5A:9C:4D:8D:73:54:6B:F4:F1:FE:D1:E1:8D:35

# Fingerprint (SHA1): 1F:49:14:F7:D8:74:95:1D:DD:AE:02:C0:BE:FD:3A:2D:82:75:51:85

```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\037\111\024\367\330\164\225\035\335\256\002\300\276\375\072\055
\202\165\121\205
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\061\205\074\142\224\227\143\271\252\375\211\116\257\157\340\317
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\002\005\306
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "XRamp Global CA Root"
#
Issuer: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
Serial Number:50:94:6c:ec:18:ea:d5:9c:4d:d5:97:ef:75:8f:a0:ad
Subject: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
Not Valid Before: Mon Nov 01 17:14:04 2004
Not Valid After : Mon Jan 01 05:37:19 2035
Fingerprint (SHA-256):
CE:CD:DC:90:50:99:D8:DA:DF:C5:B1:D2:09:B7:37:CB:E2:C1:8C:FB:2C:10:C0:FF:0B:CF:0D:32:86:FC:1A:A2
#
Fingerprint (SHA1): B8:01:86:D1:EB:9C:86:A5:41:04:CF:30:54:F3:4C:52:B7:E5:58:C6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "XRamp Global CA Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

```

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\036\060\034\006\003\125\004\013\023\025\167\167\167\056\170  
\162\141\155\160\163\145\143\165\162\151\164\171\056\143\157\155  
\061\044\060\042\006\003\125\004\012\023\033\130\122\141\155\160  
\040\123\145\143\165\162\151\164\171\040\123\145\162\166\151\143  
\145\163\040\111\156\143\061\055\060\053\006\003\125\004\003\023  
\044\130\122\141\155\160\040\107\154\157\142\141\154\040\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150  
\157\162\151\164\171

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\036\060\034\006\003\125\004\013\023\025\167\167\167\056\170  
\162\141\155\160\163\145\143\165\162\151\164\171\056\143\157\155  
\061\044\060\042\006\003\125\004\012\023\033\130\122\141\155\160  
\040\123\145\143\165\162\151\164\171\040\123\145\162\166\151\143  
\145\163\040\111\156\143\061\055\060\053\006\003\125\004\003\023  
\044\130\122\141\155\160\040\107\154\157\142\141\154\040\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150  
\157\162\151\164\171

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\120\224\154\354\030\352\325\234\115\325\227\357\165\217  
\240\255

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\060\060\202\003\030\240\003\002\001\002\002\020\120  
\224\154\354\030\352\325\234\115\325\227\357\165\217\240\255\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201  
\202\061\013\060\011\006\003\125\004\006\023\002\125\123\061\036  
\060\034\006\003\125\004\013\023\025\167\167\167\056\170\162\141  
\155\160\163\145\143\165\162\151\164\171\056\143\157\155\061\044  
\060\042\006\003\125\004\012\023\033\130\122\141\155\160\040\123  
\145\143\165\162\151\164\171\040\123\145\162\166\151\143\145\163  
\040\111\156\143\061\055\060\053\006\003\125\004\003\023\044\130  
\122\141\155\160\040\107\154\157\142\141\154\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\060\036\027\015\060\064\061\061\060\061\061\067\061  
\064\060\064\132\027\015\063\065\060\061\060\061\060\065\063\067  
\061\071\132\060\201\202\061\013\060\011\006\003\125\004\006\023  
\002\125\123\061\036\060\034\006\003\125\004\013\023\025\167\167  
\167\056\170\162\141\155\160\163\145\143\165\162\151\164\171\056  
\143\157\155\061\044\060\042\006\003\125\004\012\023\033\130\122  
\141\155\160\040\123\145\143\165\162\151\164\171\040\123\145\162  
\166\151\143\145\163\040\111\156\143\061\055\060\053\006\003\125

\004\003\023\044\130\122\141\155\160\040\107\154\157\142\141\154  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171\060\202\001\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000  
\060\202\001\012\002\202\001\001\000\230\044\036\275\025\264\272  
\337\307\214\245\047\266\070\013\151\363\266\116\250\054\056\041  
\035\134\104\337\041\135\176\043\164\376\136\176\264\112\267\246  
\255\037\256\340\006\026\342\233\133\331\147\164\153\135\200\217  
\051\235\206\033\331\234\015\230\155\166\020\050\130\344\145\260  
\177\112\230\171\237\340\303\061\176\200\053\265\214\300\100\073  
\021\206\320\313\242\206\066\140\244\325\060\202\155\331\156\320  
\017\022\004\063\227\137\117\141\132\360\344\371\221\253\347\035  
\073\274\350\317\364\153\055\064\174\342\110\141\034\216\363\141  
\104\314\157\240\112\251\224\260\115\332\347\251\064\172\162\070  
\250\101\314\074\224\021\175\353\310\246\214\267\206\313\312\063  
\073\331\075\067\213\373\172\076\206\054\347\163\327\012\127\254  
\144\233\031\353\364\017\004\010\212\254\003\027\031\144\364\132  
\045\042\215\064\054\262\366\150\035\022\155\323\212\036\024\332  
\304\217\246\342\043\205\325\172\015\275\152\340\351\354\354\027  
\273\102\033\147\252\045\355\105\203\041\374\301\311\174\325\142  
\076\372\362\305\055\323\375\324\145\002\003\001\000\001\243\201  
\237\060\201\234\060\023\006\011\053\006\001\004\001\202\067\024  
\002\004\006\036\004\000\103\000\101\060\013\006\003\125\035\017  
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\306\117\242\075\006\143\204\011\234\316\142\344\004\254  
\215\134\265\351\266\033\060\066\006\003\125\035\037\004\057\060  
\055\060\053\240\051\240\047\206\045\150\164\164\160\072\057\057  
\143\162\154\056\170\162\141\155\160\163\145\143\165\162\151\164  
\171\056\143\157\155\057\130\107\103\101\056\143\162\154\060\020  
\006\011\053\006\001\004\001\202\067\025\001\004\003\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\221\025\071\003\001\033\147\373\112\034\371\012  
\140\133\241\332\115\227\142\371\044\123\047\327\202\144\116\220  
\056\303\111\033\053\232\334\374\250\170\147\065\361\035\360\021  
\275\267\110\343\020\366\015\337\077\322\311\266\252\125\244\110  
\272\002\333\336\131\056\025\133\073\235\026\175\107\327\067\352  
\137\115\166\022\066\273\037\327\241\201\004\106\040\243\054\155  
\251\236\001\176\077\051\316\000\223\337\375\311\222\163\211\211  
\144\236\347\053\344\034\221\054\322\271\316\175\316\157\061\231  
\323\346\276\322\036\220\360\011\024\171\134\043\253\115\322\332  
\041\037\115\231\171\235\341\317\047\237\020\233\034\210\015\260  
\212\144\101\061\270\016\154\220\044\244\233\134\161\217\272\273  
\176\034\033\333\152\200\017\041\274\351\333\246\267\100\364\262  
\213\251\261\344\357\232\032\320\075\151\231\356\250\050\243\341  
\074\263\360\262\021\234\317\174\100\346\335\347\103\175\242\330  
\072\265\251\215\362\064\231\304\324\020\341\006\375\011\204\020  
\073\356\304\114\364\354\047\174\102\302\164\174\202\212\011\311

```

\264\003\045\274
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "XRamp Global CA Root"
Issuer: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
Serial Number:50:94:6c:ec:18:ea:d5:9c:4d:d5:97:ef:75:8f:a0:ad
Subject: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
Not Valid Before: Mon Nov 01 17:14:04 2004
Not Valid After : Mon Jan 01 05:37:19 2035
Fingerprint (SHA-256):
CE:CD:DC:90:50:99:D8:DA:DF:C5:B1:D2:09:B7:37:CB:E2:C1:8C:FB:2C:10:C0:FF:0B:CF:0D:32:86:FC:1A:A2
Fingerprint (SHA1): B8:01:86:D1:EB:9C:86:A5:41:04:CF:30:54:F3:4C:52:B7:E5:58:C6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "XRamp Global CA Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\270\001\206\321\353\234\206\245\101\004\317\060\124\363\114\122
\267\345\130\306
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\241\013\104\263\312\020\330\000\156\235\017\330\017\222\012\321
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\036\060\034\006\003\125\004\013\023\025\167\167\167\056\170
\162\141\155\160\163\145\143\165\162\151\164\171\056\143\157\155
\061\044\060\042\006\003\125\004\012\023\033\130\122\141\155\160
\040\123\145\143\165\162\151\164\171\040\123\145\162\166\151\143
\145\163\040\111\156\143\061\055\060\053\006\003\125\004\003\023
\044\130\122\141\155\160\040\107\154\157\142\141\154\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\120\224\154\354\030\352\325\234\115\325\227\357\165\217
\240\255
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

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CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Go Daddy Class 2 CA"
#
Issuer: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US
Serial Number: 0 (0x0)
Subject: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US
Not Valid Before: Tue Jun 29 17:06:20 2004
Not Valid After : Thu Jun 29 17:06:20 2034
Fingerprint (SHA-256):
C3:84:6B:F2:4B:9E:93:CA:64:27:4C:0E:C6:7C:1E:CC:5E:02:4F:FC:AC:D2:D7:40:19:35:0E:81:FE:54:6A:E4
Fingerprint (SHA1): 27:96:BA:E6:3F:18:01:E2:77:26:1B:A0:D7:77:70:02:8F:20:EE:E4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Go Daddy Class 2 CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157
\040\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040
\104\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157
\040\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040
\104\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\000\060\202\002\350\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061\041

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\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157\040  
\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156\143  
\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040\104  
\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171\060\036\027\015\060\064\060\066\062\071\061\067  
\060\066\062\060\132\027\015\063\064\060\066\062\071\061\067\060  
\066\062\060\132\060\143\061\013\060\011\006\003\125\004\006\023  
\002\125\123\061\041\060\037\006\003\125\004\012\023\030\124\150  
\145\040\107\157\040\104\141\144\144\171\040\107\162\157\165\160  
\054\040\111\156\143\056\061\061\060\057\006\003\125\004\013\023  
\050\107\157\040\104\141\144\144\171\040\103\154\141\163\163\040  
\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040  
\101\165\164\150\157\162\151\164\171\060\202\001\040\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\015  
\000\060\202\001\010\002\202\001\001\000\336\235\327\352\127\030  
\111\241\133\353\327\137\110\206\352\276\335\377\344\357\147\034  
\364\145\150\263\127\161\240\136\167\273\355\233\111\351\160\200  
\075\126\030\143\010\157\332\362\314\320\077\177\002\124\042\124  
\020\330\262\201\324\300\165\075\113\177\307\167\303\076\170\253  
\032\003\265\040\153\057\152\053\261\305\210\176\304\273\036\260  
\301\330\105\047\157\252\067\130\367\207\046\327\330\055\366\251  
\027\267\037\162\066\116\246\027\077\145\230\222\333\052\156\135  
\242\376\210\340\013\336\177\345\215\025\341\353\313\072\325\342  
\022\242\023\055\330\216\257\137\022\075\240\010\005\010\266\134  
\245\145\070\004\105\231\036\243\140\140\164\305\101\245\162\142  
\033\142\305\037\157\137\032\102\276\002\121\145\250\256\043\030  
\152\374\170\003\251\115\177\200\303\372\253\132\374\241\100\244  
\312\031\026\376\262\310\357\136\163\015\356\167\275\232\366\171  
\230\274\261\007\147\242\025\015\335\240\130\306\104\173\012\076  
\142\050\137\272\101\007\123\130\317\021\176\070\164\305\370\377  
\265\151\220\217\204\164\352\227\033\257\002\001\003\243\201\300  
\060\201\275\060\035\006\003\125\035\016\004\026\004\024\322\304  
\260\322\221\324\114\021\161\263\141\313\075\241\376\335\250\152  
\324\343\060\201\215\006\003\125\035\043\004\201\205\060\201\202  
\200\024\322\304\260\322\221\324\114\021\161\263\141\313\075\241  
\376\335\250\152\324\343\241\147\244\145\060\143\061\013\060\011  
\006\003\125\004\006\023\002\125\123\061\041\060\037\006\003\125  
\004\012\023\030\124\150\145\040\107\157\040\104\141\144\144\171  
\040\107\162\157\165\160\054\040\111\156\143\056\061\061\060\057  
\006\003\125\004\013\023\050\107\157\040\104\141\144\144\171\040  
\103\154\141\163\163\040\062\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\202  
\001\000\060\014\006\003\125\035\023\004\005\060\003\001\001\377  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\062\113\363\262\312\076\221\374\022\306\241\007  
\214\216\167\240\063\006\024\134\220\036\030\367\010\246\075\012  
\031\371\207\200\021\156\151\344\226\027\060\377\064\221\143\162

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\070\356\314\034\001\243\035\224\050\244\061\366\172\304\124\327
\366\345\061\130\003\242\314\316\142\333\224\105\163\265\277\105
\311\044\265\325\202\002\255\043\171\151\215\270\266\115\316\317
\114\312\063\043\350\034\210\252\235\213\101\156\026\311\040\345
\211\236\315\073\332\160\367\176\231\046\040\024\124\045\253\156
\163\205\346\233\041\235\012\154\202\016\250\370\302\014\372\020
\036\154\226\357\207\015\304\017\141\213\255\356\203\053\225\370
\216\222\204\162\071\353\040\352\203\355\203\315\227\156\010\274
\353\116\046\266\163\053\344\323\366\114\376\046\161\342\141\021
\164\112\377\127\032\207\017\165\110\056\317\121\151\027\240\002
\022\141\225\325\321\100\262\020\114\356\304\254\020\103\246\245
\236\012\325\225\142\232\015\317\210\202\305\062\014\344\053\237
\105\346\015\237\050\234\261\271\052\132\127\255\067\017\257\035
\177\333\275\237
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Go Daddy Class 2 CA"

# Issuer: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US

# Serial Number: 0 (0x0)

# Subject: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US

# Not Valid Before: Tue Jun 29 17:06:20 2004

# Not Valid After : Thu Jun 29 17:06:20 2034

# Fingerprint (SHA-256):

C3:84:6B:F2:4B:9E:93:CA:64:27:4C:0E:C6:7C:1E:CC:5E:02:4F:FC:AC:D2:D7:40:19:35:0E:81:FE:54:6A:E4

# Fingerprint (SHA1): 27:96:BA:E6:3F:18:01:E2:77:26:1B:A0:D7:77:70:02:8F:20:EE:E4

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Go Daddy Class 2 CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\047\226\272\346\077\030\001\342\167\046\033\240\327\167\160\002
\217\040\356\344
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\221\336\006\045\253\332\375\062\027\014\273\045\027\052\204\147
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157
\040\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040
\104\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145
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\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Starfield Class 2 CA"
#
Issuer: OU=Starfield Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US
Serial Number: 0 (0x0)
Subject: OU=Starfield Class 2 Certification Authority,O="Starfield
Technologies, Inc.",C=US
Not Valid Before: Tue Jun 29 17:39:16 2004
Not Valid After : Thu Jun 29 17:39:16 2034
Fingerprint (SHA-256):
14:65:FA:20:53:97:B8:76:FA:A6:F0:A9:95:8E:55:90:E4:0F:CC:7F:AA:4F:B7:C2:C8:67:75:21:FB:5F:B6:58
Fingerprint (SHA1): AD:7E:1C:28:B0:64:EF:8F:60:03:40:20:14:C3:D0:E3:37:0E:B5:8A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Class 2 CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\045\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151
\145\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023
\051\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163
\040\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\045\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151
\145\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023
\051\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163
\040\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171

```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\017\060\202\002\367\240\003\002\001\002\002\001\000  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061\045  
\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151\145  
\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163\054  
\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023\051  
\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163\040  
\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040  
\101\165\164\150\157\162\151\164\171\060\036\027\015\060\064\060  
\066\062\071\061\067\063\071\061\066\132\027\015\063\064\060\066  
\062\071\061\067\063\071\061\066\132\060\150\061\013\060\011\006  
\003\125\004\006\023\002\125\123\061\045\060\043\006\003\125\004  
\012\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143  
\150\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061  
\062\060\060\006\003\125\004\013\023\051\123\164\141\162\146\151  
\145\154\144\040\103\154\141\163\163\040\062\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\060\202\001\040\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\001\015\000\060\202\001\010\002  
\202\001\001\000\267\062\310\376\351\161\246\004\205\255\014\021  
\144\337\316\115\357\310\003\030\207\077\241\253\373\074\246\237  
\360\303\241\332\324\330\156\053\123\220\373\044\244\076\204\360  
\236\350\137\354\345\047\104\365\050\246\077\173\336\340\052\360  
\310\257\123\057\236\312\005\001\223\036\217\146\034\071\247\115  
\372\132\266\163\004\045\146\353\167\177\347\131\306\112\231\045  
\024\124\353\046\307\363\177\031\325\060\160\217\257\260\106\052  
\377\255\353\051\355\327\237\252\004\207\243\324\371\211\245\064  
\137\333\103\221\202\066\331\146\074\261\270\271\202\375\234\072  
\076\020\310\073\357\006\145\146\172\233\031\030\075\377\161\121  
\074\060\056\137\276\075\167\163\262\135\006\154\303\043\126\232  
\053\205\046\222\034\247\002\263\344\077\015\257\010\171\202\270  
\066\075\352\234\323\065\263\274\151\312\365\314\235\350\375\144  
\215\027\200\063\156\136\112\135\231\311\036\207\264\235\032\300  
\325\156\023\065\043\136\337\233\137\075\357\326\367\166\302\352  
\076\273\170\015\034\102\147\153\004\330\370\326\332\157\213\362  
\104\240\001\253\002\001\003\243\201\305\060\201\302\060\035\006  
\003\125\035\016\004\026\004\024\277\137\267\321\316\335\037\206  
\364\133\125\254\334\327\020\302\016\251\210\347\060\201\222\006  
\003\125\035\043\004\201\212\060\201\207\200\024\277\137\267\321  
\316\335\037\206\364\133\125\254\334\327\020\302\016\251\210\347  
\241\154\244\152\060\150\061\013\060\011\006\003\125\004\006\023  
\002\125\123\061\045\060\043\006\003\125\004\012\023\034\123\164  
\141\162\146\151\145\154\144\040\124\145\143\150\156\157\154\157

```
\147\151\145\163\054\040\111\156\143\056\061\062\060\060\006\003
\125\004\013\023\051\123\164\141\162\146\151\145\154\144\040\103
\154\141\163\163\040\062\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\202\001
\000\060\014\006\003\125\035\023\004\005\060\003\001\001\377\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\001\001\000\005\235\077\210\235\321\311\032\125\241\254\151\363
\363\131\332\233\001\207\032\117\127\251\241\171\011\052\333\367
\057\262\036\314\307\136\152\330\203\207\241\227\357\111\065\076
\167\006\101\130\142\277\216\130\270\012\147\077\354\263\335\041
\146\037\311\124\372\162\314\075\114\100\330\201\257\167\236\203
\172\273\242\307\365\064\027\216\331\021\100\364\374\054\052\115
\025\177\247\142\135\056\045\323\000\013\040\032\035\150\371\027
\270\364\275\213\355\050\131\335\115\026\213\027\203\310\262\145
\307\055\172\245\252\274\123\206\155\335\127\244\312\370\040\101
\013\150\360\364\373\164\276\126\135\172\171\365\371\035\205\343
\055\225\276\365\161\220\103\314\215\037\232\000\012\207\051\351
\125\042\130\000\043\352\343\022\103\051\133\107\010\335\214\101
\152\145\006\250\345\041\252\101\264\225\041\225\271\175\321\064
\253\023\326\255\274\334\342\075\071\315\275\076\165\160\241\030
\131\003\311\042\264\217\234\325\136\052\327\245\266\324\012\155
\370\267\100\021\106\232\037\171\016\142\277\017\227\354\340\057
\037\027\224
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Starfield Class 2 CA"

# Issuer: OU=Starfield

Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US

# Serial Number: 0 (0x0)

# Subject: OU=Starfield Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US

# Not Valid Before: Tue Jun 29 17:39:16 2004

# Not Valid After : Thu Jun 29 17:39:16 2034

# Fingerprint (SHA-256):

14:65:FA:20:53:97:B8:76:FA:A6:F0:A9:95:8E:55:90:E4:0F:CC:7F:AA:4F:B7:C2:C8:67:75:21:FB:5F:B6:58

# Fingerprint (SHA1): AD:7E:1C:28:B0:64:EF:8F:60:03:40:20:14:C3:D0:E3:37:0E:B5:8A

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Starfield Class 2 CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\255\176\034\050\260\144\357\217\140\003\100\040\024\303\320\343
\067\016\265\212
```

END

```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\062\112\113\273\310\143\151\233\276\164\232\306\335\035\106\044
END
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\045\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151
\145\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023
\051\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163
\040\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "DigiCert Assured ID Root CA"
#
Issuer: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
Serial Number:0c:e7:e0:e5:17:d8:46:fe:8f:e5:60:fc:1b:f0:30:39
Subject: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
Not Valid Before: Fri Nov 10 00:00:00 2006
Not Valid After : Mon Nov 10 00:00:00 2031
Fingerprint (SHA-256):
3E:90:99:B5:01:5E:8F:48:6C:00:BC:EA:9D:11:1E:E7:21:FA:BA:35:5A:89:BC:F1:DF:69:56:1E:3D:C6:32:5C
Fingerprint (SHA1): 05:63:B8:63:0D:62:D7:5A:BB:C8:AB:1E:4B:DF:B5:A8:99:B2:4D:43
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"

```

CKA\_ISSUER MULTILINE\_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145  
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023  
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151  
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040  
\122\157\157\164\040\103\101

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\014\347\340\345\027\330\106\376\217\345\140\374\033\360  
\060\071

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\267\060\202\002\237\240\003\002\001\002\002\020\014  
\347\340\345\027\330\106\376\217\345\140\374\033\360\060\071\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\145  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060  
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164  
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167  
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061  
\044\060\042\006\003\125\004\003\023\033\104\151\147\151\103\145  
\162\164\040\101\163\163\165\162\145\144\040\111\104\040\122\157  
\157\164\040\103\101\060\036\027\015\060\066\061\061\061\060\060  
\060\060\060\060\060\132\027\015\063\061\061\061\061\060\060\060  
\060\060\060\060\132\060\145\061\013\060\011\006\003\125\004\006  
\023\002\125\123\061\025\060\023\006\003\125\004\012\023\014\104  
\151\147\151\103\145\162\164\040\111\156\143\061\031\060\027\006  
\003\125\004\013\023\020\167\167\167\056\144\151\147\151\143\145  
\162\164\056\143\157\155\061\044\060\042\006\003\125\004\003\023  
\033\104\151\147\151\103\145\162\164\040\101\163\163\165\162\145  
\144\040\111\104\040\122\157\157\164\040\103\101\060\202\001\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\001\017\000\060\202\001\012\002\202\001\001\000\255\016\025  
\316\344\103\200\134\261\207\363\267\140\371\161\022\245\256\334  
\046\224\210\252\364\316\365\040\071\050\130\140\014\370\200\332  
\251\025\225\062\141\074\265\261\050\204\212\212\334\237\012\014  
\203\027\172\217\220\254\212\347\171\123\134\061\204\052\366\017  
\230\062\066\166\314\336\335\074\250\242\357\152\373\041\362\122  
\141\337\237\040\327\037\342\261\331\376\030\144\322\022\133\137  
\371\130\030\065\274\107\315\241\066\371\153\177\324\260\070\076  
\301\033\303\214\063\331\330\057\030\376\050\017\263\247\203\326  
\303\156\104\300\141\065\226\026\376\131\234\213\166\155\327\361  
\242\113\015\053\377\013\162\332\236\140\320\216\220\065\306\170  
\125\207\040\241\317\345\155\012\310\111\174\061\230\063\154\042  
\351\207\320\062\132\242\272\023\202\021\355\071\027\235\231\072  
\162\241\346\372\244\331\325\027\061\165\256\205\175\042\256\077

\001\106\206\366\050\171\310\261\332\344\127\027\304\176\034\016  
\260\264\222\246\126\263\275\262\227\355\252\247\360\267\305\250  
\077\225\026\320\377\241\226\353\010\137\030\167\117\002\003\001  
\000\001\243\143\060\141\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\105\353\242\257\364\222\313\202\061\055\121\213\247\247  
\041\235\363\155\310\017\060\037\006\003\125\035\043\004\030\060  
\026\200\024\105\353\242\257\364\222\313\202\061\055\121\213\247  
\247\041\235\363\155\310\017\060\015\006\011\052\206\110\206\367  
\015\001\001\005\005\000\003\202\001\001\000\242\016\274\337\342  
\355\360\343\162\163\172\144\224\277\367\162\146\330\062\344\102  
\165\142\256\207\353\362\325\331\336\126\263\237\314\316\024\050  
\271\015\227\140\134\022\114\130\344\323\075\203\111\105\130\227  
\065\151\032\250\107\352\126\306\171\253\022\330\147\201\204\337  
\177\011\074\224\346\270\046\054\040\275\075\263\050\211\367\137  
\377\042\342\227\204\037\351\145\357\207\340\337\301\147\111\263  
\135\353\262\011\052\353\046\355\170\276\175\077\053\363\267\046  
\065\155\137\211\001\266\111\133\237\001\005\233\253\075\045\301  
\314\266\177\302\361\157\206\306\372\144\150\353\201\055\224\353  
\102\267\372\214\036\335\142\361\276\120\147\267\154\275\363\361  
\037\153\014\066\007\026\177\067\174\251\133\155\172\361\022\106  
\140\203\327\047\004\276\113\316\227\276\303\147\052\150\021\337  
\200\347\014\063\146\277\023\015\024\156\363\177\037\143\020\036  
\372\215\033\045\155\154\217\245\267\141\001\261\322\243\046\241  
\020\161\235\255\342\303\371\303\231\121\267\053\007\010\316\056  
\346\120\262\247\372\012\105\057\242\360\362

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert Assured ID Root CA"

# Issuer: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

# Serial Number:0c:e7:e0:e5:17:d8:46:fe:8f:e5:60:fc:1b:f0:30:39

# Subject: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

# Not Valid Before: Fri Nov 10 00:00:00 2006

# Not Valid After : Mon Nov 10 00:00:00 2031

# Fingerprint (SHA-256):

3E:90:99:B5:01:5E:8F:48:6C:00:BC:EA:9D:11:1E:E7:21:FA:BA:35:5A:89:BC:F1:DF:69:56:1E:3D:C6:32:5C

# Fingerprint (SHA1): 05:63:B8:63:0D:62:D7:5A:BB:C8:AB:1E:4B:DF:B5:A8:99:B2:4D:43

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert Assured ID Root CA"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\005\143\270\143\015\142\327\132\273\310\253\036\113\337\265\250
\231\262\115\103
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\207\316\013\173\052\016\111\000\341\130\161\233\067\250\223\162
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\014\347\340\345\027\330\106\376\217\345\140\374\033\360
\060\071
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "DigiCert Global Root CA"
#
Issuer: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
Serial Number:08:3b:e0:56:90:42:46:b1:a1:75:6a:c9:59:91:c7:4a
Subject: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
Not Valid Before: Fri Nov 10 00:00:00 2006
Not Valid After : Mon Nov 10 00:00:00 2031
Fingerprint (SHA-256):
43:48:A0:E9:44:4C:78:CB:26:5E:05:8D:5E:89:44:B4:D8:4F:96:62:BD:26:DB:25:7F:89:34:A4:43:C7:01:61
Fingerprint (SHA1): A8:98:5D:3A:65:E5:E5:C4:B2:D7:D6:6D:40:C6:DD:2F:B1:9C:54:36
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023

```

\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151  
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164  
\040\103\101

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145  
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023  
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151  
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164  
\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\010\073\340\126\220\102\106\261\241\165\152\311\131\221  
\307\112

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\003\257\060\202\002\227\240\003\002\001\002\002\020\010  
\073\340\126\220\102\106\261\241\165\152\311\131\221\307\112\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\141  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060  
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164  
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167  
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061  
\040\060\036\006\003\125\004\003\023\027\104\151\147\151\103\145  
\162\164\040\107\154\157\142\141\154\040\122\157\157\164\040\103  
\101\060\036\027\015\060\066\061\061\061\060\060\060\060\060\060  
\060\132\027\015\063\061\061\061\061\060\060\060\060\060\060\060  
\132\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103  
\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013  
\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143  
\157\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147  
\151\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157  
\164\040\103\101\060\202\001\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012  
\002\202\001\001\000\342\073\341\021\162\336\250\244\323\243\127  
\252\120\242\217\013\167\220\311\242\245\356\022\316\226\133\001  
\011\040\314\001\223\247\116\060\267\123\367\103\304\151\000\127  
\235\342\215\042\335\207\006\100\000\201\011\316\316\033\203\277  
\337\315\073\161\106\342\326\146\307\005\263\166\047\026\217\173  
\236\036\225\175\356\267\110\243\010\332\326\257\172\014\071\006  
\145\177\112\135\037\274\027\370\253\276\356\050\327\164\177\172  
\170\231\131\205\150\156\134\043\062\113\277\116\300\350\132\155



\343\160\277\167\020\277\374\001\366\205\331\250\104\020\130\062  
\251\165\030\325\321\242\276\107\342\047\152\364\232\063\370\111  
\010\140\213\324\137\264\072\204\277\241\252\112\114\175\076\317  
\117\137\154\166\136\240\113\067\221\236\334\042\346\155\316\024  
\032\216\152\313\376\315\263\024\144\027\307\133\051\236\062\277  
\362\356\372\323\013\102\324\253\267\101\062\332\014\324\357\370  
\201\325\273\215\130\077\265\033\350\111\050\242\160\332\061\004  
\335\367\262\026\362\114\012\116\007\250\355\112\075\136\265\177  
\243\220\303\257\047\002\003\001\000\001\243\143\060\141\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\035\006\003\125\035\016\004\026\004\024\003\336\120\065\126\321  
\114\273\146\360\243\342\033\033\303\227\262\075\321\125\060\037  
\006\003\125\035\043\004\030\060\026\200\024\003\336\120\065\126  
\321\114\273\146\360\243\342\033\033\303\227\262\075\321\125\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202  
\001\001\000\313\234\067\252\110\023\022\012\372\335\104\234\117  
\122\260\364\337\256\004\365\171\171\010\243\044\030\374\113\053  
\204\300\055\271\325\307\376\364\301\037\130\313\270\155\234\172  
\164\347\230\051\253\021\265\343\160\240\241\315\114\210\231\223  
\214\221\160\342\253\017\034\276\223\251\377\143\325\344\007\140  
\323\243\277\235\133\011\361\325\216\343\123\364\216\143\372\077  
\247\333\264\146\337\142\146\326\321\156\101\215\362\055\265\352  
\167\112\237\235\130\342\053\131\300\100\043\355\055\050\202\105  
\076\171\124\222\046\230\340\200\110\250\067\357\360\326\171\140  
\026\336\254\350\016\315\156\254\104\027\070\057\111\332\341\105  
\076\052\271\066\123\317\072\120\006\367\056\350\304\127\111\154  
\141\041\030\325\004\255\170\074\054\072\200\153\247\353\257\025  
\024\351\330\211\301\271\070\154\342\221\154\212\377\144\271\167  
\045\127\060\300\033\044\243\341\334\351\337\107\174\265\264\044  
\010\005\060\354\055\275\013\277\105\277\120\271\251\363\353\230  
\001\022\255\310\210\306\230\064\137\215\012\074\306\351\325\225  
\225\155\336

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER

CK\_BBOOL CK\_FALSE

# Trust for "DigiCert Global Root CA"

# Issuer: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

# Serial Number:08:3b:e0:56:90:42:46:b1:a1:75:6a:c9:59:91:c7:4a

# Subject: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

# Not Valid Before: Fri Nov 10 00:00:00 2006

# Not Valid After : Mon Nov 10 00:00:00 2031

# Fingerprint (SHA-256):

43:48:A0:E9:44:4C:78:CB:26:5E:05:8D:5E:89:44:B4:D8:4F:96:62:BD:26:DB:25:7F:89:34:A4:43:C7:01:61

```

Fingerprint (SHA1): A8:98:5D:3A:65:E5:E5:C4:B2:D7:D6:6D:40:C6:DD:2F:B1:9C:54:36
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\250\230\135\072\145\345\345\304\262\327\326\155\100\306\335\057
\261\234\124\066
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\171\344\251\204\015\175\072\226\327\300\117\342\103\114\211\056
END
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\010\073\340\126\220\102\106\261\241\165\152\311\131\221
\307\112
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "DigiCert High Assurance EV Root CA"
#
Issuer: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
Serial Number:02:ac:5c:26:6a:0b:40:9b:8f:0b:79:f2:ae:46:25:77
Subject: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert
Inc,C=US
Not Valid Before: Fri Nov 10 00:00:00 2006
Not Valid After : Mon Nov 10 00:00:00 2031
Fingerprint (SHA-256):
74:31:E5:F4:C3:C1:CE:46:90:77:4F:0B:61:E0:54:40:88:3B:A9:A0:1E:D0:0B:A6:AB:D7:80:6E:D3:B1:18:CF
Fingerprint (SHA1): 5F:B7:EE:06:33:E2:59:DB:AD:0C:4C:9A:E6:D3:8F:1A:61:C7:DC:25
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

```
CKA_LABEL UTF8 "DigiCert High Assurance EV Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\053\060\051\006\003\125\004\003\023\042\104\151\147\151
\103\145\162\164\040\110\151\147\150\040\101\163\163\165\162\141
\156\143\145\040\105\126\040\122\157\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\053\060\051\006\003\125\004\003\023\042\104\151\147\151
\103\145\162\164\040\110\151\147\150\040\101\163\163\165\162\141
\156\143\145\040\105\126\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\002\254\134\046\152\013\100\233\217\013\171\362\256\106
\045\167
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\305\060\202\002\255\240\003\002\001\002\002\020\002
\254\134\046\152\013\100\233\217\013\171\362\256\106\045\167\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\154
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\053\060\051\006\003\125\004\003\023\042\104\151\147\151\103\145
\162\164\040\110\151\147\150\040\101\163\163\165\162\141\156\143
\145\040\105\126\040\122\157\157\164\040\103\101\060\036\027\015
\060\066\061\061\061\060\060\060\060\060\060\060\132\027\015\063
\061\061\061\061\060\060\060\060\060\060\060\132\060\154\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006
\003\125\004\012\023\014\104\151\147\151\103\145\162\164\040\111
\156\143\061\031\060\027\006\003\125\004\013\023\020\167\167\167
\056\144\151\147\151\143\145\162\164\056\143\157\155\061\053\060
\051\006\003\125\004\003\023\042\104\151\147\151\103\145\162\164
\040\110\151\147\150\040\101\163\163\165\162\141\156\143\145\040
\105\126\040\122\157\157\164\040\103\101\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\306\314\345\163\346
```

\373\324\273\345\055\055\062\246\337\345\201\077\311\315\045\111  
\266\161\052\303\325\224\064\147\242\012\034\260\137\151\246\100  
\261\304\267\262\217\320\230\244\251\101\131\072\323\334\224\326  
\074\333\164\070\244\112\314\115\045\202\367\112\245\123\022\070  
\356\363\111\155\161\221\176\143\266\253\246\137\303\244\204\370  
\117\142\121\276\370\305\354\333\070\222\343\006\345\010\221\014  
\304\050\101\125\373\313\132\211\025\176\161\350\065\277\115\162  
\011\075\276\072\070\120\133\167\061\033\215\263\307\044\105\232  
\247\254\155\000\024\132\004\267\272\023\353\121\012\230\101\101  
\042\116\145\141\207\201\101\120\246\171\134\211\336\031\112\127  
\325\056\346\135\034\123\054\176\230\315\032\006\026\244\150\163  
\320\064\004\023\134\241\161\323\132\174\125\333\136\144\341\067  
\207\060\126\004\345\021\264\051\200\022\361\171\071\210\242\002  
\021\174\047\146\267\210\267\170\362\312\012\250\070\253\012\144  
\302\277\146\135\225\204\301\241\045\036\207\135\032\120\013\040  
\022\314\101\273\156\013\121\070\270\113\313\002\003\001\000\001  
\243\143\060\141\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024  
\261\076\303\151\003\370\277\107\001\324\230\046\032\010\002\357  
\143\144\053\303\060\037\006\003\125\035\043\004\030\060\026\200  
\024\261\076\303\151\003\370\277\107\001\324\230\046\032\010\002  
\357\143\144\053\303\060\015\006\011\052\206\110\206\367\015\001  
\001\005\005\000\003\202\001\001\000\034\032\006\227\334\327\234  
\237\074\210\146\006\010\127\041\333\041\107\370\052\147\252\277  
\030\062\166\100\020\127\301\212\363\172\331\021\145\216\065\372  
\236\374\105\265\236\331\114\061\113\270\221\350\103\054\216\263  
\170\316\333\343\123\171\161\326\345\041\224\001\332\125\207\232  
\044\144\366\212\146\314\336\234\067\315\250\064\261\151\233\043  
\310\236\170\042\053\160\103\343\125\107\061\141\031\357\130\305  
\205\057\116\060\366\240\061\026\043\310\347\342\145\026\063\313  
\277\032\033\240\075\370\312\136\213\061\213\140\010\211\055\014  
\006\134\122\267\304\371\012\230\321\025\137\237\022\276\174\066  
\143\070\275\104\244\177\344\046\053\012\304\227\151\015\351\214  
\342\300\020\127\270\310\166\022\221\125\362\110\151\330\274\052  
\002\133\017\104\324\040\061\333\364\272\160\046\135\220\140\236  
\274\113\027\011\057\264\313\036\103\150\311\007\047\301\322\134  
\367\352\041\271\150\022\234\074\234\277\236\374\200\134\233\143  
\315\354\107\252\045\047\147\240\067\363\000\202\175\124\327\251  
\370\351\056\023\243\167\350\037\112

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert High Assurance EV Root CA"

# Issuer: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

```

Serial Number:02:ac:5c:26:6a:0b:40:9b:8f:0b:79:f2:ae:46:25:77
Subject: CN=DigiCert High Assurance EV
 Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
Not Valid Before: Fri Nov 10 00:00:00 2006
Not Valid After : Mon Nov 10 00:00:00 2031
Fingerprint (SHA-256):
74:31:E5:F4:C3:C1:CE:46:90:77:4F:0B:61:E0:54:40:88:3B:A9:A0:1E:D0:0B:A6:AB:D7:80:6E:D3:B1:18:CF
Fingerprint (SHA1): 5F:B7:EE:06:33:E2:59:DB:AD:0C:4C:9A:E6:D3:8F:1A:61:C7:DC:25
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert High Assurance EV Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\137\267\356\006\063\342\131\333\255\014\114\232\346\323\217\032
\141\307\334\045
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\324\164\336\127\134\071\262\323\234\205\203\305\300\145\111\212
END
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\053\060\051\006\003\125\004\003\023\042\104\151\147\151
\103\145\162\164\040\110\151\147\150\040\101\163\163\165\162\141
\156\143\145\040\105\126\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\002\254\134\046\152\013\100\233\217\013\171\362\256\106
\045\167
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "SwissSign Gold CA - G2"
#
Issuer: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH
Serial Number:00:bb:40:1c:43:f5:5e:4f:b0
Subject: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH
Not Valid Before: Wed Oct 25 08:30:35 2006
Not Valid After : Sat Oct 25 08:30:35 2036
Fingerprint (SHA-256):

```

62:DD:0B:E9:B9:F5:0A:16:3E:A0:F8:E7:5C:05:3B:1E:CA:57:EA:55:C8:68:8F:64:7C:68:81:F2:C8:35:7B:95

# Fingerprint (SHA1): D8:C5:38:8A:B7:30:1B:1B:6E:D4:7A:E6:45:25:3A:6F:9F:1A:27:61

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SwissSign Gold CA - G2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\105\061\013\060\011\006\003\125\004\006\023\002\103\110\061  
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123  
\151\147\156\040\101\107\061\037\060\035\006\003\125\004\003\023  
\026\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040  
\103\101\040\055\040\107\062

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\105\061\013\060\011\006\003\125\004\006\023\002\103\110\061  
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123  
\151\147\156\040\101\107\061\037\060\035\006\003\125\004\003\023  
\026\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040  
\103\101\040\055\040\107\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\011\000\273\100\034\103\365\136\117\260

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\005\272\060\202\003\242\240\003\002\001\002\002\011\000  
\273\100\034\103\365\136\117\260\060\015\006\011\052\206\110\206  
\367\015\001\001\005\005\000\060\105\061\013\060\011\006\003\125  
\004\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023  
\014\123\167\151\163\163\123\151\147\156\040\101\107\061\037\060  
\035\006\003\125\004\003\023\026\123\167\151\163\163\123\151\147  
\156\040\107\157\154\144\040\103\101\040\055\040\107\062\060\036  
\027\015\060\066\061\060\062\065\060\070\063\060\063\065\132\027  
\015\063\066\061\060\062\065\060\070\063\060\063\065\132\060\105  
\061\013\060\011\006\003\125\004\006\023\002\103\110\061\025\060  
\023\006\003\125\004\012\023\014\123\167\151\163\163\123\151\147  
\156\040\101\107\061\037\060\035\006\003\125\004\003\023\026\123  
\167\151\163\163\123\151\147\156\040\107\157\154\144\040\103\101  
\040\055\040\107\062\060\202\002\042\060\015\006\011\052\206\110  
\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002  
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\155\272\201\034\176\102\214\040\065\331\103\115\204\372\204\333  
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\335\265\231\144\123\270\240\226\263\157\342\046\167\221\214\340  
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\014\013\174\013\214\101\327\271\351\335\214\210\367\243\115\262  
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\057\162\145\160\157\163\151\164\157\162\171\056\163\167\151\163  
\163\163\151\147\156\056\143\157\155\057\060\015\006\011\052\206  
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\343\224\174\361\256\300\336\027\346\345\330\325\365\124\260\203  
\364\273\315\136\005\173\117\237\165\146\257\074\350\126\176\374  
\162\170\070\003\331\053\142\033\000\271\370\351\140\315\314\316  
\121\212\307\120\061\156\341\112\176\030\057\151\131\266\075\144  
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\064\035\062\172\011\126\247\174\045\066\251\075\113\332\300\202  
\157\012\273\022\310\207\113\047\021\371\036\055\307\223\077\236  
\333\137\046\153\122\331\056\212\361\024\306\104\215\025\251\267  
\277\275\336\246\032\356\256\055\373\110\167\027\376\273\354\257  
\030\365\052\121\360\071\204\227\225\154\156\033\303\053\304\164  
\140\171\045\260\012\047\337\337\136\322\071\317\105\175\102\113  
\337\263\054\036\305\306\135\312\125\072\240\234\151\232\217\332  
\357\262\260\074\237\207\154\022\053\145\160\025\122\061\032\044  
\317\157\061\043\120\037\214\117\217\043\303\164\101\143\034\125  
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\255\222\244\044\240\301\206\265\112\023\152\107\317\056\013\126  
\225\124\313\316\232\333\152\264\246\262\333\101\010\206\047\167  
\367\152\240\102\154\013\070\316\327\165\120\062\222\302\337\053  
\060\042\110\320\325\101\070\045\135\244\351\135\237\306\224\165  
\320\105\375\060\227\103\217\220\253\012\307\206\163\140\112\151  
\055\336\245\170\327\006\332\152\236\113\076\167\072\040\023\042  
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\223\340\177\043\263\125\255\162\045\116\106\371\322\026\357\260  
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\270\344\102\341\070\065\026\364\310\156\117\367\201\126\350\272  
\243\276\043\257\256\375\157\003\340\002\073\060\166\372\033\155  
\101\317\001\261\351\270\311\146\364\333\046\363\072\244\164\362  
\111\044\133\311\260\320\127\301\372\076\172\341\227\311

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "SwissSign Gold CA - G2"

# Issuer: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH

# Serial Number:00:bb:40:1c:43:f5:5e:4f:b0

# Subject: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH

# Not Valid Before: Wed Oct 25 08:30:35 2006

# Not Valid After : Sat Oct 25 08:30:35 2036

# Fingerprint (SHA-256):

62:DD:0B:E9:B9:F5:0A:16:3E:A0:F8:E7:5C:05:3B:1E:CA:57:EA:55:C8:68:8F:64:7C:68:81:F2:C8:35:7B:95

# Fingerprint (SHA1): D8:C5:38:8A:B7:30:1B:1B:6E:D4:7A:E6:45:25:3A:6F:9F:1A:27:61

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SwissSign Gold CA - G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\330\305\070\212\267\060\033\033\156\324\172\346\105\045\072\157

\237\032\047\141



```

END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\044\167\331\250\221\321\073\372\210\055\302\377\370\315\063\223
END
CKA_ISSUER
MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\037\060\035\006\003\125\004\003\023
\026\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\273\100\034\103\365\136\117\260
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "SwissSign Silver CA - G2"
#
Issuer: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH
Serial Number:4f:1b:d4:2f:54:bb:2f:4b
Subject: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH
Not Valid Before: Wed Oct 25 08:32:46 2006
Not Valid After : Sat Oct 25 08:32:46 2036
Fingerprint (SHA-256):
BE:6C:4D:A2:BB:B9:BA:59:B6:F3:93:97:68:37:42:46:C3:C0:05:99:3F:A9:8F:02:0D:1D:ED:BE:D4:8A:81:D5
#
Fingerprint (SHA1): 9B:AA:E5:9F:56:EE:21:CB:43:5A:BE:25:93:DF:A7:F0:40:D1:1D:CB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Silver CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023
\030\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\103\101\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061

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\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123  
\151\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023  
\030\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145  
\162\040\103\101\040\055\040\107\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\010\117\033\324\057\124\273\057\113

END

CKA\_VALUE MULTILINE\_OCTAL

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\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014  
\123\167\151\163\163\123\151\147\156\040\101\107\061\041\060\037  
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\040\123\151\154\166\145\162\040\103\101\040\055\040\107\062\060  
\036\027\015\060\066\061\060\062\065\060\070\063\062\064\066\132  
\027\015\063\066\061\060\062\065\060\070\063\062\064\066\132\060  
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\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123\151  
\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023\030  
\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145\162  
\040\103\101\040\055\040\107\062\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\304\361\207\177\323\170\061  
\367\070\311\370\303\231\103\274\307\367\274\067\347\116\161\272  
\113\217\245\163\035\134\156\230\256\003\127\256\070\067\103\057  
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\350\004\312\357\152\061\207\324\300\266\371\224\161\173\147\144  
\270\266\221\112\102\173\145\056\060\152\014\365\220\356\225\346  
\362\315\202\354\331\241\112\354\366\262\113\345\105\205\346\155  
\170\223\004\056\234\202\155\066\251\304\061\144\037\206\203\013  
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\141\250\006\204\271\050\172\137\070\331\033\251\070\260\203\177  
\163\301\303\073\110\052\202\017\041\233\270\314\250\065\303\204  
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\062\200\140\263\223\300\052\266\030\013\235\176\215\111\362\020  
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\167\151\163\163\163\151\147\156\056\143\157\155\057\060\015\006  
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\172\155\131\251\052\217\173\336\303\207\211\020\231\111\163\170  
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\045\270\232\132\075\162\141\220\146\207\356\014\326\115\324\021  
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\207\232\240\244\145\154\114\011\014\211\272\270\323\271\300\223

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\000\275\252\363\116\006\243\172\152\371\142\162\343\011\117\353
\233\016\001\043\361\237\273\174\334\334\154\021\227\045\262\362
\264\143\024\322\006\052\147\214\203\365\316\352\007\330\232\152
\036\354\344\012\273\052\114\353\011\140\071\316\312\142\330\056
\156
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "SwissSign Silver CA - G2"

# Issuer: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH

# Serial Number:4f:1b:d4:2f:54:bb:2f:4b

# Subject: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH

# Not Valid Before: Wed Oct 25 08:32:46 2006

# Not Valid After : Sat Oct 25 08:32:46 2036

# Fingerprint (SHA-256):

BE:6C:4D:A2:BB:B9:BA:59:B6:F3:93:97:68:37:42:46:C3:C0:05:99:3F:A9:8F:02:0D:1D:ED:BE:D4:8A:81:D5

# Fingerprint (SHA1): 9B:AA:E5:9F:56:EE:21:CB:43:5A:BE:25:93:DF:A7:F0:40:D1:1D:CB

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SwissSign Silver CA - G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\233\252\345\237\126\356\041\313\103\132\276\045\223\337\247\360
\100\321\035\313
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\340\006\241\311\175\317\311\374\015\300\126\165\226\330\142\023
END
```

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023
\030\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\103\101\040\055\040\107\062
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\010\117\033\324\057\124\273\057\113
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "SecureTrust CA"

#

# Issuer: CN=SecureTrust CA,O=SecureTrust Corporation,C=US

# Serial Number:0c:f0:8e:5c:08:16:a5:ad:42:7f:f0:eb:27:18:59:d0

# Subject: CN=SecureTrust CA,O=SecureTrust

Corporation,C=US

# Not Valid Before: Tue Nov 07 19:31:18 2006

# Not Valid After : Mon Dec 31 19:40:55 2029

# Fingerprint (SHA-256):

F1:C1:B5:0A:E5:A2:0D:D8:03:0E:C9:F6:BC:24:82:3D:D3:67:B5:25:57:59:B4:E7:1B:61:FC:E9:F7:37:5D:73

# Fingerprint (SHA1): 87:82:C6:C3:04:35:3B:CF:D2:96:92:D2:59:3E:7D:44:D9:34:FF:11

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SecureTrust CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\125\123\061

\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145

\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157

\156\061\027\060\025\006\003\125\004\003\023\016\123\145\143\165

\162\145\124\162\165\163\164\040\103\101

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\125\123\061

\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145

\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157

\156\061\027\060\025\006\003\125\004\003\023\016\123\145\143\165

\162\145\124\162\165\163\164\040\103\101

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\014\360\216\134\010\026\245\255\102\177\360\353\047\030

\131\320

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\270\060\202\002\240\240\003\002\001\002\002\020\014

\360\216\134\010\026\245\255\102\177\360\353\047\030\131\320\060

\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\110

\061\013\060\011\006\003\125\004\006\023\002\125\123\061\040\060

\036\006\003\125\004\012\023\027\123\145\143\165\162\145\124\162

\165\163\164\040\103\157\162\160\157\162\141\164\151\157\156\061

\027\060\025\006\003\125\004\003\023\016\123\145\143\165\162\145

\124\162\165\163\164\040\103\101\060\036\027\015\060\066\061\061  
\060\067\061\071\063\061\061\070\132\027\015\062\071\061\062\063  
\061\061\071\064\060\065\065\132\060\110\061\013\060\011\006\003  
\125\004\006\023\002\125\123\061\040\060\036\006\003\125\004\012  
\023\027\123\145\143\165\162\145\124\162\165\163\164\040\103\157  
\162\160\157\162\141\164\151\157\156\061\027\060\025\006\003\125  
\004\003\023\016\123\145\143\165\162\145\124\162\165\163\164\040  
\103\101\060\202\001\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202  
\001\001\000\253\244\201\345\225\315\365\366\024\216\302\117\312  
\324\342\170\225\130\234\101\341\015\231\100\044\027\071\221\063  
\146\351\276\341\203\257\142\134\211\321\374\044\133\141\263\340  
\021\021\101\034\035\156\360\270\273\370\336\247\201\272\246\110  
\306\237\035\275\276\216\251\101\076\270\224\355\051\032\324\216  
\322\003\035\003\357\155\015\147\034\127\327\006\255\312\310\365  
\376\016\257\146\045\110\004\226\013\135\243\272\026\303\010\117  
\321\106\370\024\134\362\310\136\001\231\155\375\210\314\206\250  
\301\157\061\102\154\122\076\150\313\363\031\064\337\273\207\030  
\126\200\046\304\320\334\300\157\337\336\240\302\221\026\240\144  
\021\113\104\274\036\366\347\372\143\336\146\254\166\244\161\243  
\354\066\224\150\172\167\244\261\347\016\057\201\172\342\265\162  
\206\357\242\153\213\360\017\333\323\131\077\272\162\274\104\044  
\234\343\163\263\367\257\127\057\102\046\235\251\164\272\000\122  
\362\113\315\123\174\107\013\066\205\016\146\251\010\227\026\064  
\127\301\146\367\200\343\355\160\124\307\223\340\056\050\025\131  
\207\272\273\002\003\001\000\001\243\201\235\060\201\232\060\023  
\006\011\053\006\001\004\001\202\067\024\002\004\006\036\004\000  
\103\000\101\060\013\006\003\125\035\017\004\004\003\002\001\206  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\035\006\003\125\035\016\004\026\004\024\102\062\266\026  
\372\004\375\376\135\113\172\303\375\367\114\100\035\132\103\257  
\060\064\006\003\125\035\037\004\055\060\053\060\051\240\047\240  
\045\206\043\150\164\164\160\072\057\057\143\162\154\056\163\145  
\143\165\162\145\164\162\165\163\164\056\143\157\155\057\123\124  
\103\101\056\143\162\154\060\020\006\011\053\006\001\004\001\202  
\067\025\001\004\003\002\001\000\060\015\006\011\052\206\110\206  
\367\015\001\001\005\005\000\003\202\001\001\000\060\355\117\112  
\341\130\072\122\162\133\265\246\243\145\030\246\273\121\073\167  
\351\235\352\323\237\134\340\105\145\173\015\312\133\342\160\120  
\262\224\005\024\256\111\307\215\101\007\022\163\224\176\014\043  
\041\375\274\020\177\140\020\132\162\365\230\016\254\354\271\177  
\335\172\157\135\323\034\364\377\210\005\151\102\251\005\161\310  
\267\254\046\350\056\264\214\152\377\161\334\270\261\337\231\274  
\174\041\124\053\344\130\242\273\127\051\256\236\251\243\031\046  
\017\231\056\010\260\357\375\151\317\231\032\011\215\343\247\237  
\053\311\066\064\173\044\263\170\114\225\027\244\006\046\036\266  
\144\122\066\137\140\147\331\234\305\005\164\013\347\147\043\322  
\010\374\210\351\256\213\177\341\060\364\067\176\375\306\062\332

```
\055\236\104\060\060\154\356\007\336\322\064\374\322\377\100\366
\113\364\146\106\006\124\246\362\062\012\143\046\060\153\233\321
\334\213\107\272\341\271\325\142\320\242\240\364\147\005\170\051
\143\032\157\004\326\370\306\114\243\232\261\067\264\215\345\050
\113\035\236\054\302\270\150\274\355\002\356\061
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "SecureTrust CA"

# Issuer: CN=SecureTrust CA,O=SecureTrust Corporation,C=US

# Serial Number:0c:f0:8e:5c:08:16:a5:ad:42:7f:f0:eb:27:18:59:d0

# Subject: CN=SecureTrust CA,O=SecureTrust Corporation,C=US

# Not Valid Before: Tue Nov 07 19:31:18 2006

# Not Valid After : Mon Dec 31 19:40:55 2029

# Fingerprint (SHA-256):

F1:C1:B5:0A:E5:A2:0D:D8:03:0E:C9:F6:BC:24:82:3D:D3:67:B5:25:57:59:B4:E7:1B:61:FC:E9:F7:37:5D:73

# Fingerprint (SHA1): 87:82:C6:C3:04:35:3B:CF:D2:96:92:D2:59:3E:7D:44:D9:34:FF:11

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL

CK\_FALSE

CKA\_LABEL UTF8 "SecureTrust CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\207\202\306\303\004\065\073\317\322\226\222\322\131\076\175\104
\331\064\377\021
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\334\062\303\247\155\045\127\307\150\011\235\352\055\251\242\321
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\110\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\027\060\025\006\003\125\004\003\023\016\123\145\143\165
\162\145\124\162\165\163\164\040\103\101
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\020\014\360\216\134\010\026\245\255\102\177\360\353\047\030
\131\320
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

```
#
Certificate "Secure Global CA"
#
Issuer: CN=Secure Global CA,O=SecureTrust
Corporation,C=US
Serial Number:07:56:22:a4:e8:d4:8a:89:4d:f4:13:c8:f0:f8:ea:a5
Subject: CN=Secure Global CA,O=SecureTrust Corporation,C=US
Not Valid Before: Tue Nov 07 19:42:28 2006
Not Valid After : Mon Dec 31 19:52:06 2029
Fingerprint (SHA-256):
42:00:F5:04:3A:C8:59:0E:BB:52:7D:20:9E:D1:50:30:29:FB:CB:D4:1C:A1:B5:06:EC:27:F1:5A:DE:7D:AC:69
Fingerprint (SHA1): 3A:44:73:5A:E5:81:90:1F:24:86:61:46:1E:3B:9C:C4:5F:F5:3A:1B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Secure Global CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\031\060\027\006\003\125\004\003\023\020\123\145\143\165
\162\145\040\107\154\157\142\141\154\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\031\060\027\006\003\125\004\003\023\020\123\145\143\165
\162\145\040\107\154\157\142\141\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\007\126\042\244\350\324\212\211\115\364\023\310\360\370
\352\245
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\274\060\202\002\244\240\003\002\001\002\002\020\007
\126\042\244\350\324\212\211\115\364\023\310\360\370\352\245\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\112
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\040\060
\036\006\003\125\004\012\023\027\123\145\143\165\162\145\124\162
\165\163\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\031\060\027\006\003\125\004\003\023\020\123\145\143\165\162\145
\040\107\154\157\142\141\154\040\103\101\060\036\027\015\060\066
```



\061\061\060\067\061\071\064\062\062\070\132\027\015\062\071\061  
\062\063\061\061\071\065\062\060\066\132\060\112\061\013\060\011  
\006\003\125\004\006\023\002\125\123\061\040\060\036\006\003\125  
\004\012\023\027\123\145\143\165\162\145\124\162\165\163\164\040  
\103\157\162\160\157\162\141\164\151\157\156\061\031\060\027\006  
\003\125\004\003\023\020\123\145\143\165\162\145\040\107\154\157  
\142\141\154\040\103\101\060\202\001\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202  
\001\012\002\202\001\001\000\257\065\056\330\254\154\125\151\006  
\161\345\023\150\044\263\117\330\314\041\107\370\361\140\070\211  
\211\003\351\275\352\136\106\123\011\334\134\365\132\350\367\105  
\052\002\353\061\141\327\051\063\114\316\307\174\012\067\176\017  
\272\062\230\341\035\227\257\217\307\334\311\070\226\363\333\032  
\374\121\355\150\306\320\156\244\174\044\321\256\102\310\226\120  
\143\056\340\376\165\376\230\247\137\111\056\225\343\071\063\144  
\216\036\244\137\220\322\147\074\262\331\376\101\271\125\247\011  
\216\162\005\036\213\335\104\205\202\102\320\111\300\035\140\360  
\321\027\054\225\353\366\245\301\222\243\305\302\247\010\140\015  
\140\004\020\226\171\236\026\064\346\251\266\372\045\105\071\310  
\036\145\371\223\365\252\361\122\334\231\230\075\245\206\032\014  
\065\063\372\113\245\004\006\025\034\061\200\357\252\030\153\302  
\173\327\332\316\371\063\040\325\365\275\152\063\055\201\004\373  
\260\134\324\234\243\342\134\035\343\251\102\165\136\173\324\167  
\357\071\124\272\311\012\030\033\022\231\111\057\210\113\375\120  
\142\321\163\347\217\172\103\002\003\001\000\001\243\201\235\060  
\201\232\060\023\006\011\053\006\001\004\001\202\067\024\002\004  
\006\036\004\000\103\000\101\060\013\006\003\125\035\017\004\004  
\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024  
\257\104\004\302\101\176\110\203\333\116\071\002\354\354\204\172  
\346\316\311\244\060\064\006\003\125\035\037\004\055\060\053\060  
\051\240\047\240\045\206\043\150\164\164\160\072\057\057\143\162  
\154\056\163\145\143\165\162\145\164\162\165\163\164\056\143\157  
\155\057\123\107\103\101\056\143\162\154\060\020\006\011\053\006  
\001\004\001\202\067\025\001\004\003\002\001\000\060\015\006\011  
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000  
\143\032\010\100\175\244\136\123\015\167\330\172\256\037\015\013  
\121\026\003\357\030\174\310\343\257\152\130\223\024\140\221\262  
\204\334\210\116\276\071\212\072\363\346\202\211\135\001\067\263  
\253\044\244\025\016\222\065\132\112\104\136\116\127\372\165\316  
\037\110\316\146\364\074\100\046\222\230\154\033\356\044\106\014  
\027\263\122\245\333\245\221\221\317\067\323\157\347\047\010\072  
\116\031\037\072\247\130\134\027\317\171\077\213\344\247\323\046  
\043\235\046\017\130\151\374\107\176\262\320\215\213\223\277\051  
\117\103\151\164\166\147\113\317\007\214\346\002\367\265\341\264  
\103\265\113\055\024\237\371\334\046\015\277\246\107\164\006\330  
\210\321\072\051\060\204\316\322\071\200\142\033\250\307\127\111  
\274\152\125\121\147\025\112\276\065\007\344\325\165\230\067\171

```

\060\024\333\051\235\154\305\151\314\107\125\242\060\367\314\134
\177\302\303\230\034\153\116\026\200\353\172\170\145\105\242\000
\032\257\014\015\125\144\064\110\270\222\271\361\264\120\051\362
\117\043\037\332\154\254\037\104\341\335\043\170\121\133\307\026
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "Secure Global CA"
Issuer: CN=Secure Global CA,O=SecureTrust Corporation,C=US
Serial Number:07:56:22:a4:e8:d4:8a:89:4d:f4:13:c8:f0:f8:ea:a5
Subject: CN=Secure Global CA,O=SecureTrust Corporation,C=US
Not Valid Before: Tue Nov 07 19:42:28 2006
Not Valid After : Mon Dec 31 19:52:06 2029
Fingerprint (SHA-256):
42:00:F5:04:3A:C8:59:0E:BB:52:7D:20:9E:D1:50:30:29:FB:CB:D4:1C:A1:B5:06:EC:27:F1:5A:DE:7D:AC:69
Fingerprint (SHA1): 3A:44:73:5A:E5:81:90:1F:24:86:61:46:1E:3B:9C:C4:5F:F5:3A:1B
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Secure Global CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\072\104\163\132\345\201\220\037\044\206\141\106\036\073\234\304
\137\365\072\033
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\317\364\047\015\324\355\334\145\026\111\155\075\332\277\156\336
END
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\031\060\027\006\003\125\004\003\023\020\123\145\143\165
\162\145\040\107\154\157\142\141\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\007\126\042\244\350\324\212\211\115\364\023\310\360\370
\352\245
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

#
Certificate "COMODO Certification Authority"
#
Issuer: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
Serial Number:4e:81:2d:8a:82:65:e0:0b:02:ee:3e:35:02:46:e5:3d
Subject: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
Not Valid Before: Fri Dec 01 00:00:00 2006
Not Valid After : Mon Dec 31 23:59:59 2029
Fingerprint (SHA-256):
0C:2C:D6:3D:F7:80:6F:A3:99:ED:E8:09:11:6B:57:5B:F8:79:89:F0:65:18:F9:80:8C:86:05:03:17:8B:AF:66
Fingerprint (SHA1): 66:31:BF:9E:F7:4F:9E:B6:C9:D5:A6:0C:BA:6A:BE:D1:F7:BD:EF:7B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\201\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\047\060\045\006
\003\125\004\003\023\036\103\117\115\117\104\117\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\201\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\047\060\045\006
\003\125\004\003\023\036\103\117\115\117\104\117\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\116\201\055\212\202\145\340\013\002\356\076\065\002\106
\345\075

```

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\035\060\202\003\005\240\003\002\001\002\002\020\116  
\201\055\212\202\145\340\013\002\356\076\065\002\106\345\075\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201  
\201\061\013\060\011\006\003\125\004\006\023\002\107\102\061\033  
\060\031\006\003\125\004\010\023\022\107\162\145\141\164\145\162  
\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016\006  
\003\125\004\007\023\007\123\141\154\146\157\162\144\061\032\060  
\030\006\003\125\004\012\023\021\103\117\115\117\104\117\040\103  
\101\040\114\151\155\151\164\145\144\061\047\060\045\006\003\125  
\004\003\023\036\103\117\115\117\104\117\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\060\036\027\015\060\066\061\062\060\061\060\060\060\060  
\060\060\132\027\015\062\071\061\062\063\061\062\063\065\071\065  
\071\132\060\201\201\061\013\060\011\006\003\125\004\006\023\002  
\107\102\061\033\060\031\006\003\125\004\010\023\022\107\162\145  
\141\164\145\162\040\115\141\156\143\150\145\163\164\145\162\061  
\020\060\016\006\003\125\004\007\023\007\123\141\154\146\157\162  
\144\061\032\060\030\006\003\125\004\012\023\021\103\117\115\117  
\104\117\040\103\101\040\114\151\155\151\164\145\144\061\047\060  
\045\006\003\125\004\003\023\036\103\117\115\117\104\117\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\060\202\001\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202  
\001\012\002\202\001\001\000\320\100\213\213\162\343\221\033\367  
\121\301\033\124\004\230\323\251\277\301\346\212\135\073\207\373  
\273\210\316\015\343\057\077\006\226\360\242\051\120\231\256\333  
\073\241\127\260\164\121\161\315\355\102\221\115\101\376\251\310  
\330\152\206\167\104\273\131\146\227\120\136\264\324\054\160\104  
\317\332\067\225\102\151\074\060\304\161\263\122\360\041\115\241  
\330\272\071\174\034\236\243\044\235\362\203\026\230\252\026\174  
\103\233\025\133\267\256\064\221\376\324\142\046\030\106\232\077  
\353\301\371\361\220\127\353\254\172\015\213\333\162\060\152\146  
\325\340\106\243\160\334\150\331\377\004\110\211\167\336\265\351  
\373\147\155\101\351\274\071\275\062\331\142\002\361\261\250\075  
\156\067\234\342\057\342\323\242\046\213\306\270\125\103\210\341  
\043\076\245\322\044\071\152\107\253\000\324\241\263\251\045\376  
\015\077\247\035\272\323\121\301\013\244\332\254\070\357\125\120  
\044\005\145\106\223\064\117\055\215\255\306\324\041\031\322\216  
\312\005\141\161\007\163\107\345\212\031\022\275\004\115\316\116  
\234\245\110\254\273\046\367\002\003\001\000\001\243\201\216\060  
\201\213\060\035\006\003\125\035\016\004\026\004\024\013\130\345  
\213\306\114\025\067\244\100\251\060\251\041\276\107\066\132\126  
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\111\006\003\125\035\037\004\102\060\100\060\076\240  
\074\240\072\206\070\150\164\164\160\072\057\057\143\162\154\056

\143\157\155\157\144\157\143\141\056\143\157\155\057\103\117\115  
\117\104\117\103\145\162\164\151\146\151\143\141\164\151\157\156  
\101\165\164\150\157\162\151\164\171\056\143\162\154\060\015\006  
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001  
\000\076\230\236\233\366\033\351\327\071\267\170\256\035\162\030  
\111\323\207\344\103\202\353\077\311\252\365\250\265\357\125\174  
\041\122\145\371\325\015\341\154\364\076\214\223\163\221\056\002  
\304\116\007\161\157\300\217\070\141\010\250\036\201\012\300\057  
\040\057\101\213\221\334\110\105\274\361\306\336\272\166\153\063  
\310\000\055\061\106\114\355\347\235\317\210\224\377\063\300\126  
\350\044\206\046\270\330\070\070\337\052\153\335\022\314\307\077  
\107\027\114\242\302\006\226\011\326\333\376\077\074\106\101\337  
\130\342\126\017\074\073\301\034\223\065\331\070\122\254\356\310  
\354\056\060\116\224\065\264\044\037\113\170\151\332\362\002\070  
\314\225\122\223\360\160\045\131\234\040\147\304\356\371\213\127  
\141\364\222\166\175\077\204\215\125\267\350\345\254\325\361\365  
\031\126\246\132\373\220\034\257\223\353\345\034\324\147\227\135  
\004\016\276\013\203\246\027\203\271\060\022\240\305\063\025\005  
\271\015\373\307\005\166\343\330\112\215\374\064\027\243\306\041  
\050\276\060\105\061\036\307\170\276\130\141\070\254\073\342\001  
\145

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "COMODO Certification Authority"

# Issuer: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB

# Serial Number:4e:81:2d:8a:82:65:e0:0b:02:ee:3e:35:02:46:e5:3d

# Subject: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB

#

Not Valid Before: Fri Dec 01 00:00:00 2006

# Not Valid After : Mon Dec 31 23:59:59 2029

# Fingerprint (SHA-256):

0C:2C:D6:3D:F7:80:6F:A3:99:ED:E8:09:11:6B:57:5B:F8:79:89:F0:65:18:F9:80:8C:86:05:03:17:8B:AF:66

# Fingerprint (SHA1): 66:31:BF:9E:F7:4F:9E:B6:C9:D5:A6:0C:BA:6A:BE:D1:F7:BD:EF:7B

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "COMODO Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\146\061\277\236\367\117\236\266\311\325\246\014\272\152\276\321  
\367\275\357\173

END

```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\134\110\334\367\102\162\354\126\224\155\034\314\161\065\200\165
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\201\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\047\060\045\006
\003\125\004\003\023\036\103\117\115\117\104\117\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\116\201\055\212\202\145\340\013\002\356\076\065\002\106
\345\075
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "COMODO ECC Certification Authority"
#
Issuer: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
Serial Number: 1f:47:af:aa:62:00:70:50:54:4c:01:9e:9b:63:99:2a
Subject: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
Not Valid Before: Thu Mar 06 00:00:00 2008
Not Valid After : Mon Jan
18 23:59:59 2038
Fingerprint (SHA-256):
17:93:92:7A:06:14:54:97:89:AD:CE:2F:8F:34:F7:F0:B6:6D:0F:3A:E3:A3:B8:4D:21:EC:15:DB:BA:4F:AD:C7
Fingerprint (SHA1): 9F:74:4E:9F:2B:4D:BA:EC:0F:31:2C:50:B6:56:3B:8E:2D:93:C3:11
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO ECC Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060

```

\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061  
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117  
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006  
\003\125\004\003\023\042\103\117\115\117\104\117\040\105\103\103  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102  
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164  
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060  
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061  
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117  
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006  
\003\125\004\003\023\042\103\117\115\117\104\117\040\105\103\103  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\037\107\257\252\142\000\160\120\124\114\001\236\233\143  
\231\052

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\211\060\202\002\017\240\003\002\001\002\002\020\037  
\107\257\252\142\000\160\120\124\114\001\236\233\143\231\052\060  
\012\006\010\052\206\110\316\075\004\003\003\060\201\205\061\013  
\060\011\006\003\125\004\006\023\002\107\102\061\033\060\031\006  
\003\125\004\010\023\022\107\162\145\141\164\145\162\040\115\141  
\156\143\150\145\163\164\145\162\061\020\060\016\006\003\125\004  
\007\023\007\123\141\154\146\157\162\144\061\032\060\030\006\003  
\125\004\012\023\021\103\117\115\117\104\117\040\103\101\040\114  
\151\155\151\164\145\144\061\053\060\051\006\003\125\004\003\023  
\042\103\117\115\117\104\117\040\105\103\103\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\060\036\027\015\060\070\060\063\060\066\060\060\060  
\060\060\060\132\027\015\063\070\060\061\061\070\062\063\065\071  
\065\071\132\060\201\205\061\013\060\011\006\003\125\004\006\023  
\002\107\102\061\033\060\031\006\003\125\004\010\023\022\107\162  
\145\141\164\145\162\040\115\141\156\143\150\145\163\164\145\162  
\061\020\060\016\006\003\125\004\007\023\007\123\141\154\146\157  
\162\144\061\032\060\030\006\003\125\004\012\023\021\103\117\115  
\117\104\117\040\103\101\040\114\151\155\151\164\145\144\061\053  
\060\051\006\003\125\004\003\023\042\103\117\115\117\104\117\040  
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\060\166\060\020\006  
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003

```
\142\000\004\003\107\173\057\165\311\202\025\205\373\165\344\221
\026\324\253\142\231\365\076\122\013\006\316\101\000\177\227\341
\012\044\074\035\001\004\356\075\322\215\011\227\014\340\165\344
\372\373\167\212\052\365\003\140\113\066\213\026\043\026\255\011
\161\364\112\364\050\120\264\376\210\034\156\077\154\057\057\011
\131\133\245\133\013\063\231\342\303\075\211\371\152\054\357\262
\323\006\351\243\102\060\100\060\035\006\003\125\035\016\004\026
\004\024\165\161\247\031\110\031\274\235\235\352\101\107\337\224
\304\110\167\231\323\171\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\061\000\357\003\133\172\254
\267\170\012\162\267\210\337\377\265\106\024\011\012\372\240\346
\175\010\306\032\207\275\030\250\163\275\046\312\140\014\235\316
\231\237\317\134\017\060\341\276\024\061\352\002\060\024\364\223
\074\111\247\063\172\220\106\107\263\143\175\023\233\116\267\157
\030\067\200\123\376\335\040\340\065\232\066\321\307\001\271\346
\334\335\363\377\035\054\072\026\127\331\222\071\326
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "COMODO ECC Certification Authority"

# Issuer: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB

# Serial Number: 1f:47:af:aa:62:00:70:50:54:4c:01:9e:9b:63:99:2a

# Subject: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB

# Not Valid Before: Thu Mar 06 00:00:00 2008

# Not Valid After : Mon Jan 18 23:59:59 2038

# Fingerprint

(SHA-256):

17:93:92:7A:06:14:54:97:89:AD:CE:2F:8F:34:F7:F0:B6:6D:0F:3A:E3:A3:B8:4D:21:EC:15:DB:BA:4F:AD:C7

# Fingerprint (SHA1): 9F:74:4E:9F:2B:4D:BA:EC:0F:31:2C:50:B6:56:3B:8E:2D:93:C3:11

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "COMODO ECC Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\237\164\116\237\053\115\272\354\017\061\054\120\266\126\073\216
\055\223\303\021
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\174\142\377\164\235\061\123\136\150\112\325\170\252\036\277\043
```

END



```
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\105\103\103
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\037\107\257\252\142\000\160\120\124\114\001\236\233\143
\231\052
```

END

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

#

# Certificate "OISTE WISeKey Global Root GA CA"

#

# Issuer: CN=OISTE WISeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c) 2005,O=WISeKey,C=CH

# Serial Number:41:3d:72:c7:f4:6b:1f:81:43:7d:f1:d2:28:54:df:9a

# Subject: CN=OISTE WISeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c) 2005,O=WISeKey,C=CH

# Not Valid Before: Sun Dec 11 16:03:44 2005

# Not Valid After : Fri Dec 11 16:09:51 2037

# Fingerprint (SHA-256):

41:C9:23:86:6A:B4:CA:D6:B7:AD:57:80:81:58:2E:02:07:97:A6:CB:DF:4F:FF:78:CE:83:96:B3:89:37:D7:F5

#

Fingerprint (SHA1): 59:22:A1:E1:5A:EA:16:35:21:F8:98:39:6A:46:46:B0:44:1B:0F:A9

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "OISTE WISeKey Global Root GA CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113
\145\171\061\033\060\031\006\003\125\004\013\023\022\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\062\060\060\065\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
```

\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111  
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142  
\141\154\040\122\157\157\164\040\107\101\040\103\101

END

CKA\_ID UTF8

"0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\110  
\061\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113  
\145\171\061\033\060\031\006\003\125\004\013\023\022\103\157\160  
\171\162\151\147\150\164\040\050\143\051\040\062\060\060\065\061  
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040  
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162  
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111  
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142  
\141\154\040\122\157\157\164\040\107\101\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\101\075\162\307\364\153\037\201\103\175\361\322\050\124  
\337\232

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\361\060\202\002\331\240\003\002\001\002\002\020\101  
\075\162\307\364\153\037\201\103\175\361\322\050\124\337\232\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201  
\212\061\013\060\011\006\003\125\004\006\023\002\103\110\061\020  
\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145\171  
\061\033\060\031\006\003\125\004\013\023\022\103\157\160\171\162  
\151\147\150\164\040\050\143\051\040\062\060\060\065\061\042\060  
\040\006\003\125\004\013\023\031\117\111\123\124\105\040\106\157  
\165\156\144\141\164\151\157\156\040\105\156\144\157\162\163\145  
\144\061\050\060\046\006\003\125\004\003\023\037\117\111\123\124  
\105\040\127\111\123\145\113\145\171\040\107\154\157\142\141\154  
\040\122\157\157\164\040\107\101\040\103\101\060\036\027\015\060  
\065\061\062\061\061\061\066\060\063\064\064\132\027\015\063\067  
\061\062\061\061\061\066\060\071\065\061\132\060\201\212\061\013  
\060\011\006\003\125\004\006\023\002\103\110\061\020\060\016\006  
\003\125\004\012\023\007\127\111\123\145\113\145\171\061\033\060  
\031\006\003\125\004\013\023\022\103\157\160\171\162\151\147\150  
\164\040\050\143\051\040\062\060\060\065\061\042\060\040\006\003  
\125\004\013\023\031\117\111\123\124\105\040\106\157\165\156\144  
\141\164\151\157\156\040\105\156\144\157\162\163\145\144\061\050  
\060\046\006\003\125\004\003\023\037\117\111\123\124\105\040\127  
\111\123\145\113\145\171\040\107\154\157\142\141\154\040\122\157  
\157\164\040\107\101\040\103\101\060\202\001\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000  
\060\202\001\012\002\202\001\001\000\313\117\263\000\233\075\066  
\335\371\321\111\152\153\020\111\037\354\330\053\262\306\370\062

\201\051\103\225\114\232\031\043\041\025\105\336\343\310\034\121  
\125\133\256\223\350\067\377\053\153\351\324\352\276\052\335\250  
\121\053\327\146\303\141\134\140\002\310\365\316\162\173\073\270  
\362\116\145\010\232\315\244\152\031\301\001\273\163\246\327\366  
\303\335\315\274\244\213\265\231\141\270\001\242\243\324\115\324  
\005\075\221\255\370\264\010\161\144\257\160\361\034\153\176\366  
\303\167\235\044\163\173\344\014\214\341\331\066\341\231\213\005  
\231\013\355\105\061\011\312\302\000\333\367\162\240\226\252\225  
\207\320\216\307\266\141\163\015\166\146\214\334\033\264\143\242  
\237\177\223\023\060\361\241\047\333\331\377\054\125\210\221\240  
\340\117\007\260\050\126\214\030\033\227\104\216\211\335\340\027  
\156\347\052\357\217\071\012\061\204\202\330\100\024\111\056\172  
\101\344\247\376\343\144\314\301\131\161\113\054\041\247\133\175  
\340\035\321\056\201\233\303\330\150\367\275\226\033\254\160\261  
\026\024\013\333\140\271\046\001\005\002\003\001\000\001\243\121  
\060\117\060\013\006\003\125\035\017\004\004\003\002\001\206\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\035\006\003\125\035\016\004\026\004\024\263\003\176\256\066  
\274\260\171\321\334\224\046\266\021\276\041\262\151\206\224\060  
\020\006\011\053\006\001\004\001\202\067\025\001\004\003\002\001  
\000\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000  
\003\202\001\001\000\113\241\377\013\207\156\263\371\301\103\261  
\110\363\050\300\035\056\311\011\101\372\224\000\034\244\244\253  
\111\117\217\075\036\357\115\157\275\274\244\366\362\046\060\311  
\020\312\035\210\373\164\031\037\205\105\275\260\154\121\371\066  
\176\333\365\114\062\072\101\117\133\107\317\350\013\055\266\304  
\031\235\164\305\107\306\073\152\017\254\024\333\074\364\163\234  
\251\005\337\000\334\164\170\372\370\065\140\131\002\023\030\174  
\274\373\115\260\040\155\103\273\140\060\172\147\063\134\305\231  
\321\370\055\071\122\163\373\214\252\227\045\134\162\331\010\036  
\253\116\074\343\201\061\237\003\246\373\300\376\051\210\125\332  
\204\325\120\003\266\342\204\243\246\066\252\021\072\001\341\030  
\113\326\104\150\263\075\371\123\164\204\263\106\221\106\226\000  
\267\200\054\266\341\343\020\342\333\242\347\050\217\001\226\142  
\026\076\000\343\034\245\066\201\030\242\114\122\166\300\021\243  
\156\346\035\272\343\132\276\066\123\305\076\165\217\206\151\051  
\130\123\265\234\273\157\237\134\305\030\354\335\057\341\230\311  
\374\276\337\012\015

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

#

Trust for "OISTE WISEKey Global Root GA CA"

# Issuer: CN=OISTE WISEKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)

2005,O=WISEKey,C=CH

```
Serial Number:41:3d:72:c7:f4:6b:1f:81:43:7d:f1:d2:28:54:df:9a
Subject: CN=OISTE WISeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)
2005,O=WISeKey,C=CH
Not Valid Before: Sun Dec 11 16:03:44 2005
Not Valid After : Fri Dec 11 16:09:51 2037
Fingerprint (SHA-256):
41:C9:23:86:6A:B4:CA:D6:B7:AD:57:80:81:58:2E:02:07:97:A6:CB:DF:4F:FF:78:CE:83:96:B3:89:37:D7:F5
Fingerprint (SHA1): 59:22:A1:E1:5A:EA:16:35:21:F8:98:39:6A:46:46:B0:44:1B:0F:A9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GA CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\131\042\241\341\132\352\026\065\041\370\230\071\152\106\106\260
\104\033\017\251
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\274\154\121\063\247\351\323\146\143\124\025\162\033\041\222\223
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113
\145\171\061\033\060\031\006\003\125\004\013\023\022\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\062\060\060\065\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142
\141\154\040\122\157\157\164\040\107\101\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\101\075\162\307\364\153\037\201\103\175\361\322\050\124
\337\232
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Certigna"
#
#
Issuer: CN=Certigna,O=Dhimyotis,C=FR
Serial Number:00:fe:dc:e3:01:0f:c9:48:ff
Subject: CN=Certigna,O=Dhimyotis,C=FR
```

```
Not Valid Before: Fri Jun 29 15:13:05 2007
Not Valid After : Tue Jun 29 15:13:05 2027
Fingerprint (SHA-256):
E3:B6:A2:DB:2E:D7:CE:48:84:2F:7A:C5:32:41:C7:B7:1D:54:14:4B:FB:40:C1:1F:3F:1D:0B:42:F5:EE:A1:2D
Fingerprint (SHA1): B1:2E:13:63:45:86:A4:6F:1A:B2:60:68:37:58:2D:C4:AC:FD:94:97
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\064\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\021\060\017\006\003\125\004\003\014\010\103\145
\162\164\151\147\156\141
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\064\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\021\060\017\006\003\125\004\003\014\010\103\145
\162\164\151\147\156\141
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\376\334\343\001\017\311\110\377
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\250\060\202\002\220\240\003\002\001\002\002\011\000
\376\334\343\001\017\311\110\377\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\060\064\061\013\060\011\006\003\125
\004\006\023\002\106\122\061\022\060\020\006\003\125\004\012\014
\011\104\150\151\155\171\157\164\151\163\061\021\060\017\006\003
\125\004\003\014\010\103\145\162\164\151\147\156\141\060\036\027
\015\060\067\060\066\062\071\061\065\061\063\060\065\132\027\015
\062\067\060\066\062\071\061\065\061\063\060\065\132\060\064\061
\013\060\011\006\003\125\004\006\023\002\106\122\061\022\060\020
\006\003\125\004\012\014\011\104\150\151\155\171\157\164\151\163
\061\021\060\017\006\003\125\004\003\014\010\103\145\162\164\151
\147\156\141\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\310\150\361\311\326\326\263\064\165\046\202\036
\354\264\276\352\134\341\046\355\021\107\141\341\242\174\026\170
\100\041\344\140\236\132\310\143\341\304\261\226\222\377\030\155
\151\043\341\053\142\367\335\342\066\057\221\007\271\110\317\016
\354\171\266\054\347\064\113\160\010\045\243\074\207\033\031\362
\201\007\017\070\220\031\323\021\376\206\264\362\321\136\036\036
```

\226\315\200\154\316\073\061\223\266\362\240\320\251\225\022\175  
\245\232\314\153\310\204\126\212\063\251\347\042\025\123\026\360  
\314\027\354\127\137\351\242\012\230\011\336\343\137\234\157\334  
\110\343\205\013\025\132\246\272\237\254\110\343\011\262\367\364  
\062\336\136\064\276\034\170\135\102\133\316\016\042\217\115\220  
\327\175\062\030\263\013\054\152\277\216\077\024\021\211\040\016  
\167\024\265\075\224\010\207\367\045\036\325\262\140\000\354\157  
\052\050\045\156\052\076\030\143\027\045\077\076\104\040\026\366  
\046\310\045\256\005\112\264\347\143\054\363\214\026\123\176\134  
\373\021\032\010\301\106\142\237\042\270\361\302\215\151\334\372  
\072\130\006\337\002\003\001\000\001\243\201\274\060\201\271\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\035\006\003\125\035\016\004\026\004\024\032\355\376\101\071  
\220\264\044\131\276\001\362\122\325\105\366\132\071\334\021\060  
\144\006\003\125\035\043\004\135\060\133\200\024\032\355\376\101  
\071\220\264\044\131\276\001\362\122\325\105\366\132\071\334\021  
\241\070\244\066\060\064\061\013\060\011\006\003\125\004\006\023  
\002\106\122\061\022\060\020\006\003\125\004\012\014\011\104\150  
\151\155\171\157\164\151\163\061\021\060\017\006\003\125\004\003  
\014\010\103\145\162\164\151\147\156\141\202\011\000\376\334\343  
\001\017\311\110\377\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\021\006\011\140\206\110\001\206\370\102  
\001\001\004\004\003\002\000\007\060\015\006\011\052\206\110\206  
\367\015\001\001\005\005\000\003\202\001\001\000\205\003\036\222  
\161\366\102\257\341\243\141\236\353\363\300\017\362\245\324\332  
\225\346\326\276\150\066\075\176\156\037\114\212\357\321\017\041  
\155\136\245\122\143\316\022\370\357\052\332\157\353\067\376\023  
\002\307\313\073\076\042\153\332\141\056\177\324\162\075\335\060  
\341\036\114\100\031\214\017\327\234\321\203\060\173\230\131\334  
\175\306\271\014\051\114\241\063\242\353\147\072\145\204\323\226  
\342\355\166\105\160\217\265\053\336\371\043\326\111\156\074\024  
\265\306\237\065\036\120\320\301\217\152\160\104\002\142\313\256  
\035\150\101\247\252\127\350\123\252\007\322\006\366\325\024\006  
\013\221\003\165\054\154\162\265\141\225\232\015\213\271\015\347  
\365\337\124\315\336\346\330\326\011\010\227\143\345\301\056\260  
\267\104\046\300\046\300\257\125\060\236\073\325\066\052\031\004  
\364\134\036\377\317\054\267\377\320\375\207\100\021\325\021\043  
\273\110\300\041\251\244\050\055\375\025\370\260\116\053\364\060  
\133\041\374\021\221\064\276\101\357\173\235\227\165\377\227\225  
\300\226\130\057\352\273\106\327\273\344\331\056

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Certigna"

# Issuer: CN=Certigna,O=Dhimyotis,C=FR

```

Serial Number:00:fe:dc:e3:01:0f:c9:48:ff
Subject: CN=Certigna,O=Dhimyotis,C=FR
Not Valid Before: Fri Jun 29 15:13:05 2007
Not Valid After : Tue Jun 29 15:13:05 2027
Fingerprint (SHA-256):
E3:B6:A2:DB:2E:D7:CE:48:84:2F:7A:C5:32:41:C7:B7:1D:54:14:4B:FB:40:C1:1F:3F:1D:0B:42:F5:EE:A1:2D
Fingerprint (SHA1): B1:2E:13:63:45:86:A4:6F:1A:B2:60:68:37:58:2D:C4:AC:FD:94:97
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\261\056\023\143\105\206\244\157\032\262\140\150\067\130\055\304
\254\375\224\227
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\253\127\246\133\175\102\202\031\265\330\130\046\050\136\375\377
END
CKA_ISSUER
MULTILINE_OCTAL
\060\064\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\021\060\017\006\003\125\004\003\014\010\103\145
\162\164\151\147\156\141
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\376\334\343\001\017\311\110\377
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "ePKI Root Certification Authority"
#
Issuer: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW
Serial Number:15:c8:bd:65:47:5c:af:b8:97:00:5e:e4:06:d2:bc:9d
Subject: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW
Not Valid Before: Mon Dec 20 02:31:27 2004
Not Valid After : Wed Dec 20 02:31:27 2034
Fingerprint (SHA-256):
C0:A6:F4:DC:63:A2:4B:FD:CF:54:EF:2A:6A:08:2A:0A:72:DE:35:80:3E:2F:F5:FF:52:7A:E5:D8:72:06:DF:D5
#
Fingerprint (SHA1): 67:65:0D:F1:7E:8E:7E:5B:82:40:A4:F4:56:4B:CF:E2:3D:69:C6:F0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ePKI Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\052\060\050\006\003\125\004\013\014\041\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\052\060\050\006\003\125\004\013\014\041\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\025\310\275\145\107\134\257\270\227\000\136\344\006\322
\274\235
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\260\060\202\003\230\240\003\002\001\002\002\020\025
\310\275\145\107\134\257\270\227\000\136\344\006\322\274\235\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\136
\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043\060
\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167\141
\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114\164
\144\056\061\052\060\050\006\003\125\004\013\014\041\145\120\113
\111\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036
\027\015\060\064\061\062\062\060\060\062\063\061\062\067\132\027
\015\063\064\061\062\062\060\060\062\063\061\062\067\132\060\136
\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043\060
\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167\141
\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114\164
\144\056\061\052\060\050\006\003\125\004\013\014\041\145\120\113
\111\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\341
\045\017\356\215\333\210\063\165\147\315\255\037\175\072\116\155
\235\323\057\024\363\143\164\313\001\041\152\067\352\204\120\007
```



\113\046\133\011\103\154\041\236\152\310\325\003\365\140\151\217  
\314\360\042\344\037\347\367\152\042\061\267\054\025\362\340\376  
\000\152\103\377\207\145\306\265\032\301\247\114\155\042\160\041  
\212\061\362\227\164\211\011\022\046\034\236\312\331\022\242\225  
\074\332\351\147\277\010\240\144\343\326\102\267\105\357\227\364  
\366\365\327\265\112\025\002\130\175\230\130\113\140\274\315\327  
\015\232\023\063\123\321\141\371\172\325\327\170\263\232\063\367  
\000\206\316\035\115\224\070\257\250\354\170\121\160\212\134\020  
\203\121\041\367\021\075\064\206\136\345\110\315\227\201\202\065  
\114\031\354\145\366\153\305\005\241\356\107\023\326\263\041\047  
\224\020\012\331\044\073\272\276\104\023\106\060\077\227\074\330  
\327\327\152\356\073\070\343\053\324\227\016\271\033\347\007\111  
\177\067\052\371\167\170\317\124\355\133\106\235\243\200\016\221  
\103\301\326\133\137\024\272\237\246\215\044\107\100\131\277\162  
\070\262\066\154\067\377\231\321\135\016\131\012\253\151\367\300  
\262\004\105\172\124\000\256\276\123\366\265\347\341\370\074\243  
\061\322\251\376\041\122\144\305\246\147\360\165\007\006\224\024  
\201\125\306\047\344\001\217\027\301\152\161\327\276\113\373\224  
\130\175\176\021\063\261\102\367\142\154\030\326\317\011\150\076  
\177\154\366\036\217\142\255\245\143\333\011\247\037\042\102\101  
\036\157\231\212\076\327\371\077\100\172\171\260\245\001\222\322  
\235\075\010\025\245\020\001\055\263\062\166\250\225\015\263\172  
\232\373\007\020\170\021\157\341\217\307\272\017\045\032\164\052  
\345\034\230\101\231\337\041\207\350\225\006\152\012\263\152\107  
\166\145\366\072\317\217\142\027\031\173\012\050\315\032\322\203  
\036\041\307\054\277\276\377\141\150\267\147\033\273\170\115\215  
\316\147\345\344\301\216\267\043\146\342\235\220\165\064\230\251  
\066\053\212\232\224\271\235\354\314\212\261\370\045\211\134\132  
\266\057\214\037\155\171\044\247\122\150\303\204\065\342\146\215  
\143\016\045\115\325\031\262\346\171\067\247\042\235\124\061\002  
\003\001\000\001\243\152\060\150\060\035\006\003\125\035\016\004  
\026\004\024\036\014\367\266\147\362\341\222\046\011\105\300\125  
\071\056\167\077\102\112\242\060\014\006\003\125\035\023\004\005  
\060\003\001\001\377\060\071\006\004\147\052\007\000\004\061\060  
\057\060\055\002\001\000\060\011\006\005\053\016\003\002\032\005  
\000\060\007\006\005\147\052\003\000\000\004\024\105\260\302\307  
\012\126\174\356\133\170\014\225\371\030\123\301\246\034\330\020  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\002\001\000\011\263\203\123\131\001\076\225\111\271\361\201  
\272\371\166\040\043\265\047\140\164\324\152\231\064\136\154\000  
\123\331\237\362\246\261\044\007\104\152\052\306\245\216\170\022  
\350\107\331\130\033\023\052\136\171\233\237\012\052\147\246\045  
\077\006\151\126\163\303\212\146\110\373\051\201\127\164\006\312  
\234\352\050\350\070\147\046\053\361\325\265\077\145\223\370\066  
\135\216\215\215\100\040\207\031\352\357\047\300\075\264\071\017  
\045\173\150\120\164\125\234\014\131\175\132\075\101\224\045\122  
\010\340\107\054\025\061\031\325\277\007\125\306\273\022\265\227  
\364\137\203\205\272\161\301\331\154\201\021\166\012\012\260\277

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\202\227\367\352\075\372\372\354\055\251\050\224\073\126\335\322
\121\056\256\300\275\010\025\214\167\122\064\226\326\233\254\323
\035\216\141\017\065\173\233\256\071\151\013\142\140\100\040\066
\217\257\373\066\356\055\010\112\035\270\277\233\134\370\352\245
\033\240\163\246\330\370\156\340\063\004\137\150\252\047\207\355
\331\301\220\234\355\275\343\152\065\257\143\337\253\030\331\272
\346\351\112\352\120\212\017\141\223\036\342\055\031\342\060\224
\065\222\135\016\266\007\257\031\200\217\107\220\121\113\056\115
\335\205\342\322\012\122\012\027\232\374\032\260\120\002\345\001
\243\143\067\041\114\104\304\233\121\231\021\016\163\234\006\217
\124\056\247\050\136\104\071\207\126\055\067\275\205\104\224\341
\014\113\054\234\303\222\205\064\141\313\017\270\233\112\103\122
\376\064\072\175\270\351\051\334\166\251\310\060\370\024\161\200
\306\036\066\110\164\042\101\134\207\202\350\030\161\213\101\211
\104\347\176\130\133\250\270\215\023\351\247\154\303\107\355\263
\032\235\142\256\215\202\352\224\236\335\131\020\303\255\335\342
\115\343\061\325\307\354\350\362\260\376\222\036\026\012\032\374
\331\363\370\047\266\311\276\035\264\154\144\220\177\364\344\304
\133\327\067\256\102\016\335\244\032\157\174\210\124\305\026\156
\341\172\150\056\370\072\277\015\244\074\211\073\170\247\116\143
\203\004\041\010\147\215\362\202\111\320\133\375\261\315\017\203
\204\324\076\040\205\367\112\075\053\234\375\052\012\011\115\352
\201\370\021\234
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "ePKI Root Certification Authority"

# Issuer: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW

# Serial Number: 15:c8:bd:65:47:5c:af:b8:97:00:5e:e4:06:d2:bc:9d

# Subject: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW

# Not Valid Before: Mon Dec 20 02:31:27 2004

# Not Valid After : Wed Dec 20 02:31:27 2034

# Fingerprint (SHA-256):

C0:A6:F4:DC:63:A2:4B:FD:CF:54:EF:2A:6A:08:2A:0A:72:DE:35:80:3E:2F:F5:FF:52:7A:E5:D8:72:06:DF:D5

# Fingerprint (SHA1): 67:65:0D:F1:7E:8E:7E:5B:82:40:A4:F4:56:4B:CF:E2:3D:69:C6:F0

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ePKI Root Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\147\145\015\361\176\216\176\133\202\100\244\364\126\113\317\342
\075\151\306\360
```

END

```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\056\000\312\046\006\220\075\255\376\157\025\150\323\153\263
END
CKA_ISSUER MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\052\060\050\006\003\125\004\013\014\041\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\310\275\145\107\134\257\270\227\000\136\344\006\322
\274\235
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "certSIGN ROOT CA"
#
Issuer: OU=certSIGN ROOT CA,O=certSIGN,C=RO
Serial Number:20:06:05:16:70:02
Subject: OU=certSIGN ROOT CA,O=certSIGN,C=RO
Not Valid Before: Tue Jul 04 17:20:04 2006
Not Valid After : Fri Jul 04 17:20:04 2031
Fingerprint (SHA-256):
EA:A9:62:C4:FA:4A:6B:AF:EB:E4:15:19:6D:35:1C:CD:88:8D:4F:53:F3:FA:8A:E6:D7:C4:66:A9:4E:60:42:BB
Fingerprint (SHA1): FA:B7:EE:36:97:26:62:FB:2D:B0:2A:F6:BF:03:FD:E8:7C:4B:2F:9B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "certSIGN ROOT CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123\111
\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145\162
\164\123\111\107\116\040\122\117\117\124\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117\061

```

\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123\111  
\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145\162  
\164\123\111\107\116\040\122\117\117\124\040\103\101  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\006\040\006\005\026\160\002  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\003\070\060\202\002\040\240\003\002\001\002\002\006\040  
\006\005\026\160\002\060\015\006\011\052\206\110\206\367\015\001  
\001\005\005\000\060\073\061\013\060\011\006\003\125\004\006\023  
\002\122\117\061\021\060\017\006\003\125\004\012\023\010\143\145  
\162\164\123\111\107\116\061\031\060\027\006\003\125\004\013\023  
\020\143\145\162\164\123\111\107\116\040\122\117\117\124\040\103  
\101\060\036\027\015\060\066\060\067\060\064\061\067\062\060\060  
\064\132\027\015\063\061\060\067\060\064\061\067\062\060\060\064  
\132\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117  
\061\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123  
\111\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145  
\162\164\123\111\107\116\040\122\117\117\124\040\103\101\060\202  
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\267  
\063\271\176\310\045\112\216\265\333\264\050\033\252\127\220\350  
\321\042\323\144\272\323\223\350\324\254\206\141\100\152\140\127  
\150\124\204\115\274\152\124\002\005\377\337\233\232\052\256\135  
\007\217\112\303\050\177\357\373\053\372\171\361\307\255\360\020  
\123\044\220\213\146\311\250\210\253\257\132\243\000\351\276\272  
\106\356\133\163\173\054\027\202\201\136\142\054\241\002\145\263  
\275\305\053\000\176\304\374\003\063\127\015\355\342\372\316\135  
\105\326\070\315\065\266\262\301\320\234\201\112\252\344\262\001  
\134\035\217\137\231\304\261\255\333\210\041\353\220\010\202\200  
\363\060\243\103\346\220\202\256\125\050\111\355\133\327\251\020  
\070\016\376\217\114\133\233\106\352\101\365\260\010\164\303\320  
\210\063\266\174\327\164\337\334\204\321\103\016\165\071\241\045  
\100\050\352\170\313\016\054\056\071\235\214\213\156\026\034\057  
\046\202\020\342\343\145\224\012\004\300\136\367\135\133\370\020  
\342\320\272\172\113\373\336\067\000\000\032\133\050\343\322\234  
\163\076\062\207\230\241\311\121\057\327\336\254\063\263\117\002  
\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\306\060\035\006\003\125\035\016  
\004\026\004\024\340\214\233\333\045\111\263\361\174\206\326\262  
\102\207\013\320\153\240\331\344\060\015\006\011\052\206\110\206  
\367\015\001\001\005\005\000\003\202\001\001\000\076\322\034\211  
\056\065\374\370\165\335\346\177\145\210\364\162\114\311\054\327  
\062\116\363\335\031\171\107\275\216\073\133\223\017\120\111\044  
\023\153\024\006\162\357\011\323\241\241\343\100\204\311\347\030  
\062\164\074\110\156\017\237\113\324\367\036\323\223\206\144\124

```
\227\143\162\120\325\125\317\372\040\223\002\242\233\303\043\223
\116\026\125\166\240\160\171\155\315\041\037\317\057\055\274\031
\343\210\061\370\131\032\201\011\310\227\246\164\307\140\304\133
\314\127\216\262\165\375\033\002\011\333\131\157\162\223\151\367
\061\101\326\210\070\277\207\262\275\026\171\371\252\344\276\210
\045\335\141\047\043\034\265\061\007\004\066\264\032\220\275\240
\164\161\120\211\155\274\024\343\017\206\256\361\253\076\307\240
\011\314\243\110\321\340\333\144\347\222\265\317\257\162\103\160
\213\371\303\204\074\023\252\176\222\233\127\123\223\372\160\302
\221\016\061\371\233\147\135\351\226\070\136\137\263\163\116\210
\025\147\336\236\166\020\142\040\276\125\151\225\103\000\071\115
\366\356\260\132\116\111\104\124\130\137\102\203
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL

CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "certSIGN ROOT CA"

# Issuer: OU=certSIGN ROOT CA,O=certSIGN,C=RO

# Serial Number:20:06:05:16:70:02

# Subject: OU=certSIGN ROOT CA,O=certSIGN,C=RO

# Not Valid Before: Tue Jul 04 17:20:04 2006

# Not Valid After : Fri Jul 04 17:20:04 2031

# Fingerprint (SHA-256):

EA:A9:62:C4:FA:4A:6B:AF:EB:E4:15:19:6D:35:1C:CD:88:8D:4F:53:F3:FA:8A:E6:D7:C4:66:A9:4E:60:42:BB

# Fingerprint (SHA1): FA:B7:EE:36:97:26:62:FB:2D:B0:2A:F6:BF:03:FD:E8:7C:4B:2F:9B

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "certSIGN ROOT CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\372\267\356\066\227\046\142\373\055\260\052\366\277\003\375\350
\174\113\057\233
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\030\230\300\326\351\072\374\371\260\365\014\367\113\001\104\027
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123\111
\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145\162
\164\123\111\107\116\040\122\117\117\124\040\103\101
```

END

CKA\_SERIAL\_NUMBER

```

MULTILINE_OCTAL
\002\006\040\006\005\026\160\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "NetLock Arany (Class Gold) Ftanúsítvány"
#
Issuer: CN=NetLock Arany (Class Gold) F.tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification
Services),O=NetLock Kft.,L=Budapest,C=HU
Serial Number:49:41:2c:e4:00:10
Subject: CN=NetLock Arany (Class Gold) F.tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification
Services),O=NetLock Kft.,L=Budapest,C=HU
Not Valid Before: Thu Dec 11 15:08:21 2008
Not Valid After : Wed Dec 06 15:08:21 2028
Fingerprint (SHA-256):
6C:61:DA:C3:A2:DE:F0:31:50:6B:E0:36:D2:A6:FE:40:19:94:FB:D1:3D:F9:C8:D4:66:59:92:74:C4:46:EC:98
#
Fingerprint (SHA1): 06:08:3F:59:3F:15:A1:04:A0:69:A4:6B:A9:03:D0:06:B7:97:09:91
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Arany (Class Gold) Ftanúsítvány"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\065\060\063\006\003\125\004\003\014\054\116\145
\164\114\157\143\153\040\101\162\141\156\171\040\050\103\154\141
\163\163\040\107\157\154\144\051\040\106\305\221\164\141\156\303
\272\163\303\255\164\166\303\241\156\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003

```

\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303  
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143  
\145\163\051\061\065\060\063\006\003\125\004\003\014\054\116\145  
\164\114\157\143\153\040\101\162\141\156\171\040\050\103\154\141  
\163\163\040\107\157\154\144\051\040\106\305\221\164\141\156\303  
\272\163\303\255\164\166\303\241\156\171

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\006\111\101\054\344\000\020

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\025\060\202\002\375\240\003\002\001\002\002\006\111  
\101\054\344\000\020\060\015\006\011\052\206\110\206\367\015\001  
\001\013\005\000\060\201\247\061\013\060\011\006\003\125\004\006  
\023\002\110\125\061\021\060\017\006\003\125\004\007\014\010\102  
\165\144\141\160\145\163\164\061\025\060\023\006\003\125\004\012  
\014\014\116\145\164\114\157\143\153\040\113\146\164\056\061\067  
\060\065\006\003\125\004\013\014\056\124\141\156\303\272\163\303  
\255\164\166\303\241\156\171\153\151\141\144\303\263\153\040\050  
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145  
\162\166\151\143\145\163\051\061\065\060\063\006\003\125\004\003  
\014\054\116\145\164\114\157\143\153\040\101\162\141\156\171\040  
\050\103\154\141\163\163\040\107\157\154\144\051\040\106\305\221  
\164\141\156\303\272\163\303\255\164\166\303\241\156\171\060\036  
\027\015\060\070\061\062\061\061\061\065\060\070\062\061\132\027  
\015\062\070\061\062\060\066\061\065\060\070\062\061\132\060\201  
\247\061\013\060\011\006\003\125\004\006\023\002\110\125\061\021  
\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145\163  
\164\061\025\060\023\006\003\125\004\012\014\014\116\145\164\114  
\157\143\153\040\113\146\164\056\061\067\060\065\006\003\125\004  
\013\014\056\124\141\156\303\272\163\303\255\164\166\303\241\156  
\171\153\151\141\144\303\263\153\040\050\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145\163  
\051\061\065\060\063\006\003\125\004\003\014\054\116\145\164\114  
\157\143\153\040\101\162\141\156\171\040\050\103\154\141\163\163  
\040\107\157\154\144\051\040\106\305\221\164\141\156\303\272\163  
\303\255\164\166\303\241\156\171\060\202\001\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000  
\060\202\001\012\002\202\001\001\000\304\044\136\163\276\113\155  
\024\303\241\364\343\227\220\156\322\060\105\036\074\356\147\331  
\144\340\032\212\177\312\060\312\203\343\040\301\343\364\072\323  
\224\137\032\174\133\155\277\060\117\204\047\366\237\037\111\274  
\306\231\012\220\362\017\365\177\103\204\067\143\121\213\172\245  
\160\374\172\130\315\216\233\355\303\106\154\204\160\135\332\363  
\001\220\043\374\116\060\251\176\341\047\143\347\355\144\074\240  
\270\311\063\143\376\026\220\377\260\270\375\327\250\300\300\224  
\103\013\266\325\131\246\236\126\320\044\037\160\171\257\333\071

\124\015\145\165\331\025\101\224\001\257\136\354\366\215\361\377  
\255\144\376\040\232\327\134\353\376\246\037\010\144\243\213\166  
\125\255\036\073\050\140\056\207\045\350\252\257\037\306\144\106  
\040\267\160\177\074\336\110\333\226\123\267\071\167\344\032\342  
\307\026\204\166\227\133\057\273\031\025\205\370\151\205\365\231  
\247\251\362\064\247\251\266\246\003\374\157\206\075\124\174\166  
\004\233\153\371\100\135\000\064\307\056\231\165\235\345\210\003  
\252\115\370\003\322\102\166\300\033\002\003\000\250\213\243\105  
\060\103\060\022\006\003\125\035\023\001\001\377\004\010\060\006  
\001\001\377\002\001\004\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004  
\024\314\372\147\223\360\266\270\320\245\300\036\363\123\375\214  
\123\337\203\327\226\060\015\006\011\052\206\110\206\367\015\001  
\001\013\005\000\003\202\001\001\000\253\177\356\034\026\251\234  
\074\121\000\240\300\021\010\005\247\231\346\157\001\210\124\141  
\156\361\271\030\255\112\255\376\201\100\043\224\057\373\165\174  
\057\050\113\142\044\201\202\013\365\141\361\034\156\270\141\070  
\353\201\372\142\241\073\132\142\323\224\145\304\341\346\155\202  
\370\057\045\160\262\041\046\301\162\121\037\214\054\303\204\220  
\303\132\217\272\317\364\247\145\245\353\230\321\373\005\262\106  
\165\025\043\152\157\205\143\060\200\360\325\236\037\051\034\302  
\154\260\120\131\135\220\133\073\250\015\060\317\277\175\177\316  
\361\235\203\275\311\106\156\040\246\371\141\121\272\041\057\173  
\276\245\025\143\241\324\225\207\361\236\271\363\211\363\075\205  
\270\270\333\276\265\271\051\371\332\067\005\000\111\224\003\204  
\104\347\277\103\061\317\165\213\045\321\364\246\144\365\222\366  
\253\005\353\075\351\245\013\066\142\332\314\006\137\066\213\266  
\136\061\270\052\373\136\366\161\337\104\046\236\304\346\015\221  
\264\056\165\225\200\121\152\113\060\246\260\142\241\223\361\233  
\330\316\304\143\165\077\131\107\261

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "NetLock Arany (Class Gold) Ftanúsítvány"

# Issuer: CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification Services),O=NetLock Kft.,L=Budapest,C=HU

# Serial Number:49:41:2c:e4:00:10

# Subject: CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification Services),O=NetLock Kft.,L=Budapest,C=HU

# Not Valid Before: Thu Dec 11 15:08:21 2008

# Not Valid After : Wed Dec 06 15:08:21 2028

# Fingerprint (SHA-256):

6C:61:DA:C3:A2:DE:F0:31:50:6B:E0:36:D2:A6:FE:40:19:94:FB:D1:3D:F9:C8:D4:66:59:92:74:C4:46:EC:98

# Fingerprint (SHA1): 06:08:3F:59:3F:15:A1:04:A0:69:A4:6B:A9:03:D0:06:B7:97:09:91

CKA\_CLASS



```

CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Arany (Class Gold) Ftanúsítvány"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\006\010\077\131\077\025\241\004\240\151\244\153\251\003\320\006
\267\227\011\221
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\305\241\267\377\163\335\326\327\064\062\030\337\374\074\255\210
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\065\060\063\006\003\125\004\003\014\054\116\145
\164\114\157\143\153\040\101\162\141\156\171\040\050\103\154\141
\163\163\040\107\157\154\144\051\040\106\305\221\164\141\156\303
\272\163\303\255\164\166\303\241\156\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\006\111\101\054\344\000\020
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "SecureSign RootCA11"
#
Issuer: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
Serial Number: 1 (0x1)
Subject: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
Not Valid Before: Wed Apr 08 04:56:47 2009
Not Valid After : Sun Apr 08 04:56:47 2029
Fingerprint (SHA-256):
BF:0F:EE:FB:9E:3A:58:1A:D5:F9:E9:DB:75:89:98:57:43:D2:61:08:5C:4D:31:4F:6F:5D:72:59:AA:42:16:12
Fingerprint (SHA1): 3B:C4:9F:48:F8:F3:73:A0:9C:1E:BD:F8:5B:B1:C3:65:C7:D8:11:B3
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL

```

```
CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SecureSign RootCA11"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\053\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032
\006\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147
\156\040\122\157\157\164\103\101\061\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\053\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032
\006\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147
\156\040\122\157\157\164\103\101\061\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\003\155\060\202\002\125\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061\053
\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145\162
\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032\006
\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147\156
\040\122\157\157\164\103\101\061\061\060\036\027\015\060\071\060
\064\060\070\060\064\065\066\064\067\132\027\015\062\071\060\064
\060\070\060\064\065\066\064\067\132\060\130\061\013\060\011\006
\003\125\004\006\023\002\112\120\061\053\060\051\006\003\125\004
\012\023\042\112\141\160\141\156\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\123\145\162\166\151\143\145\163\054
\040\111\156\143\056\061\034\060\032\006\003\125\004\003\023\023
\123\145\143\165\162\145\123\151\147\156\040\122\157\157\164\103
\101\061\061\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\375\167\252\245\034\220\005\073\313\114\233\063
\213\132\024\105\244\347\220\026\321\337\127\322\041\020\244\027
\375\337\254\326\037\247\344\333\174\367\354\337\270\003\332\224
\130\375\135\162\174\214\077\137\001\147\164\025\226\343\002\074
```

\207\333\256\313\001\216\302\363\146\306\205\105\364\002\306\072  
\265\142\262\257\372\234\277\244\346\324\200\060\230\363\015\266  
\223\217\251\324\330\066\362\260\374\212\312\054\241\025\063\225  
\061\332\300\033\362\356\142\231\206\143\077\277\335\223\052\203  
\250\166\271\023\037\267\316\116\102\205\217\042\347\056\032\362  
\225\011\262\005\265\104\116\167\241\040\275\251\362\116\012\175  
\120\255\365\005\015\105\117\106\161\375\050\076\123\373\004\330  
\055\327\145\035\112\033\372\317\073\260\061\232\065\156\310\213  
\006\323\000\221\362\224\010\145\114\261\064\006\000\172\211\342  
\360\307\003\131\317\325\326\350\247\062\263\346\230\100\206\305  
\315\047\022\213\314\173\316\267\021\074\142\140\007\043\076\053  
\100\156\224\200\011\155\266\263\157\167\157\065\010\120\373\002  
\207\305\076\211\002\003\001\000\001\243\102\060\100\060\035\006  
\003\125\035\016\004\026\004\024\133\370\115\117\262\245\206\324  
\072\322\361\143\232\240\276\011\366\127\267\336\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\015\006  
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001  
\000\240\241\070\026\146\056\247\126\037\041\234\006\372\035\355  
\271\042\305\070\046\330\116\117\354\243\177\171\336\106\041\241  
\207\167\217\007\010\232\262\244\305\257\017\062\230\013\174\146  
\051\266\233\175\045\122\111\103\253\114\056\053\156\172\160\257  
\026\016\343\002\154\373\102\346\030\235\105\330\125\310\350\073  
\335\347\341\364\056\013\034\064\134\154\130\112\373\214\210\120  
\137\225\034\277\355\253\042\265\145\263\205\272\236\017\270\255  
\345\172\033\212\120\072\035\275\015\274\173\124\120\013\271\102  
\257\125\240\030\201\255\145\231\357\276\344\234\277\304\205\253  
\101\262\124\157\334\045\315\355\170\342\216\014\215\011\111\335  
\143\173\132\151\226\002\041\250\275\122\131\351\175\065\313\310  
\122\312\177\201\376\331\153\323\367\021\355\045\337\370\347\371  
\244\372\162\227\204\123\015\245\320\062\030\121\166\131\024\154  
\017\353\354\137\200\214\165\103\203\303\205\230\377\114\236\055  
\015\344\167\203\223\116\265\226\007\213\050\023\233\214\031\215  
\101\047\111\100\356\336\346\043\104\071\334\241\042\326\272\003  
\362

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "SecureSign RootCA11"

# Issuer: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP

# Serial Number: 1 (0x1)

# Subject: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP

# Not Valid

Before: Wed Apr 08 04:56:47 2009

# Not Valid After : Sun Apr 08 04:56:47 2029

```

Fingerprint (SHA-256):
BF:0F:EE:FB:9E:3A:58:1A:D5:F9:E9:DB:75:89:98:57:43:D2:61:08:5C:4D:31:4F:6F:5D:72:59:AA:42:16:12
Fingerprint (SHA1): 3B:C4:9F:48:F8:F3:73:A0:9C:1E:BD:F8:5B:B1:C3:65:C7:D8:11:B3
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SecureSign RootCA11"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\073\304\237\110\370\363\163\240\234\036\275\370\133\261\303\145
\307\330\021\263
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\267\122\164\342\222\264\200\223\362\165\344\314\327\362\352\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\053\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032
\006\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147
\156\040\122\157\157\164\103\101\061\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Microsec e-Szigno Root CA 2009"
#
Issuer: E=info@e-szigno.hu,CN=Microsec e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
Serial Number:00:c2:7e:43:04:4e:47:3f:19
Subject: E=info@e-szigno.hu,CN=Microsec e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
Not Valid Before: Tue Jun 16 11:30:18 2009
Not Valid After : Sun Dec 30 11:30:18 2029
Fingerprint (SHA-256):
3C:5F:81:FE:A5:FA:B8:2C:64:BF:A2:EA:EC:AF:CD:E8:E0:77:FC:86:20:A7:CA:E5:37:16:3D:F3:6E:DB:F3:78
Fingerprint (SHA1): 89:DF:74:FE:5C:F4:0F:4A:80:F9:E3:37:7D:54:DA:91:E1:01:31:8E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

```
CKA_LABEL UTF8 "Microsec e-Szigno Root CA 2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151
\143\162\157\163\145\143\040\114\164\144\056\061\047\060\045\006
\003\125\004\003\014\036\115\151\143\162\157\163\145\143\040\145
\055\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040
\062\060\060\071\061\037\060\035\006\011\052\206\110\206\367\015
\001\011\001\026\020\151\156\146\157\100\145\055\163\172\151\147
\156\157\056\150\165
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151
\143\162\157\163\145\143\040\114\164\144\056\061\047\060\045\006
\003\125\004\003\014\036\115\151\143\162\157\163\145\143\040\145
\055\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040
\062\060\060\071\061\037\060\035\006\011\052\206\110\206\367\015
\001\011\001\026\020\151\156\146\157\100\145\055\163\172\151\147
\156\157\056\150\165
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\302\176\103\004\116\107\077\031
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\012\060\202\002\362\240\003\002\001\002\002\011\000
\302\176\103\004\116\107\077\031\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\201\202\061\013\060\011\006\003
\125\004\006\023\002\110\125\061\021\060\017\006\003\125\004\007
\014\010\102\165\144\141\160\145\163\164\061\026\060\024\006\003
\125\004\012\014\015\115\151\143\162\157\163\145\143\040\114\164
\144\056\061\047\060\045\006\003\125\004\003\014\036\115\151\143
\162\157\163\145\143\040\145\055\123\172\151\147\156\157\040\122
\157\157\164\040\103\101\040\062\060\060\071\061\037\060\035\006
\011\052\206\110\206\367\015\001\011\001\026\020\151\156\146\157
\100\145\055\163\172\151\147\156\157\056\150\165\060\036\027\015
\060\071\060\066\061\066\061\061\063\060\061\070\132\027\015\062
\071\061\062\063\060\061\061\063\060\061\070\132\060\201\202\061
\013\060\011\006\003\125\004\006\023\002\110\125\061\021\060\017
\006\003\125\004\007\014\010\102\165\144\141\160\145\163\164\061
\026\060\024\006\003\125\004\012\014\015\115\151\143\162\157\163
\145\143\040\114\164\144\056\061\047\060\045\006\003\125\004\003
\014\036\115\151\143\162\157\163\145\143\040\145\055\123\172\151
```

\147\156\157\040\122\157\157\164\040\103\101\040\062\060\060\071  
\061\037\060\035\006\011\052\206\110\206\367\015\001\011\001\026  
\020\151\156\146\157\100\145\055\163\172\151\147\156\157\056\150  
\165\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001  
\001\000\351\370\217\363\143\255\332\206\330\247\340\102\373\317  
\221\336\246\046\370\231\245\143\160\255\233\256\312\063\100\175  
\155\226\156\241\016\104\356\341\023\235\224\102\122\232\275\165  
\205\164\054\250\016\035\223\266\030\267\214\054\250\317\373\134  
\161\271\332\354\376\350\176\217\344\057\035\262\250\165\207\330  
\267\241\345\073\317\231\112\106\320\203\031\175\300\241\022\034  
\225\155\112\364\330\307\245\115\063\056\205\071\100\165\176\024  
\174\200\022\230\120\307\101\147\270\240\200\141\124\246\154\116  
\037\340\235\016\007\351\311\272\063\347\376\300\125\050\054\002  
\200\247\031\365\236\334\125\123\003\227\173\007\110\377\231\373  
\067\212\044\304\131\314\120\020\143\216\252\251\032\260\204\032  
\206\371\137\273\261\120\156\244\321\012\314\325\161\176\037\247  
\033\174\365\123\156\042\137\313\053\346\324\174\135\256\326\302  
\306\114\345\005\001\331\355\127\374\301\043\171\374\372\310\044  
\203\225\363\265\152\121\001\320\167\326\351\022\241\371\032\203  
\373\202\033\271\260\227\364\166\006\063\103\111\240\377\013\265  
\372\265\002\003\001\000\001\243\201\200\060\176\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006  
\003\125\035\016\004\026\004\024\313\017\306\337\102\103\314\075  
\313\265\110\043\241\032\172\246\052\273\064\150\060\037\006\003  
\125\035\043\004\030\060\026\200\024\313\017\306\337\102\103\314  
\075\313\265\110\043\241\032\172\246\052\273\064\150\060\033\006  
\003\125\035\021\004\024\060\022\201\020\151\156\146\157\100\145  
\055\163\172\151\147\156\157\056\150\165\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\003\202\001\001\000\311\321  
\016\136\056\325\314\263\174\076\313\374\075\377\015\050\225\223  
\004\310\277\332\315\171\270\103\220\360\244\276\357\362\357\041  
\230\274\324\324\135\006\366\356\102\354\060\154\240\252\251\312  
\361\257\212\372\077\013\163\152\076\352\056\100\176\037\256\124  
\141\171\353\056\010\067\327\043\363\214\237\276\035\261\341\244  
\165\333\240\342\124\024\261\272\034\051\244\030\366\022\272\242  
\024\024\343\061\065\310\100\377\267\340\005\166\127\301\034\131  
\362\370\277\344\355\045\142\134\204\360\176\176\037\263\276\371  
\267\041\021\314\003\001\126\160\247\020\222\036\033\064\201\036  
\255\234\032\303\004\074\355\002\141\326\036\006\363\137\072\207  
\362\053\361\105\207\345\075\254\321\307\127\204\275\153\256\334  
\330\371\266\033\142\160\013\075\066\311\102\362\062\327\172\141  
\346\322\333\075\317\310\251\311\233\334\333\130\104\327\157\070  
\257\177\170\323\243\255\032\165\272\034\301\066\174\217\036\155  
\034\303\165\106\256\065\005\246\366\134\075\041\356\126\360\311  
\202\042\055\172\124\253\160\303\175\042\145\202\160\226

END

```
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "Microsec e-Szigno Root CA 2009"
Issuer: E=info@e-szigno.hu,CN=Microsec e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
Serial Number:00:c2:7e:43:04:4e:47:3f:19
Subject: E=info@e-szigno.hu,CN=Microsec
e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
Not Valid Before: Tue Jun 16 11:30:18 2009
Not Valid After : Sun Dec 30 11:30:18 2029
Fingerprint (SHA-256):
3C:5F:81:FE:A5:FA:B8:2C:64:BF:A2:EA:EC:AF:CD:E8:E0:77:FC:86:20:A7:CA:E5:37:16:3D:F3:6E:DB:F3:78
Fingerprint (SHA1): 89:DF:74:FE:5C:F4:0F:4A:80:F9:E3:37:7D:54:DA:91:E1:01:31:8E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsec e-Szigno Root CA 2009"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\211\337\164\376\134\364\017\112\200\371\343\067\175\124\332\221
\341\001\061\216
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\370\111\364\003\274\104\055\203\276\110\151\175\051\144\374\261
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151
\143\162\157\163\145\143\040\114\164\144\056\061\047\060\045\006
\003\125\004\003\014\036\115\151\143\162\157\163\145\143\040\145
\055\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040
\062\060\060\071\061\037\060\035\006\011\052\206\110\206\367\015
\001\011\001\026\020\151\156\146\157\100\145\055\163\172\151\147
\156\157\056\150\165
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\302\176\103\004\116\107\077\031
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
```

```
Certificate "GlobalSign Root CA - R3"
#
Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
Serial Number:04:00:00:00:00:01:21:58:53:08:a2
Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
Not Valid Before: Wed Mar 18 10:00:00 2009
Not Valid After : Sun Mar 18 10:00:00 2029
Fingerprint (SHA-256):
CB:B5:22:D7:B7:F1:27:AD:6A:01:13:86:5B:DF:1C:D4:10:2E:7D:07:59:AF:63:5A:7C:F4:72:0D:C9:63:C5:3B
#
Fingerprint (SHA1): D6:9B:56:11:48:F0:1C:77:C5:45:78:C1:09:26:DF:5B:85:69:76:AD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA - R3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\063\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\063\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\041\130\123\010\242
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\137\060\202\002\107\240\003\002\001\002\002\013\004
\000\000\000\000\001\041\130\123\010\242\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\114\061\040\060\036\006
\003\125\004\013\023\027\107\154\157\142\141\154\123\151\147\156
\040\122\157\157\164\040\103\101\040\055\040\122\063\061\023\060
\021\006\003\125\004\012\023\012\107\154\157\142\141\154\123\151
\147\156\061\023\060\021\006\003\125\004\003\023\012\107\154\157
\142\141\154\123\151\147\156\060\036\027\015\060\071\060\063\061
\070\061\060\060\060\060\060\132\027\015\062\071\060\063\061\070
\061\060\060\060\060\060\132\060\114\061\040\060\036\006\003\125
\004\013\023\027\107\154\157\142\141\154\123\151\147\156\040\122
```



\157\157\164\040\103\101\040\055\040\122\063\061\023\060\021\006  
\003\125\004\012\023\012\107\154\157\142\141\154\123\151\147\156  
\061\023\060\021\006\003\125\004\003\023\012\107\154\157\142\141  
\154\123\151\147\156\060\202\001\042\060\015\006\011\052\206\110  
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001  
\012\002\202\001\001\000\314\045\166\220\171\006\170\042\026\365  
\300\203\266\204\312\050\236\375\005\166\021\305\255\210\162\374  
\106\002\103\307\262\212\235\004\137\044\313\056\113\341\140\202  
\106\341\122\253\014\201\107\160\154\335\144\321\353\365\054\243  
\017\202\075\014\053\256\227\327\266\024\206\020\171\273\073\023  
\200\167\214\010\341\111\322\152\142\057\037\136\372\226\150\337  
\211\047\225\070\237\006\327\076\311\313\046\131\015\163\336\260  
\310\351\046\016\203\025\306\357\133\213\322\004\140\312\111\246  
\050\366\151\073\366\313\310\050\221\345\235\212\141\127\067\254  
\164\024\334\164\340\072\356\162\057\056\234\373\320\273\277\365  
\075\000\341\006\063\350\202\053\256\123\246\072\026\163\214\335  
\101\016\040\072\300\264\247\241\351\262\117\220\056\062\140\351  
\127\313\271\004\222\150\150\345\070\046\140\165\262\237\167\377  
\221\024\357\256\040\111\374\255\100\025\110\321\002\061\141\031  
\136\270\227\357\255\167\267\144\232\172\277\137\301\023\357\233  
\142\373\015\154\340\124\151\026\251\003\332\156\351\203\223\161  
\166\306\151\205\202\027\002\003\001\000\001\243\102\060\100\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\035\006\003\125\035\016\004\026\004\024\217\360\113\177\250  
\056\105\044\256\115\120\372\143\232\213\336\342\335\033\274\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202  
\001\001\000\113\100\333\300\120\252\376\310\014\357\367\226\124  
\105\111\273\226\000\011\101\254\263\023\206\206\050\007\063\312  
\153\346\164\271\272\000\055\256\244\012\323\365\361\361\017\212  
\277\163\147\112\203\307\104\173\170\340\257\156\154\157\003\051  
\216\063\071\105\303\216\344\271\127\154\252\374\022\226\354\123  
\306\055\344\044\154\271\224\143\373\334\123\150\147\126\076\203  
\270\317\065\041\303\311\150\376\316\332\302\123\252\314\220\212  
\351\360\135\106\214\225\335\172\130\050\032\057\035\336\315\000  
\067\101\217\355\104\155\327\123\050\227\176\363\147\004\036\025  
\327\212\226\264\323\336\114\047\244\114\033\163\163\166\364\027  
\231\302\037\172\016\343\055\010\255\012\034\054\377\074\253\125  
\016\017\221\176\066\353\303\127\111\276\341\056\055\174\140\213  
\303\101\121\023\043\235\316\367\062\153\224\001\250\231\347\054  
\063\037\072\073\045\322\206\100\316\073\054\206\170\311\141\057  
\024\272\356\333\125\157\337\204\356\005\011\115\275\050\330\162  
\316\323\142\120\145\036\353\222\227\203\061\331\263\265\312\107  
\130\077\137

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GlobalSign Root CA - R3"

# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3

# Serial Number:04:00:00:00:01:21:58:53:08:a2

#

Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3

# Not Valid Before: Wed Mar 18 10:00:00 2009

# Not Valid After : Sun Mar 18 10:00:00 2029

# Fingerprint (SHA-256):

CB:B5:22:D7:B7:F1:27:AD:6A:01:13:86:5B:DF:1C:D4:10:2E:7D:07:59:AF:63:5A:7C:F4:72:0D:C9:63:C5:3B

# Fingerprint (SHA1): D6:9B:56:11:48:F0:1C:77:C5:45:78:C1:09:26:DF:5B:85:69:76:AD

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GlobalSign Root CA - R3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\326\233\126\021\110\360\034\167\305\105\170\301\011\046\337\133

\205\151\166\255

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\305\337\270\111\312\005\023\125\356\055\272\032\303\076\260\050

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157

\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040

\055\040\122\063\061\023\060\021\006\003\125\004\012\023\012\107

\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125

\004\003\023\012\107\154\157\142\141\154\123\151\147\156

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\013\004\000\000\000\000\001\041\130\123\010\242

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Izenpe.com"

#

# Issuer: CN=Izenpe.com,O=IZENPE S.A.,C=ES

# Serial Number:00:b0:b7:5a:16:48:5f:bf:e1:cb:f5:8b:d7:19:e6:7d

# Subject: CN=Izenpe.com,O=IZENPE S.A.,C=ES

# Not Valid Before: Thu Dec 13 13:08:28 2007

# Not Valid After : Sun Dec 13 08:27:25 2037

# Fingerprint (SHA-256):

25:30:CC:8E:98:32:15:02:BA:D9:6F:9B:1F:BA:1B:09:9E:2D:29:9E:0F:45:48:BB:91:4F:36:3B:C0:D4:53:1F

# Fingerprint (SHA1): 2F:78:3D:25:52:18:A7:4A:65:39:71:B5:2C:A2:9C:45:15:6F:E9:19

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL

CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Izenpe.com"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\070\061\013\060\011\006\003\125\004\006\023\002\105\123\061  
\024\060\022\006\003\125\004\012\014\013\111\132\105\116\120\105  
\040\123\056\101\056\061\023\060\021\006\003\125\004\003\014\012  
\111\172\145\156\160\145\056\143\157\155

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\070\061\013\060\011\006\003\125\004\006\023\002\105\123\061  
\024\060\022\006\003\125\004\012\014\013\111\132\105\116\120\105  
\040\123\056\101\056\061\023\060\021\006\003\125\004\003\014\012  
\111\172\145\156\160\145\056\143\157\155

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\000\260\267\132\026\110\137\277\341\313\365\213\327\031  
\346\175

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\361\060\202\003\331\240\003\002\001\002\002\020\000  
\260\267\132\026\110\137\277\341\313\365\213\327\031\346\175\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\070  
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\024\060  
\022\006\003\125\004\012\014\013\111\132\105\116\120\105\040\123  
\056\101\056\061\023\060\021\006\003\125\004\003\014\012\111\172  
\145\156\160\145\056\143\157\155\060\036\027\015\060\067\061\062  
\061\063\061\063\060\070\062\070\132\027\015\063\067\061\062\061  
\063\060\070\062\067\062\065\132\060\070\061\013\060\011\006\003  
\125\004\006\023\002\105\123\061\024\060\022\006\003\125\004\012  
\014\013\111\132\105\116\120\105\040\123\056\101\056\061\023\060  
\021\006\003\125\004\003\014\012\111\172\145\156\160\145\056\143  
\157\155\060\202\002\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202  
\002\001\000\311\323\172\312\017\036\254\247\206\350\026\145\152  
\261\302\033\105\062\161\225\331\376\020\133\314\257\347\245\171  
\001\217\211\303\312\362\125\161\367\167\276\167\224\363\162\244  
\054\104\330\236\222\233\024\072\241\347\044\220\012\012\126\216  
\305\330\046\224\341\331\110\341\055\076\332\012\162\335\243\231  
\025\332\201\242\207\364\173\156\046\167\211\130\255\326\353\014

\262\101\172\163\156\155\333\172\170\101\351\010\210\022\176\207  
\056\146\021\143\154\124\373\074\235\162\300\274\056\377\302\267  
\335\015\166\343\072\327\367\264\150\276\242\365\343\201\156\301  
\106\157\135\215\340\115\306\124\125\211\032\063\061\012\261\127  
\271\243\212\230\303\354\073\064\305\225\101\151\176\165\302\074  
\040\305\141\272\121\107\240\040\220\223\241\220\113\363\116\174  
\205\105\124\232\321\005\046\101\260\265\115\035\063\276\304\003  
\310\045\174\301\160\333\073\364\011\055\124\047\110\254\057\341  
\304\254\076\310\313\222\114\123\071\067\043\354\323\001\371\340  
\011\104\115\115\144\300\341\015\132\207\042\274\255\033\243\376  
\046\265\025\363\247\374\204\031\351\354\241\210\264\104\151\204  
\203\363\211\321\164\006\251\314\013\326\302\336\047\205\120\046  
\312\027\270\311\172\207\126\054\032\001\036\154\276\023\255\020  
\254\265\044\365\070\221\241\326\113\332\361\273\322\336\107\265  
\361\274\201\366\131\153\317\031\123\351\215\025\313\112\313\251  
\157\104\345\033\101\317\341\206\247\312\320\152\237\274\114\215  
\006\063\132\242\205\345\220\065\240\142\134\026\116\360\343\242  
\372\003\032\264\054\161\263\130\054\336\173\013\333\032\017\353  
\336\041\037\006\167\006\003\260\311\357\231\374\300\271\117\013  
\206\050\376\322\271\352\343\332\245\303\107\151\022\340\333\360  
\366\031\213\355\173\160\327\002\326\355\207\030\050\054\004\044  
\114\167\344\110\212\032\306\073\232\324\017\312\372\165\322\001  
\100\132\215\171\277\213\317\113\317\252\026\301\225\344\255\114  
\212\076\027\221\324\261\142\345\202\345\200\004\244\003\176\215  
\277\332\177\242\017\227\117\014\323\015\373\327\321\345\162\176  
\034\310\167\377\133\232\017\267\256\005\106\345\361\250\026\354  
\107\244\027\002\003\001\000\001\243\201\366\060\201\363\060\201  
\260\006\003\125\035\021\004\201\250\060\201\245\201\017\151\156  
\146\157\100\151\172\145\156\160\145\056\143\157\155\244\201\221  
\060\201\216\061\107\060\105\006\003\125\004\012\014\076\111\132  
\105\116\120\105\040\123\056\101\056\040\055\040\103\111\106\040  
\101\060\061\063\063\067\062\066\060\055\122\115\145\162\143\056  
\126\151\164\157\162\151\141\055\107\141\163\164\145\151\172\040  
\124\061\060\065\065\040\106\066\062\040\123\070\061\103\060\101  
\006\003\125\004\011\014\072\101\166\144\141\040\144\145\154\040  
\115\145\144\151\164\145\162\162\141\156\145\157\040\105\164\157  
\162\142\151\144\145\141\040\061\064\040\055\040\060\061\060\061  
\060\040\126\151\164\157\162\151\141\055\107\141\163\164\145\151  
\172\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\006\060\035\006\003\125\035\016\004\026\004\024\035\034\145  
\016\250\362\045\173\264\221\317\344\261\261\346\275\125\164\154  
\005\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000  
\003\202\002\001\000\170\246\014\026\112\237\114\210\072\300\313  
\016\245\026\175\237\271\110\137\030\217\015\142\066\366\315\031  
\153\254\253\325\366\221\175\256\161\363\077\263\016\170\205\233  
\225\244\047\041\107\102\112\174\110\072\365\105\174\263\014\216  
\121\170\254\225\023\336\306\375\175\270\032\220\114\253\222\003

\307\355\102\001\316\017\330\261\372\242\222\341\140\155\256\172  
\153\011\252\306\051\356\150\111\147\060\200\044\172\061\026\071  
\133\176\361\034\056\335\154\011\255\362\061\301\202\116\271\273  
\371\276\277\052\205\077\300\100\243\072\131\374\131\113\074\050  
\044\333\264\025\165\256\015\210\272\056\163\300\275\130\207\345  
\102\362\353\136\356\036\060\042\231\313\067\321\304\041\154\201  
\354\276\155\046\346\034\344\102\040\236\107\260\254\203\131\160  
\054\065\326\257\066\064\264\315\073\370\062\250\357\343\170\211  
\373\215\105\054\332\234\270\176\100\034\141\347\076\242\222\054  
\113\362\315\372\230\266\051\377\363\362\173\251\037\056\240\223  
\127\053\336\205\003\371\151\067\313\236\170\152\005\264\305\061  
\170\211\354\172\247\205\341\271\173\074\336\276\036\171\204\316  
\237\160\016\131\302\065\056\220\052\061\331\344\105\172\101\244  
\056\023\233\064\016\146\173\111\253\144\227\320\106\303\171\235  
\162\120\143\246\230\133\006\275\110\155\330\071\203\160\350\065  
\360\005\321\252\274\343\333\310\002\352\174\375\202\332\302\133  
\122\065\256\230\072\255\272\065\223\043\247\037\110\335\065\106  
\230\262\020\150\344\245\061\302\012\130\056\031\201\020\311\120  
\165\374\352\132\026\316\021\327\356\357\120\210\055\141\377\077  
\102\163\005\224\103\325\216\074\116\001\072\031\245\037\106\116  
\167\320\135\345\201\042\041\207\376\224\175\204\330\223\255\326  
\150\103\110\262\333\353\163\044\347\221\177\124\244\266\200\076  
\235\243\074\114\162\302\127\304\240\324\314\070\047\316\325\006  
\236\242\110\331\351\237\316\202\160\066\223\232\073\337\226\041  
\343\131\267\014\332\221\067\360\375\131\132\263\231\310\151\154  
\103\046\001\065\143\140\125\211\003\072\165\330\272\112\331\124  
\377\356\336\200\330\055\321\070\325\136\055\013\230\175\076\154  
\333\374\046\210\307

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Izenpe.com"

# Issuer: CN=Izenpe.com,O=IZENPE S.A.,C=ES

# Serial Number:00:b0:b7:5a:16:48:5f:bf:e1:cb:f5:8b:d7:19:e6:7d

# Subject: CN=Izenpe.com,O=IZENPE S.A.,C=ES

# Not Valid Before: Thu Dec 13 13:08:28 2007

# Not Valid After : Sun Dec 13 08:27:25 2037

# Fingerprint (SHA-256):

25:30:CC:8E:98:32:15:02:BA:D9:6F:9B:1F:BA:1B:09:9E:2D:29:9E:0F:45:48:BB:91:4F:36:3B:C0:D4:53:1F

# Fingerprint (SHA1): 2F:78:3D:25:52:18:A7:4A:65:39:71:B5:2C:A2:9C:45:15:6F:E9:19

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Izenpe.com"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\057\170\075\045\122\030\247\112\145\071\161\265\054\242\234\105
\025\157\351\031
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\246\260\315\205\200\332\134\120\064\243\071\220\057\125\147\163
END
CKA_ISSUER
MULTILINE_OCTAL
\060\070\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\024\060\022\006\003\125\004\012\014\013\111\132\105\116\120\105
\040\123\056\101\056\061\023\060\021\006\003\125\004\003\014\012
\111\172\145\156\160\145\056\143\157\155
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\000\260\267\132\026\110\137\277\341\313\365\213\327\031
\346\175
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Go Daddy Root Certificate Authority - G2"
#
Issuer: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com, Inc.",L=Scottsdale,ST=Arizona,C=US
Serial Number: 0 (0x0)
Subject: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com,
Inc.",L=Scottsdale,ST=Arizona,C=US
Not Valid Before: Tue Sep 01 00:00:00 2009
Not Valid After : Thu Dec 31 23:59:59 2037
Fingerprint
(SHA-256):
45:14:0B:32:47:EB:9C:C8:C5:B4:F0:D7:B5:30:91:F7:32:92:08:9E:6E:5A:63:E2:74:9D:D3:AC:A9:19:8E:DA
Fingerprint (SHA1): 47:BE:AB:C9:22:EA:E8:0E:78:78:34:62:A7:9F:45:C2:54:FD:E6:8B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Go Daddy Root Certificate Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012
\023\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111

```

\156\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157  
\040\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164  
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164  
\171\040\055\040\107\062

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157  
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157  
\164\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012  
\023\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111  
\156\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157  
\040\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164  
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164  
\171\040\055\040\107\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\305\060\202\002\255\240\003\002\001\002\002\001\000  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156  
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164  
\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012\023  
\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111\156  
\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157\040  
\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164\151  
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171  
\040\055\040\107\062\060\036\027\015\060\071\060\071\060\061\060  
\060\060\060\060\060\132\027\015\063\067\061\062\063\061\062\063  
\065\071\065\071\132\060\201\203\061\013\060\011\006\003\125\004  
\006\023\002\125\123\061\020\060\016\006\003\125\004\010\023\007  
\101\162\151\172\157\156\141\061\023\060\021\006\003\125\004\007  
\023\012\123\143\157\164\164\163\144\141\154\145\061\032\060\030  
\006\003\125\004\012\023\021\107\157\104\141\144\144\171\056\143  
\157\155\054\040\111\156\143\056\061\061\060\057\006\003\125\004  
\003\023\050\107\157\040\104\141\144\144\171\040\122\157\157\164  
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164  
\150\157\162\151\164\171\040\055\040\107\062\060\202\001\042\060  
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202  
\001\017\000\060\202\001\012\002\202\001\001\000\277\161\142\010  
\361\372\131\064\367\033\311\030\243\367\200\111\130\351\042\203  
\023\246\305\040\103\001\073\204\361\346\205\111\237\047\352\366  
\204\033\116\240\264\333\160\230\307\062\001\261\005\076\007\116

\356\364\372\117\057\131\060\042\347\253\031\126\153\342\200\007  
\374\363\026\165\200\071\121\173\345\371\065\266\164\116\251\215  
\202\023\344\266\077\251\003\203\372\242\276\212\025\152\177\336  
\013\303\266\031\024\005\312\352\303\250\004\224\073\106\174\062  
\015\363\000\146\042\310\215\151\155\066\214\021\030\267\323\262  
\034\140\264\070\372\002\214\316\323\335\106\007\336\012\076\353  
\135\174\310\174\373\260\053\123\244\222\142\151\121\045\005\141  
\032\104\201\214\054\251\103\226\043\337\254\072\201\232\016\051  
\305\034\251\351\135\036\266\236\236\060\012\071\316\361\210\200  
\373\113\135\314\062\354\205\142\103\045\064\002\126\047\001\221  
\264\073\160\052\077\156\261\350\234\210\001\175\237\324\371\333  
\123\155\140\235\277\054\347\130\253\270\137\106\374\316\304\033  
\003\074\011\353\111\061\134\151\106\263\340\107\002\003\001\000  
\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004  
\024\072\232\205\007\020\147\050\266\357\366\275\005\101\156\040  
\301\224\332\017\336\060\015\006\011\052\206\110\206\367\015\001  
\001\013\005\000\003\202\001\001\000\231\333\135\171\325\371\227  
\131\147\003\141\361\176\073\006\061\165\055\241\040\216\117\145  
\207\264\367\246\234\274\330\351\057\320\333\132\356\317\164\214  
\163\264\070\102\332\005\173\370\002\165\270\375\245\261\327\256  
\366\327\336\023\313\123\020\176\212\106\321\227\372\267\056\053  
\021\253\220\260\047\200\371\350\237\132\351\067\237\253\344\337  
\154\263\205\027\235\075\331\044\117\171\221\065\326\137\004\353  
\200\203\253\232\002\055\265\020\364\330\220\307\004\163\100\355  
\162\045\240\251\237\354\236\253\150\022\231\127\306\217\022\072  
\011\244\275\104\375\006\025\067\301\233\344\062\243\355\070\350  
\330\144\363\054\176\024\374\002\352\237\315\377\007\150\027\333  
\042\220\070\055\172\215\321\124\361\151\343\137\063\312\172\075  
\173\012\343\312\177\137\071\345\342\165\272\305\166\030\063\316  
\054\360\057\114\255\367\261\347\316\117\250\304\233\112\124\006  
\305\177\175\325\010\017\342\034\376\176\027\270\254\136\366\324  
\026\262\103\011\014\115\366\247\153\264\231\204\145\312\172\210  
\342\342\104\276\134\367\352\034\365

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Go Daddy Root Certificate Authority - G2"

# Issuer: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com, Inc.",L=Scottsdale,ST=Arizona,C=US

# Serial Number: 0 (0x0)

# Subject: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com, Inc.",L=Scottsdale,ST=Arizona,C=US

# Not Valid Before: Tue Sep 01 00:00:00 2009

# Not Valid After : Thu Dec 31 23:59:59 2037



```

Fingerprint (SHA-256):
45:14:0B:32:47:EB:9C:C8:C5:B4:F0:D7:B5:30:91:F7:32:92:08:9E:6E:5A:63:E2:74:9D:D3:AC:A9:19:8E:DA
Fingerprint (SHA1): 47:BE:AB:C9:22:EA:E8:0E:78:78:34:62:A7:9F:45:C2:54:FD:E6:8B
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Go Daddy Root Certificate Authority - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\107\276\253\311\042\352\350\016\170\170\064\142\247\237\105\302
\124\375\346\213
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\200\072\274\042\301\346\373\215\233\073\047\112\062\033\232\001
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012
\023\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111
\156\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157
\040\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Starfield Root Certificate Authority - G2"
#
Issuer: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
Serial Number: 0 (0x0)
Subject: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
Not Valid Before: Tue Sep 01 00:00:00 2009
Not Valid After : Thu Dec
31 23:59:59 2037
Fingerprint (SHA-256):
2C:E1:CB:0B:F9:D2:F9:E1:02:99:3F:BE:21:51:52:C3:B2:DD:0C:AB:DE:1C:68:E5:31:9B:83:91:54:DB:B7:F5

```

# Fingerprint (SHA1): B5:1C:06:7C:EE:2B:0C:3D:F8:55:AB:2D:92:F4:FE:39:D4:E7:0F:0E

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Root Certificate Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062
\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145
\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062
\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145
\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\335\060\202\002\305\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164
\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012\023
\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150\156
\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062\060
\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145\154
\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040\107
```

\062\060\036\027\015\060\071\060\071\060\061\060\060\060\060\060  
\060\132\027\015\063\067\061\062\063\061\062\063\065\071\065\071  
\132\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172  
\157\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143  
\157\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004  
\012\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143  
\150\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061  
\062\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151  
\145\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151  
\143\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055  
\040\107\062\060\202\001\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002  
\202\001\001\000\275\355\301\003\374\366\217\374\002\261\157\133  
\237\110\331\235\171\342\242\267\003\141\126\030\303\107\266\327  
\312\075\065\056\211\103\367\241\151\233\336\212\032\375\023\040  
\234\264\111\167\062\051\126\375\271\354\214\335\042\372\162\334  
\047\141\227\356\366\132\204\354\156\031\271\211\054\334\204\133  
\325\164\373\153\137\305\211\245\020\122\211\106\125\364\270\165  
\034\346\177\344\124\256\113\370\125\162\127\002\031\370\027\161  
\131\353\036\050\007\164\305\235\110\276\154\264\364\244\260\363  
\144\067\171\222\300\354\106\136\177\341\155\123\114\142\257\315  
\037\013\143\273\072\235\373\374\171\000\230\141\164\317\046\202  
\100\143\363\262\162\152\031\015\231\312\324\016\165\314\067\373  
\213\211\301\131\361\142\177\137\263\137\145\060\370\247\267\115  
\166\132\036\166\136\064\300\350\226\126\231\212\263\360\177\244  
\315\275\334\062\061\174\221\317\340\137\021\370\153\252\111\134  
\321\231\224\321\242\343\143\133\011\166\265\126\142\341\113\164  
\035\226\324\046\324\010\004\131\320\230\016\016\346\336\374\303  
\354\037\220\361\002\003\001\000\001\243\102\060\100\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035  
\006\003\125\035\016\004\026\004\024\174\014\062\037\247\331\060  
\177\304\175\150\243\142\250\241\316\253\007\133\047\060\015\006  
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001  
\000\021\131\372\045\117\003\157\224\231\073\232\037\202\205\071  
\324\166\005\224\136\341\050\223\155\142\135\011\302\240\250\324  
\260\165\070\361\064\152\235\344\237\212\206\046\121\346\054\321  
\306\055\156\225\040\112\222\001\354\270\212\147\173\061\342\147  
\056\214\225\003\046\056\103\235\112\061\366\016\265\014\273\267  
\342\067\177\042\272\000\243\016\173\122\373\153\273\073\304\323  
\171\121\116\315\220\364\147\007\031\310\074\106\172\015\001\175  
\305\130\347\155\346\205\060\027\232\044\304\020\340\004\367\340  
\362\177\324\252\012\377\102\035\067\355\224\345\144\131\022\040  
\167\070\323\062\076\070\201\165\226\163\372\150\217\261\313\316  
\037\305\354\372\234\176\317\176\261\361\007\055\266\374\277\312  
\244\277\320\227\005\112\274\352\030\050\002\220\275\124\170\011  
\041\161\323\321\175\035\331\026\260\251\141\075\320\012\000\042

```
\374\307\173\313\011\144\105\013\073\100\201\367\175\174\062\365
\230\312\130\216\175\052\356\220\131\163\144\371\066\164\136\045
\241\365\146\005\056\177\071\025\251\052\373\120\213\216\205\151
\364
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Starfield

Root Certificate Authority - G2"

# Issuer: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,  
Inc.",L=Scottsdale,ST=Arizona,C=US

# Serial Number: 0 (0x0)

# Subject: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,  
Inc.",L=Scottsdale,ST=Arizona,C=US

# Not Valid Before: Tue Sep 01 00:00:00 2009

# Not Valid After : Thu Dec 31 23:59:59 2037

# Fingerprint (SHA-256):

2C:E1:CB:0B:F9:D2:F9:E1:02:99:3F:BE:21:51:52:C3:B2:DD:0C:AB:DE:1C:68:E5:31:9B:83:91:54:DB:B7:F5

# Fingerprint (SHA1): B5:1C:06:7C:EE:2B:0C:3D:F8:55:AB:2D:92:F4:FE:39:D4:E7:0F:0E

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Starfield Root Certificate Authority - G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\265\034\006\174\356\053\014\075\370\125\253\055\222\364\376\071
\324\347\017\016
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\326\071\201\306\122\176\226\151\374\374\312\146\355\005\362\226
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062
\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145
\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\062
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```

\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Starfield Services Root Certificate Authority - G2"
#
Issuer: CN=Starfield
 Services Root Certificate Authority - G2,O="Starfield Technologies, Inc.",L=Scottsdale,ST=Arizona,C=US
Serial Number: 0 (0x0)
Subject: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
Not Valid Before: Tue Sep 01 00:00:00 2009
Not Valid After : Thu Dec 31 23:59:59 2037
Fingerprint (SHA-256):
56:8D:69:05:A2:C8:87:08:A4:B3:02:51:90:ED:CF:ED:B1:97:4A:60:6A:13:C6:E5:29:0F:CB:2A:E6:3E:DA:B5
Fingerprint (SHA1): 92:5A:8F:8D:2C:6D:04:E0:66:5F:59:6A:FF:22:D8:63:E8:25:6F:3F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Services Root Certificate Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073
\060\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145
\154\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073
\060\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145

```

\154\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164  
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164  
\150\157\162\151\164\171\040\055\040\107\062  
END  
CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\001\000  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\003\357\060\202\002\327\240\003\002\001\002\002\001\000  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156  
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164  
\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012\023  
\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150\156  
\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073\060  
\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145\154  
\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164\040  
\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150  
\157\162\151\164\171\040\055\040\107\062\060\036\027\015\060\071  
\060\071\060\061\060\060\060\060\060\060\132\027\015\063\067\061  
\062\063\061\062\063\065\071\065\071\132\060\201\230\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\020\060\016\006\003  
\125\004\010\023\007\101\162\151\172\157\156\141\061\023\060\021  
\006\003\125\004\007\023\012\123\143\157\164\164\163\144\141\154  
\145\061\045\060\043\006\003\125\004\012\023\034\123\164\141\162  
\146\151\145\154\144\040\124\145\143\150\156\157\154\157\147\151  
\145\163\054\040\111\156\143\056\061\073\060\071\006\003\125\004  
\003\023\062\123\164\141\162\146\151\145\154\144\040\123\145\162  
\166\151\143\145\163\040\122\157\157\164\040\103\145\162\164\151  
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171  
\040\055\040\107\062\060\202\001\042\060\015\006\011\052\206\110  
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001  
\012\002\202\001\001\000\325\014\072\304\052\371\116\342\365\276  
\031\227\137\216\210\123\261\037\077\313\317\237\040\023\155\051  
\072\310\017\175\074\367\153\166\070\143\331\066\140\250\233\136  
\134\000\200\262\057\131\177\366\207\371\045\103\206\347\151\033  
\122\232\220\341\161\343\330\055\015\116\157\366\310\111\331\266  
\363\032\126\256\053\266\164\024\353\317\373\046\343\032\272\035  
\226\056\152\073\130\224\211\107\126\377\045\240\223\160\123\203  
\332\204\164\024\303\147\236\004\150\072\337\216\100\132\035\112  
\116\317\103\221\073\347\126\326\000\160\313\122\356\173\175\256  
\072\347\274\061\371\105\366\302\140\317\023\131\002\053\200\314  
\064\107\337\271\336\220\145\155\002\317\054\221\246\246\347\336  
\205\030\111\174\146\116\243\072\155\251\265\356\064\056\272\015  
\003\270\063\337\107\353\261\153\215\045\331\233\316\201\321\105  
\106\062\226\160\207\336\002\016\111\103\205\266\154\163\273\144

\352\141\101\254\311\324\124\337\207\057\307\042\262\046\314\237  
\131\124\150\237\374\276\052\057\304\125\034\165\100\140\027\205  
\002\125\071\213\177\005\002\003\001\000\001\243\102\060\100\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\035\006\003\125\035\016\004\026\004\024\234\137\000\337\252  
\001\327\060\053\070\210\242\270\155\112\234\362\021\221\203\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202  
\001\001\000\113\066\246\204\167\151\335\073\031\237\147\043\010  
\157\016\141\311\375\204\334\137\330\066\201\315\330\033\101\055  
\237\140\335\307\032\150\331\321\156\206\341\210\043\317\023\336  
\103\317\342\064\263\004\235\037\051\325\277\370\136\310\325\301  
\275\356\222\157\062\164\362\221\202\057\275\202\102\172\255\052  
\267\040\175\115\274\172\125\022\302\025\352\275\367\152\225\056  
\154\164\237\317\034\264\362\305\001\243\205\320\162\076\255\163  
\253\013\233\165\014\155\105\267\216\224\254\226\067\265\240\320  
\217\025\107\016\343\350\203\335\217\375\357\101\001\167\314\047  
\251\142\205\063\362\067\010\357\161\317\167\006\336\310\031\035  
\210\100\317\175\106\035\377\036\307\341\316\377\043\333\306\372  
\215\125\116\251\002\347\107\021\106\076\364\375\275\173\051\046  
\273\251\141\142\067\050\266\055\052\366\020\206\144\311\160\247  
\322\255\267\051\160\171\352\074\332\143\045\237\375\150\267\060  
\354\160\373\165\212\267\155\140\147\262\036\310\271\351\330\250  
\157\002\213\147\015\115\046\127\161\332\040\374\301\112\120\215  
\261\050\272

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Starfield Services Root Certificate Authority - G2"

# Issuer: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies,  
Inc.",L=Scottsdale,ST=Arizona,C=US

# Serial Number: 0 (0x0)

# Subject: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies,  
Inc.",L=Scottsdale,ST=Arizona,C=US

# Not Valid Before: Tue Sep 01 00:00:00 2009

# Not Valid After : Thu Dec 31 23:59:59 2037

# Fingerprint (SHA-256):

56:8D:69:05:A2:C8:87:08:A4:B3:02:51:90:ED:CF:ED:B1:97:4A:60:6A:13:C6:E5:29:0F:CB:2A:E6:3E:DA:B5

#

Fingerprint (SHA1): 92:5A:8F:8D:2C:6D:04:E0:66:5F:59:6A:FF:22:D8:63:E8:25:6F:3F

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Starfield Services Root Certificate Authority - G2"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\222\132\217\215\054\155\004\340\146\137\131\152\377\042\330\143
\350\045\157\077
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\027\065\164\257\173\141\034\353\364\371\074\342\356\100\371\242
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073
\060\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145
\154\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "AffirmTrust Commercial"
#
Issuer: CN=AffirmTrust Commercial,O=AffirmTrust,C=US
Serial Number:77:77:06:27:26:a9:b1:7c
Subject: CN=AffirmTrust Commercial,O=AffirmTrust,C=US
Not Valid Before: Fri Jan 29 14:06:06 2010
Not Valid After : Tue Dec 31 14:06:06 2030
Fingerprint (SHA-256):
03:76:AB:1D:54:C5:F9:80:3C:E4:B2:E2:01:A0:EE:7E:EF:7B:57:B6:36:E8:A9:3C:9B:8D:48:60:C9:6F:5F:A7
Fingerprint (SHA1): F9:B5:B6:32:45:5F:9C:BE:EC:57:5F:80:DC:E9:6E:2C:C7:B2:78:B7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Commercial"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061

```



\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155  
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026  
\101\146\146\151\162\155\124\162\165\163\164\040\103\157\155\155  
\145\162\143\151\141\154

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155  
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026  
\101\146\146\151\162\155\124\162\165\163\164\040\103\157\155\155  
\145\162\143\151\141\154

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\010\167\167\006\047\046\251\261\174

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\114\060\202\002\064\240\003\002\001\002\002\010\167  
\167\006\047\046\251\261\174\060\015\006\011\052\206\110\206\367  
\015\001\001\013\005\000\060\104\061\013\060\011\006\003\125\004  
\006\023\002\125\123\061\024\060\022\006\003\125\004\012\014\013  
\101\146\146\151\162\155\124\162\165\163\164\061\037\060\035\006  
\003\125\004\003\014\026\101\146\146\151\162\155\124\162\165\163  
\164\040\103\157\155\155\145\162\143\151\141\154\060\036\027\015  
\061\060\060\061\062\071\061\064\060\066\060\066\132\027\015\063  
\060\061\062\063\061\061\064\060\066\060\066\132\060\104\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\024\060\022\006  
\003\125\004\012\014\013\101\146\146\151\162\155\124\162\165\163  
\164\061\037\060\035\006\003\125\004\003\014\026\101\146\146\151  
\162\155\124\162\165\163\164\040\103\157\155\155\145\162\143\151  
\141\154\060\202\001\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202  
\001\001\000\366\033\117\147\007\053\241\025\365\006\042\313\037  
\001\262\343\163\105\006\104\111\054\273\111\045\024\326\316\303  
\267\253\054\117\306\101\062\224\127\372\022\247\133\016\342\217  
\037\036\206\031\247\252\265\055\271\137\015\212\302\257\205\065  
\171\062\055\273\034\142\067\362\261\133\112\075\312\315\161\137  
\351\102\276\224\350\310\336\371\042\110\144\306\345\253\306\053  
\155\255\005\360\372\325\013\317\232\345\360\120\244\213\073\107  
\245\043\133\172\172\370\063\077\270\357\231\227\343\040\301\326  
\050\211\317\224\373\271\105\355\343\100\027\021\324\164\360\013  
\061\342\053\046\152\233\114\127\256\254\040\076\272\105\172\005  
\363\275\233\151\025\256\175\116\040\143\304\065\166\072\007\002  
\311\067\375\307\107\356\350\361\166\035\163\025\362\227\244\265  
\310\172\171\331\102\252\053\177\134\376\316\046\117\243\146\201  
\065\257\104\272\124\036\034\060\062\145\235\346\074\223\136\120  
\116\172\343\072\324\156\314\032\373\371\322\067\256\044\052\253  
\127\003\042\050\015\111\165\177\267\050\332\165\277\216\343\334

```
\016\171\061\002\003\001\000\001\243\102\060\100\060\035\006\003
\125\035\016\004\026\004\024\235\223\306\123\213\136\312\257\077
\237\036\017\345\231\225\274\044\366\224\217\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011
\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001\000
\130\254\364\004\016\315\300\015\377\012\375\324\272\026\137\051
\275\173\150\231\130\111\322\264\035\067\115\177\047\175\106\006
\135\103\306\206\056\076\163\262\046\175\117\223\251\266\304\052
\232\253\041\227\024\261\336\214\323\253\211\025\330\153\044\324
\361\026\256\330\244\134\324\177\121\216\355\030\001\261\223\143
\275\274\370\141\200\232\236\261\316\102\160\342\251\175\006\045
\175\047\241\376\157\354\263\036\044\332\343\113\125\032\000\073
\065\264\073\331\327\135\060\375\201\023\211\362\302\006\053\355
\147\304\216\311\103\262\134\153\025\211\002\274\142\374\116\362
\265\063\252\262\157\323\012\242\120\343\366\073\350\056\104\302
\333\146\070\251\063\126\110\361\155\033\063\215\015\214\077\140
\067\235\323\312\155\176\064\176\015\237\162\166\213\033\237\162
\375\122\065\101\105\002\226\057\034\262\232\163\111\041\261\111
\107\105\107\264\357\152\064\021\311\115\232\314\131\267\326\002
\236\132\116\145\265\224\256\033\337\051\260\026\361\277\000\236
\007\072\027\144\265\004\265\043\041\231\012\225\073\227\174\357
END
```

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "AffirmTrust Commercial"

# Issuer: CN=AffirmTrust Commercial,O=AffirmTrust,C=US

# Serial Number:77:77:06:27:26:a9:b1:7c

# Subject: CN=AffirmTrust Commercial,O=AffirmTrust,C=US

# Not Valid Before: Fri Jan 29 14:06:06 2010

# Not Valid After : Tue Dec 31 14:06:06 2030

# Fingerprint (SHA-256):

03:76:AB:1D:54:C5:F9:80:3C:E4:B2:E2:01:A0:EE:7E:EF:7B:57:B6:36:E8:A9:3C:9B:8D:48:60:C9:6F:5F:A7

# Fingerprint (SHA1): F9:B5:B6:32:45:5F:9C:BE:EC:57:5F:80:DC:E9:6E:2C:C7:B2:78:B7

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "AffirmTrust Commercial"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\371\265\266\062\105\137\234\276\354\127\137\200\334\351\156\054
\307\262\170\267
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\202\222\272\133\357\315\212\157\246\075\125\371\204\366\326\267

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155  
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026  
\101\146\146\151\162\155\124\162\165\163\164\040\103\157\155\155  
\145\162\143\151\141\154

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\010\167\167\006\047\046\251\261\174

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

#

Certificate "AffirmTrust Networking"

#

# Issuer: CN=AffirmTrust Networking,O=AffirmTrust,C=US

# Serial Number:7c:4f:04:39:1c:d4:99:2d

# Subject: CN=AffirmTrust Networking,O=AffirmTrust,C=US

# Not Valid Before: Fri Jan 29 14:08:24 2010

# Not Valid After : Tue Dec 31 14:08:24 2030

# Fingerprint (SHA-256):

0A:81:EC:5A:92:97:77:F1:45:90:4A:F3:8D:5D:50:9F:66:B5:E2:C5:8F:CD:B5:31:05:8B:0E:17:F3:F0:B4:1B

# Fingerprint (SHA1): 29:36:21:02:8B:20:ED:02:F5:66:C5:32:D1:D6:ED:90:9F:45:00:2F

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "AffirmTrust Networking"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155  
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026  
\101\146\146\151\162\155\124\162\165\163\164\040\116\145\164\167  
\157\162\153\151\156\147

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155  
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026

\101\146\146\151\162\155\124\162\165\163\164\040\116\145\164\167  
\157\162\153\151\156\147

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\010\174\117\004\071\034\324\231\055

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\114\060\202\002\064\240\003\002\001\002\002\010\174  
\117\004\071\034\324\231\055\060\015\006\011\052\206\110\206\367  
\015\001\001\005\005\000\060\104\061\013\060\011\006\003\125\004  
\006\023\002\125\123\061\024\060\022\006\003\125\004\012\014\013  
\101\146\146\151\162\155\124\162\165\163\164\061\037\060\035\006  
\003\125\004\003\014\026\101\146\146\151\162\155\124\162\165\163  
\164\040\116\145\164\167\157\162\153\151\156\147\060\036\027\015  
\061\060\060\061\062\071\061\064\060\070\062\064\132\027\015\063  
\060\061\062\063\061\061\064\060\070\062\064\132\060\104\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\024\060\022\006  
\003\125\004\012\014\013\101\146\146\151\162\155\124\162\165\163  
\164\061\037\060\035\006\003\125\004\003\014\026\101\146\146\151  
\162\155\124\162\165\163\164\040\116\145\164\167\157\162\153\151  
\156\147\060\202\001\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202  
\001\001\000\264\204\314\063\027\056\153\224\154\153\141\122\240  
\353\243\317\171\224\114\345\224\200\231\313\125\144\104\145\217  
\147\144\342\006\343\134\067\111\366\057\233\204\204\036\055\362  
\140\235\060\116\314\204\205\342\054\317\036\236\376\066\253\063  
\167\065\104\330\065\226\032\075\066\350\172\016\330\325\107\241  
\152\151\213\331\374\273\072\256\171\132\325\364\326\161\273\232  
\220\043\153\232\267\210\164\207\014\036\137\271\236\055\372\253  
\123\053\334\273\166\076\223\114\010\010\214\036\242\043\034\324  
\152\255\042\272\231\001\056\155\145\313\276\044\146\125\044\113  
\100\104\261\033\327\341\302\205\300\336\020\077\075\355\270\374  
\361\361\043\123\334\277\145\227\157\331\371\100\161\215\175\275  
\225\324\316\276\240\136\047\043\336\375\246\320\046\016\000\051  
\353\074\106\360\075\140\277\077\120\322\334\046\101\121\236\024  
\067\102\004\243\160\127\250\033\207\355\055\372\173\356\214\012  
\343\251\146\211\031\313\101\371\335\104\066\141\317\342\167\106  
\310\175\366\364\222\201\066\375\333\064\361\162\176\363\014\026  
\275\264\025\002\003\001\000\001\243\102\060\100\060\035\006\003  
\125\035\016\004\026\004\024\007\037\322\347\234\332\302\156\242  
\100\264\260\172\120\020\120\164\304\310\275\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011  
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000  
\211\127\262\026\172\250\302\375\326\331\233\233\064\302\234\264  
\062\024\115\247\244\337\354\276\247\276\370\103\333\221\067\316  
\264\062\056\120\125\032\065\116\166\103\161\040\357\223\167\116  
\025\160\056\207\303\301\035\155\334\313\265\047\324\054\126\321

```
\122\123\072\104\322\163\310\304\033\005\145\132\142\222\234\356
\101\215\061\333\347\064\352\131\041\325\001\172\327\144\270\144
\071\315\311\355\257\355\113\003\110\247\240\231\001\200\334\145
\243\066\256\145\131\110\117\202\113\310\145\361\127\035\345\131
\056\012\077\154\330\321\365\345\011\264\154\124\000\012\340\025
\115\207\165\155\267\130\226\132\335\155\322\000\240\364\233\110
\276\303\067\244\272\066\340\174\207\205\227\032\025\242\336\056
\242\133\275\257\030\371\220\120\315\160\131\370\047\147\107\313
\307\240\007\072\175\321\054\135\154\031\072\146\265\175\375\221
\157\202\261\276\010\223\333\024\107\361\242\067\307\105\236\074
\307\167\257\144\250\223\337\366\151\203\202\140\362\111\102\064
\355\132\000\124\205\034\026\066\222\014\134\372\246\255\277\333
END
```

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL

CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "AffirmTrust Networking"

# Issuer: CN=AffirmTrust Networking,O=AffirmTrust,C=US

# Serial Number:7c:4f:04:39:1c:d4:99:2d

# Subject: CN=AffirmTrust Networking,O=AffirmTrust,C=US

# Not Valid Before: Fri Jan 29 14:08:24 2010

# Not Valid After : Tue Dec 31 14:08:24 2030

# Fingerprint (SHA-256):

0A:81:EC:5A:92:97:77:F1:45:90:4A:F3:8D:5D:50:9F:66:B5:E2:C5:8F:CD:B5:31:05:8B:0E:17:F3:F0:B4:1B

# Fingerprint (SHA1): 29:36:21:02:8B:20:ED:02:F5:66:C5:32:D1:D6:ED:90:9F:45:00:2F

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "AffirmTrust Networking"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\051\066\041\002\213\040\355\002\365\146\305\062\321\326\355\220
\237\105\000\057
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\102\145\312\276\001\232\232\114\251\214\101\111\315\300\325\177
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\116\145\164\167
\157\162\153\151\156\147
```

END

CKA\_SERIAL\_NUMBER

```

MULTILINE_OCTAL
\002\010\174\117\004\071\034\324\231\055
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "AffirmTrust Premium"
#
Issuer: CN=AffirmTrust Premium,O=AffirmTrust,C=US
Serial Number:6d:8c:14:46:b1:a6:0a:ee
Subject: CN=AffirmTrust Premium,O=AffirmTrust,C=US
Not Valid Before: Fri Jan 29 14:10:36 2010
Not Valid After : Mon Dec 31 14:10:36 2040
Fingerprint (SHA-256):
70:A7:3F:7F:37:6B:60:07:42:48:90:45:34:B1:14:82:D5:BF:0E:69:8E:CC:49:8D:F5:25:77:EB:F2:E9:3B:9A
Fingerprint (SHA1): D8:A6:33:2C:E0:03:6F:B1:85:F6:63:4F:7D:6A:06:65:26:32:28:27
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Premium"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\034\060\032\006\003\125\004\003\014\023
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\034\060\032\006\003\125\004\003\014\023
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\155\214\024\106\261\246\012\356
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\106\060\202\003\056\240\003\002\001\002\002\010\155
\214\024\106\261\246\012\356\060\015\006\011\052\206\110\206\367
\015\001\001\014\005\000\060\101\061\013\060\011\006\003\125\004

```

\006\023\002\125\123\061\024\060\022\006\003\125\004\012\014\013  
\101\146\146\151\162\155\124\162\165\163\164\061\034\060\032\006  
\003\125\004\003\014\023\101\146\146\151\162\155\124\162\165\163  
\164\040\120\162\145\155\151\165\155\060\036\027\015\061\060\060  
\061\062\071\061\064\061\060\063\066\132\027\015\064\060\061\062  
\063\061\061\064\061\060\063\066\132\060\101\061\013\060\011\006  
\003\125\004\006\023\002\125\123\061\024\060\022\006\003\125\004  
\012\014\013\101\146\146\151\162\155\124\162\165\163\164\061\034  
\060\032\006\003\125\004\003\014\023\101\146\146\151\162\155\124  
\162\165\163\164\040\120\162\145\155\151\165\155\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\304\022\337  
\251\137\376\101\335\335\365\237\212\343\366\254\341\074\170\232  
\274\330\360\177\172\240\063\052\334\215\040\133\256\055\157\347  
\223\331\066\160\152\150\317\216\121\243\205\133\147\004\240\020  
\044\157\135\050\202\301\227\127\330\110\051\023\266\341\276\221  
\115\337\205\014\123\030\232\036\044\242\117\217\360\242\205\013  
\313\364\051\177\322\244\130\356\046\115\311\252\250\173\232\331  
\372\070\336\104\127\025\345\370\214\310\331\110\342\015\026\047  
\035\036\310\203\205\045\267\272\252\125\101\314\003\042\113\055  
\221\215\213\346\211\257\146\307\351\377\053\351\074\254\332\322  
\263\303\341\150\234\211\370\172\000\126\336\364\125\225\154\373  
\272\144\335\142\213\337\013\167\062\353\142\314\046\232\233\273  
\252\142\203\114\264\006\172\060\310\051\277\355\006\115\227\271  
\034\304\061\053\325\137\274\123\022\027\234\231\127\051\146\167  
\141\041\061\007\056\045\111\235\030\362\356\363\053\161\214\265  
\272\071\007\111\167\374\357\056\222\220\005\215\055\057\167\173  
\357\103\277\065\273\232\330\371\163\247\054\362\320\127\356\050  
\116\046\137\217\220\150\011\057\270\370\334\006\351\056\232\076  
\121\247\321\042\304\012\247\070\110\154\263\371\377\175\253\206  
\127\343\272\326\205\170\167\272\103\352\110\177\366\330\276\043  
\155\036\277\321\066\154\130\134\361\356\244\031\124\032\365\003  
\322\166\346\341\214\275\074\263\323\110\113\342\310\370\177\222  
\250\166\106\234\102\145\076\244\036\301\007\003\132\106\055\270  
\227\363\267\325\262\125\041\357\272\334\114\000\227\373\024\225  
\047\063\277\350\103\107\106\322\010\231\026\140\073\232\176\322  
\346\355\070\352\354\001\036\074\110\126\111\011\307\114\067\000  
\236\210\016\300\163\341\157\146\351\162\107\060\076\020\345\013  
\003\311\232\102\000\154\305\224\176\141\304\212\337\177\202\032  
\013\131\304\131\062\167\263\274\140\151\126\071\375\264\006\173  
\054\326\144\066\331\275\110\355\204\037\176\245\042\217\052\270  
\102\364\202\267\324\123\220\170\116\055\032\375\201\157\104\327  
\073\001\164\226\102\340\000\342\056\153\352\305\356\162\254\273  
\277\376\352\252\250\370\334\366\262\171\212\266\147\002\003\001  
\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004  
\024\235\300\147\246\014\042\331\046\365\105\253\246\145\122\021  
\047\330\105\254\143\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377

\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015  
\001\001\014\005\000\003\202\002\001\000\263\127\115\020\142\116  
\072\344\254\352\270\034\257\062\043\310\263\111\132\121\234\166  
\050\215\171\252\127\106\027\325\365\122\366\267\104\350\010\104  
\277\030\204\322\013\200\315\305\022\375\000\125\005\141\207\101  
\334\265\044\236\074\304\330\310\373\160\236\057\170\226\203\040  
\066\336\174\017\151\023\210\245\165\066\230\010\246\306\337\254  
\316\343\130\326\267\076\336\272\363\353\064\100\330\242\201\365  
\170\077\057\325\245\374\331\242\324\136\004\016\027\255\376\101  
\360\345\262\162\372\104\202\063\102\350\055\130\367\126\214\142  
\077\272\102\260\234\014\134\176\056\145\046\134\123\117\000\262  
\170\176\241\015\231\055\215\270\035\216\242\304\260\375\140\320  
\060\244\216\310\004\142\251\304\355\065\336\172\227\355\016\070  
\136\222\057\223\160\245\251\234\157\247\175\023\035\176\306\010  
\110\261\136\147\353\121\010\045\351\346\045\153\122\051\221\234  
\322\071\163\010\127\336\231\006\264\133\235\020\006\341\302\000  
\250\270\034\112\002\012\024\320\301\101\312\373\214\065\041\175  
\202\070\362\251\124\221\031\065\223\224\155\152\072\305\262\320  
\273\211\206\223\350\233\311\017\072\247\172\270\241\360\170\106  
\372\374\067\057\345\212\204\363\337\376\004\331\241\150\240\057  
\044\342\011\225\006\325\225\312\341\044\226\353\174\366\223\005  
\273\355\163\351\055\321\165\071\327\347\044\333\330\116\137\103  
\217\236\320\024\071\277\125\160\110\231\127\061\264\234\356\112  
\230\003\226\060\037\140\006\356\033\043\376\201\140\043\032\107  
\142\205\245\314\031\064\200\157\263\254\032\343\237\360\173\110  
\255\325\001\331\147\266\251\162\223\352\055\146\265\262\270\344  
\075\074\262\357\114\214\352\353\007\277\253\065\232\125\206\274  
\030\246\265\250\136\264\203\154\153\151\100\323\237\334\361\303  
\151\153\271\341\155\011\364\361\252\120\166\012\172\175\172\027  
\241\125\226\102\231\061\011\335\140\021\215\005\060\176\346\216  
\106\321\235\024\332\307\027\344\005\226\214\304\044\265\033\317  
\024\007\262\100\370\243\236\101\206\274\004\320\153\226\310\052  
\200\064\375\277\357\006\243\335\130\305\205\075\076\217\376\236  
\051\340\266\270\011\150\031\034\030\103

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "AffirmTrust Premium"

# Issuer: CN=AffirmTrust Premium,O=AffirmTrust,C=US

# Serial Number:6d:8c:14:46:b1:a6:0a:ee

# Subject: CN=AffirmTrust Premium,O=AffirmTrust,C=US

# Not Valid Before: Fri Jan 29 14:10:36 2010

# Not Valid After : Mon Dec 31 14:10:36 2040

# Fingerprint (SHA-256):

70:A7:3F:7F:37:6B:60:07:42:48:90:45:34:B1:14:82:D5:BF:0E:69:8E:CC:49:8D:F5:25:77:EB:F2:E9:3B:9A



```

#
Fingerprint (SHA1): D8:A6:33:2C:E0:03:6F:B1:85:F6:63:4F:7D:6A:06:65:26:32:28:27
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Premium"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\330\246\063\054\340\003\157\261\205\366\143\117\175\152\006\145
\046\062\050\047
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\304\135\016\110\266\254\050\060\116\012\274\371\070\026\207\127
END
CKA_ISSUER MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\034\060\032\006\003\125\004\003\014\023
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\155\214\024\106\261\246\012\356
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

#
Certificate "AffirmTrust Premium ECC"
#
Issuer: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US
Serial Number:74:97:25:8a:c7:3f:7a:54
Subject: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US
Not Valid Before: Fri Jan 29 14:20:24 2010
Not Valid After : Mon Dec 31 14:20:24 2040
Fingerprint (SHA-256):
BD:71:FD:F6:DA:97:E4:CF:62:D1:64:7A:DD:25:81:B0:7D:79:AD:F8:39:7E:B4:EC:BA:9C:5E:84:88:82:14:23
Fingerprint (SHA1): B8:23:6B:00:2F:1D:16:86:53:01:55:6C:11:A4:37:CA:EB:FF:C3:BB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Premium ECC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL

```

\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155  
\124\162\165\163\164\061\040\060\036\006\003\125\004\003\014\027  
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155  
\151\165\155\040\105\103\103

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155  
\124\162\165\163\164\061\040\060\036\006\003\125\004\003\014\027  
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155  
\151\165\155\040\105\103\103

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\010\164\227\045\212\307\077\172\124

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\001\376\060\202\001\205\240\003\002\001\002\002\010\164  
\227\045\212\307\077\172\124\060\012\006\010\052\206\110\316\075  
\004\003\003\060\105\061\013\060\011\006\003\125\004\006\023\002  
\125\123\061\024\060\022\006\003\125\004\012\014\013\101\146\146  
\151\162\155\124\162\165\163\164\061\040\060\036\006\003\125\004  
\003\014\027\101\146\146\151\162\155\124\162\165\163\164\040\120  
\162\145\155\151\165\155\040\105\103\103\060\036\027\015\061\060  
\060\061\062\071\061\064\062\060\062\064\132\027\015\064\060\061  
\062\063\061\061\064\062\060\062\064\132\060\105\061\013\060\011  
\006\003\125\004\006\023\002\125\123\061\024\060\022\006\003\125  
\004\012\014\013\101\146\146\151\162\155\124\162\165\163\164\061  
\040\060\036\006\003\125\004\003\014\027\101\146\146\151\162\155  
\124\162\165\163\164\040\120\162\145\155\151\165\155\040\105\103  
\103\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005  
\053\201\004\000\042\003\142\000\004\015\060\136\033\025\235\003  
\320\241\171\065\267\072\074\222\172\312\025\034\315\142\363\234  
\046\134\007\075\345\124\372\243\326\314\022\352\364\024\137\350  
\216\031\253\057\056\110\346\254\030\103\170\254\320\067\303\275  
\262\315\054\346\107\342\032\346\143\270\075\056\057\170\304\117  
\333\364\017\244\150\114\125\162\153\225\035\116\030\102\225\170  
\314\067\074\221\342\233\145\053\051\243\102\060\100\060\035\006  
\003\125\035\016\004\026\004\024\232\257\051\172\300\021\065\065  
\046\121\060\000\303\152\376\100\325\256\326\074\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\012\006  
\010\052\206\110\316\075\004\003\003\003\147\000\060\144\002\060  
\027\011\363\207\210\120\132\257\310\300\102\277\107\137\365\154  
\152\206\340\304\047\164\344\070\123\327\005\177\033\064\343\306  
\057\263\312\011\074\067\235\327\347\270\106\361\375\241\342\161

```
\002\060\102\131\207\103\324\121\337\272\323\011\062\132\316\210
\176\127\075\234\137\102\153\365\007\055\265\360\202\223\371\131
\157\256\144\372\130\345\213\036\343\143\276\265\201\315\157\002
\214\171
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "AffirmTrust Premium ECC"

# Issuer: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US

# Serial Number:74:97:25:8a:c7:3f:7a:54

# Subject: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US

# Not Valid

Before: Fri Jan 29 14:20:24 2010

# Not Valid After : Mon Dec 31 14:20:24 2040

# Fingerprint (SHA-256):

BD:71:FD:F6:DA:97:E4:CF:62:D1:64:7A:DD:25:81:B0:7D:79:AD:F8:39:7E:B4:EC:BA:9C:5E:84:88:82:14:23

# Fingerprint (SHA1): B8:23:6B:00:2F:1D:16:86:53:01:55:6C:11:A4:37:CA:EB:FF:C3:BB

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "AffirmTrust Premium ECC"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\270\043\153\000\057\035\026\206\123\001\125\154\021\244\067\312
\353\377\303\273
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\144\260\011\125\317\261\325\231\342\276\023\253\246\135\352\115
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\040\060\036\006\003\125\004\003\014\027
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155\040\105\103\103
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\010\164\227\045\212\307\077\172\124
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

```

#
Certificate "Certum Trusted Network CA"
#
Issuer: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
Serial Number: 279744 (0x444c0)
Subject: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
Not Valid Before: Wed Oct 22 12:07:37 2008
Not Valid After : Mon Dec 31 12:07:37 2029
Fingerprint (SHA-256):
5C:58:46:8D:55:F5:8E:49:7E:74:39:82:D2:B5:00:10:B6:D1:65:37:4A:CF:83:A7:D4:A3:2D:B7:68:C4:40:8E
Fingerprint (SHA1): 07:E0:32:E0:20:B7:2C:3F:19:2F:06:28:A2:59:3A:19:A7:0F:06:9E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164
\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060\040
\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124\162
\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164
\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060\040
\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124\162
\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\004\104\300
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\273\060\202\002\243\240\003\002\001\002\002\003\004
\104\300\060\015\006\011\052\206\110\206\367\015\001\001\005\005

```

\000\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114  
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145  
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040  
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103  
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060  
\040\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124  
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103  
\101\060\036\027\015\060\070\061\060\062\062\061\062\060\067\063  
\067\132\027\015\062\071\061\062\063\061\061\062\060\067\063\067  
\132\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114  
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145  
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040  
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103  
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060  
\040\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124  
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103  
\101\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001  
\001\000\343\373\175\243\162\272\302\360\311\024\207\365\153\001  
\116\341\156\100\007\272\155\047\135\177\367\133\055\263\132\307  
\121\137\253\244\062\246\141\207\266\156\017\206\322\060\002\227  
\370\327\151\127\241\030\071\135\152\144\171\306\001\131\254\074  
\061\112\070\174\322\004\322\113\050\350\040\137\073\007\242\314  
\115\163\333\363\256\117\307\126\325\132\247\226\211\372\363\253  
\150\324\043\206\131\047\317\011\047\274\254\156\162\203\034\060  
\162\337\340\242\351\322\341\164\165\031\275\052\236\173\025\124  
\004\033\327\103\071\255\125\050\305\342\032\273\364\300\344\256  
\070\111\063\314\166\205\237\071\105\322\244\236\362\022\214\121  
\370\174\344\055\177\365\254\137\353\026\237\261\055\321\272\314  
\221\102\167\114\045\311\220\070\157\333\360\314\373\216\036\227  
\131\076\325\140\116\346\005\050\355\111\171\023\113\272\110\333  
\057\371\162\323\071\312\376\037\330\064\162\365\264\100\317\061  
\001\303\354\336\021\055\027\135\037\270\120\321\136\031\247\151  
\336\007\063\050\312\120\225\371\247\124\313\124\206\120\105\251  
\371\111\002\003\001\000\001\243\102\060\100\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003  
\125\035\016\004\026\004\024\010\166\315\313\007\377\044\366\305  
\315\355\273\220\274\342\204\067\106\165\367\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052  
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\246  
\250\255\042\316\001\075\246\243\377\142\320\110\235\213\136\162  
\260\170\104\343\334\034\257\011\375\043\110\372\275\052\304\271  
\125\004\265\020\243\215\047\336\013\202\143\320\356\336\014\067  
\171\101\133\042\262\260\232\101\134\246\160\340\324\320\167\313  
\043\323\000\340\154\126\057\341\151\015\015\331\252\277\041\201  
\120\331\006\245\250\377\225\067\320\252\376\342\263\365\231\055

```
\105\204\212\345\102\011\327\164\002\057\367\211\330\231\351\274
\047\324\107\215\272\015\106\034\167\317\024\244\034\271\244\061
\304\234\050\164\003\064\377\063\031\046\245\351\015\164\267\076
\227\306\166\350\047\226\243\146\335\341\256\362\101\133\312\230
\126\203\163\160\344\206\032\322\061\101\272\057\276\055\023\132
\166\157\116\350\116\201\016\077\133\003\042\240\022\276\146\130
\021\112\313\003\304\264\052\052\055\226\027\340\071\124\274\110
\323\166\047\235\232\055\006\246\311\354\071\322\253\333\237\232
\013\047\002\065\051\261\100\225\347\371\350\234\125\210\031\106
\326\267\064\365\176\316\071\232\331\070\361\121\367\117\054
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Certum Trusted Network CA"

# Issuer: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies S.A.,C=PL

# Serial Number: 279744 (0x444c0)

# Subject: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies S.A.,C=PL

# Not Valid Before: Wed Oct 22 12:07:37 2008

# Not Valid After : Mon Dec 31 12:07:37 2029

# Fingerprint (SHA-256):

5C:58:46:8D:55:F5:8E:49:7E:74:39:82:D2:B5:00:10:B6:D1:65:37:4A:CF:83:A7:D4:A3:2D:B7:68:C4:40:8E

# Fingerprint (SHA1): 07:E0:32:E0:20:B7:2C:3F:19:2F:06:28:A2:59:3A:19:A7:0F:06:9E

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE

CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certum Trusted Network CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\007\340\062\340\040\267\054\077\031\057\006\050\242\131\072\031
\247\017\006\236
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\325\351\201\100\305\030\151\374\106\054\211\165\142\017\252\170
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164
\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060\040
\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124\162
```

```

\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\004\104\300
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "TWCA Root Certification Authority"
#
Issuer: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW
Serial Number: 1 (0x1)
Subject: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW
Not Valid Before: Thu Aug 28 07:24:33 2008
Not Valid After : Tue Dec 31 15:59:59 2030
Fingerprint (SHA-256):
BF:D8:8F:E1:10:1C:41:AE:3E:80:1B:F8:BE:56:35:0E:E9:BA:D1:A6:B9:BD:51:5E:DC:5C:6D:5B:87:11:AC:44
Fingerprint (SHA1): CF:9E:87:6D:D3:EB:FC:42:26:97:A3:B5:A3:7A:A0:76:A9:06:23:48
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END

```

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\173\060\202\002\143\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061\022  
\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116\055  
\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157\157  
\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041\124  
\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171  
\060\036\027\015\060\070\060\070\062\070\060\067\062\064\063\063  
\132\027\015\063\060\061\062\063\061\061\065\065\071\065\071\132  
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061  
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116  
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157  
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041  
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
\171\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001  
\001\000\260\176\162\270\244\003\224\346\247\336\011\070\221\112  
\021\100\207\247\174\131\144\024\173\265\021\020\335\376\277\325  
\300\273\126\342\205\045\364\065\162\017\370\123\320\101\341\104  
\001\302\264\034\303\061\102\026\107\205\063\042\166\262\012\157  
\017\345\045\120\117\205\206\276\277\230\056\020\147\036\276\021  
\005\206\005\220\304\131\320\174\170\020\260\200\134\267\341\307  
\053\165\313\174\237\256\265\321\235\043\067\143\247\334\102\242  
\055\222\004\033\120\301\173\270\076\033\311\126\004\213\057\122  
\233\255\251\126\351\301\377\255\251\130\207\060\266\201\367\227  
\105\374\031\127\073\053\157\344\107\364\231\105\376\035\361\370  
\227\243\210\035\067\034\134\217\340\166\045\232\120\370\240\124  
\377\104\220\166\043\322\062\306\303\253\006\277\374\373\277\363  
\255\175\222\142\002\133\051\323\065\243\223\232\103\144\140\135  
\262\372\062\377\073\004\257\115\100\152\371\307\343\357\043\375  
\153\313\345\017\213\070\015\356\012\374\376\017\230\237\060\061  
\335\154\122\145\371\213\201\276\042\341\034\130\003\272\221\033  
\211\007\002\003\001\000\001\243\102\060\100\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003  
\125\035\016\004\026\004\024\152\070\133\046\215\336\213\132\362  
\117\172\124\203\031\030\343\010\065\246\272\060\015\006\011\052  
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\074  
\325\167\075\332\337\211\272\207\014\010\124\152\040\120\222\276  
\260\101\075\271\046\144\203\012\057\350\100\300\227\050\047\202  
\060\112\311\223\377\152\347\246\000\177\211\102\232\326\021\345  
\123\316\057\314\362\332\005\304\376\342\120\304\072\206\175\314



```
\332\176\020\011\073\222\065\052\123\262\376\353\053\005\331\154
\135\346\320\357\323\152\146\236\025\050\205\172\350\202\000\254
\036\247\011\151\126\102\323\150\121\030\276\124\232\277\104\101
\272\111\276\040\272\151\134\356\270\167\315\316\154\037\255\203
\226\030\175\016\265\024\071\204\361\050\351\055\243\236\173\036
\172\162\132\203\263\171\157\357\264\374\320\012\245\130\117\106
\337\373\155\171\131\362\204\042\122\256\017\314\373\174\073\347
\152\312\107\141\303\172\370\323\222\004\037\270\040\204\341\066
\124\026\307\100\336\073\212\163\334\337\306\011\114\337\354\332
\377\324\123\102\241\311\362\142\035\042\203\074\227\305\371\031
\142\047\254\145\042\327\323\074\306\345\216\262\123\314\111\316
\274\060\376\173\016\063\220\373\355\322\024\221\037\007\257
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "TWCA Root Certification Authority"

# Issuer: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW

# Serial Number: 1 (0x1)

# Subject: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW

# Not Valid Before: Thu Aug 28 07:24:33 2008

# Not Valid After : Tue Dec 31 15:59:59 2030

# Fingerprint (SHA-256):

BF:D8:8F:E1:10:1C:41:AE:3E:80:1B:F8:BE:56:35:0E:E9:BA:D1:A6:B9:BD:51:5E:DC:5C:6D:5B:87:11:AC:44

#

Fingerprint (SHA1): CF:9E:87:6D:D3:EB:FC:42:26:97:A3:B5:A3:7A:A0:76:A9:06:23:48

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "TWCA Root Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\317\236\207\155\323\353\374\102\046\227\243\265\243\172\240\166
\251\006\043\110
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\252\010\217\366\371\173\267\362\261\247\036\233\352\352\275\171
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
```

```

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Explicitly Distrust DigiNotar Root CA"
#
Issuer: E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL
Serial Number:0f:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff
Subject: E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL
Not Valid Before: Fri Jul 27 17:19:37 2007
Not Valid After : Mon Mar 31 18:19:22 2025
Fingerprint (MD5): 0A:A4:D5:CC:BA:B4:FB:A3:59:E3:E6:01:DD:53:D9:4E
Fingerprint (SHA1): C1:77:CB:4B:E0:B4:26:8E:F5:C7:CF:45:99:22:B9:B0:CE:BA:21:2F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Explicitly Distrust DigiNotar Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT
MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\022\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157
\164\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151
\147\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061
\040\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021
\151\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156
\154
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\022\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157
\164\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151
\147\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061
\040\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021
\151\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156
\154
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\017\377\377\377\377\377\377\377\377\377\377\377\377\377\377

```

\377\377

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\212\060\202\003\162\240\003\002\001\002\002\020\017  
\377\377\377\377\377\377\377\377\377\377\377\377\377\377\377\377\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\137  
\061\013\060\011\006\003\125\004\006\023\002\116\114\061\022\060  
\020\006\003\125\004\012\023\011\104\151\147\151\116\157\164\141  
\162\061\032\060\030\006\003\125\004\003\023\021\104\151\147\151  
\116\157\164\141\162\040\122\157\157\164\040\103\101\061\040\060  
\036\006\011\052\206\110\206\367\015\001\011\001\026\021\151\156  
\146\157\100\144\151\147\151\156\157\164\141\162\056\156\154\060  
\036\027\015\060\067\060\067\062\067\061\067\061\071\063\067\132  
\027\015\062\065\060\063\063\061\061\070\061\071\062\062\132\060  
\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061\022  
\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157\164  
\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151\147  
\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061\040  
\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021\151  
\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156\154  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\254\260\130\301\000\275\330\041\010\013\053\232\376\156\126  
\060\005\237\033\167\220\020\101\134\303\015\207\021\167\216\201  
\361\312\174\351\214\152\355\070\164\065\273\332\337\371\273\300  
\011\067\264\226\163\201\175\063\032\230\071\367\223\157\225\177  
\075\271\261\165\207\272\121\110\350\213\160\076\225\004\305\330  
\266\303\026\331\210\260\261\207\035\160\332\206\264\017\024\213  
\172\317\020\321\164\066\242\022\173\167\206\112\171\346\173\337  
\002\021\150\245\116\206\256\064\130\233\044\023\170\126\042\045  
\036\001\213\113\121\161\373\202\314\131\226\151\210\132\150\123  
\305\271\015\002\067\313\113\274\146\112\220\176\052\013\005\007  
\355\026\137\125\220\165\330\106\311\033\203\342\010\276\361\043  
\314\231\035\326\052\017\203\040\025\130\047\202\056\372\342\042  
\302\111\261\271\001\201\152\235\155\235\100\167\150\166\116\041  
\052\155\204\100\205\116\166\231\174\202\363\363\267\002\131\324  
\046\001\033\216\337\255\123\006\321\256\030\335\342\262\072\313  
\327\210\070\216\254\133\051\271\031\323\230\371\030\003\317\110  
\202\206\146\013\033\151\017\311\353\070\210\172\046\032\005\114  
\222\327\044\324\226\362\254\122\055\243\107\325\122\366\077\376  
\316\204\006\160\246\252\076\242\362\266\126\064\030\127\242\344  
\201\155\347\312\360\152\323\307\221\153\002\203\101\174\025\357  
\153\232\144\136\343\320\074\345\261\353\173\135\206\373\313\346  
\167\111\315\243\145\334\367\271\234\270\344\013\137\223\317\314  
\060\032\062\034\316\034\143\225\245\371\352\341\164\213\236\351  
\053\251\060\173\240\030\037\016\030\013\345\133\251\323\321\154  
\036\007\147\217\221\113\251\212\274\322\146\252\223\001\210\262  
\221\372\061\134\325\246\301\122\010\011\315\012\143\242\323\042

\246\350\241\331\071\006\227\365\156\215\002\220\214\024\173\077  
\200\315\033\234\272\304\130\162\043\257\266\126\237\306\172\102  
\063\051\007\077\202\311\346\037\005\015\315\114\050\066\213\323  
\310\076\034\306\210\357\136\356\211\144\351\035\353\332\211\176  
\062\246\151\321\335\314\210\237\321\320\311\146\041\334\006\147  
\305\224\172\232\155\142\114\175\314\340\144\200\262\236\107\216  
\243\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125  
\035\016\004\026\004\024\210\150\277\340\216\065\304\073\070\153  
\142\367\050\073\204\201\310\014\327\115\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\073\002  
\215\313\074\060\350\156\240\255\362\163\263\137\236\045\023\004  
\005\323\366\343\213\273\013\171\316\123\336\344\226\305\321\257  
\163\274\325\303\320\100\125\174\100\177\315\033\137\011\325\362  
\174\237\150\035\273\135\316\172\071\302\214\326\230\173\305\203  
\125\250\325\175\100\312\340\036\367\211\136\143\135\241\023\302  
\135\212\266\212\174\000\363\043\303\355\205\137\161\166\360\150  
\143\252\105\041\071\110\141\170\066\334\361\103\223\324\045\307  
\362\200\145\341\123\002\165\121\374\172\072\357\067\253\204\050  
\127\014\330\324\324\231\126\154\343\242\376\131\204\264\061\350  
\063\370\144\224\224\121\227\253\071\305\113\355\332\335\200\013  
\157\174\051\015\304\216\212\162\015\347\123\024\262\140\101\075  
\204\221\061\150\075\047\104\333\345\336\364\372\143\105\310\114  
\076\230\365\077\101\272\116\313\067\015\272\146\230\361\335\313  
\237\134\367\124\066\202\153\054\274\023\141\227\102\370\170\273  
\314\310\242\237\312\360\150\275\153\035\262\337\215\157\007\235  
\332\216\147\307\107\036\312\271\277\052\102\221\267\143\123\146  
\361\102\243\341\364\132\115\130\153\265\344\244\063\255\134\160  
\035\334\340\362\353\163\024\221\232\003\301\352\000\145\274\007  
\374\317\022\021\042\054\256\240\275\072\340\242\052\330\131\351  
\051\323\030\065\244\254\021\137\031\265\265\033\377\042\112\134  
\306\172\344\027\357\040\251\247\364\077\255\212\247\232\004\045  
\235\016\312\067\346\120\375\214\102\051\004\232\354\271\317\113  
\162\275\342\010\066\257\043\057\142\345\312\001\323\160\333\174  
\202\043\054\026\061\014\306\066\007\220\172\261\037\147\130\304  
\073\130\131\211\260\214\214\120\263\330\206\313\150\243\304\012  
\347\151\113\040\316\301\036\126\113\225\251\043\150\330\060\330  
\303\353\260\125\121\315\345\375\053\270\365\273\021\237\123\124  
\366\064\031\214\171\011\066\312\141\027\045\027\013\202\230\163  
\014\167\164\303\325\015\307\250\022\114\307\247\124\161\107\056  
\054\032\175\311\343\053\073\110\336\047\204\247\143\066\263\175  
\217\240\144\071\044\015\075\173\207\257\146\134\164\033\113\163  
\262\345\214\360\206\231\270\345\305\337\204\301\267\353

END

#



```
Fingerprint (SHA-256):
51:3B:2C:EC:B8:10:D4:CD:E5:DD:85:39:1A:DF:C6:C2:DD:60:D8:7B:B7:36:D2:B5:21:48:4A:A4:7A:0E:BE:F6
Fingerprint (SHA1): 5F:3B:8C:F2:F8:10:B3:7D:78:B4:CE:EC:19:19:C3:73:34:B9:C7:74
CKA_CLASS CK_OBJECT_CLASS
CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication RootCA2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\167\060\202\002\137\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061\045
\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040\124
\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117\056
\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023\036
\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156\151
\143\141\164\151\157\156\040\122\157\157\164\103\101\062\060\036
\027\015\060\071\060\065\062\071\060\065\060\060\063\071\132\027
\015\062\071\060\065\062\071\060\065\060\060\063\071\132\060\135
\061\013\060\011\006\003\125\004\006\023\002\112\120\061\045\060
\043\006\003\125\004\012\023\034\123\105\103\117\115\040\124\162
\165\163\164\040\123\171\163\164\145\155\163\040\103\117\056\054
\114\124\104\056\061\047\060\045\006\003\125\004\013\023\036\123
\145\143\165\162\151\164\171\040\103\157\155\155\165\156\151\143
\141\164\151\157\156\040\122\157\157\164\103\101\062\060\202\001
```

\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\320\025  
\071\122\261\122\263\272\305\131\202\304\135\122\256\072\103\145  
\200\113\307\362\226\274\333\066\227\326\246\144\214\250\136\360  
\343\012\034\367\337\227\075\113\256\366\135\354\041\265\101\253  
\315\271\176\166\237\276\371\076\066\064\240\073\301\366\061\021  
\105\164\223\075\127\200\305\371\211\231\312\345\253\152\324\265  
\332\101\220\020\301\326\326\102\211\302\277\364\070\022\225\114  
\124\005\367\066\344\105\203\173\024\145\326\334\014\115\321\336  
\176\014\253\073\304\025\276\072\126\246\132\157\166\151\122\251  
\172\271\310\353\152\232\135\122\320\055\012\153\065\026\011\020  
\204\320\152\312\072\006\000\067\107\344\176\127\117\077\213\353  
\147\270\210\252\305\276\123\125\262\221\304\175\271\260\205\031  
\006\170\056\333\141\032\372\205\365\112\221\241\347\026\325\216  
\242\071\337\224\270\160\037\050\077\213\374\100\136\143\203\074  
\203\052\032\231\153\317\336\131\152\073\374\157\026\327\037\375  
\112\020\353\116\202\026\072\254\047\014\123\361\255\325\044\260  
\153\003\120\301\055\074\026\335\104\064\047\032\165\373\002\003  
\001\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026  
\004\024\012\205\251\167\145\005\230\174\100\201\370\017\227\054  
\070\361\012\354\074\317\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\015\006\011\052\206\110\206\367  
\015\001\001\013\005\000\003\202\001\001\000\114\072\243\104\254  
\271\105\261\307\223\176\310\013\012\102\337\144\352\034\356\131  
\154\010\272\211\137\152\312\112\225\236\172\217\007\305\332\105  
\162\202\161\016\072\322\314\157\247\264\241\043\273\366\044\237  
\313\027\376\214\246\316\302\322\333\314\215\374\161\374\003\051  
\301\154\135\063\137\144\266\145\073\211\157\030\166\170\365\334  
\242\110\037\031\077\216\223\353\361\372\027\356\315\116\343\004  
\022\125\326\345\344\335\373\076\005\174\342\035\136\306\247\274  
\227\117\150\072\365\351\056\012\103\266\257\127\134\142\150\174  
\267\375\243\212\204\240\254\142\276\053\011\207\064\360\152\001  
\273\233\051\126\074\376\000\067\317\043\154\361\116\252\266\164  
\106\022\154\221\356\064\325\354\232\221\347\104\276\220\061\162  
\325\111\002\366\002\345\364\037\353\174\331\226\125\251\377\354  
\212\371\231\107\377\065\132\002\252\004\313\212\133\207\161\051  
\221\275\244\264\172\015\275\232\365\127\043\000\007\041\027\077  
\112\071\321\005\111\013\247\266\067\201\245\135\214\252\063\136  
\201\050\174\247\175\047\353\000\256\215\067

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Security Communication RootCA2"

# Issuer: OU=Security Communication RootCA2,O="SECOM"

```

Trust Systems CO.,LTD.",C=JP
Serial Number: 0 (0x0)
Subject: OU=Security Communication RootCA2,O="SECOM Trust Systems CO.,LTD.",C=JP
Not Valid Before: Fri May 29 05:00:39 2009
Not Valid After : Tue May 29 05:00:39 2029
Fingerprint (SHA-256):
51:3B:2C:EC:B8:10:D4:CD:E5:DD:85:39:1A:DF:C6:C2:DD:60:D8:7B:B7:36:D2:B5:21:48:4A:A4:7A:0E:BE:F6
Fingerprint (SHA1): 5F:3B:8C:F2:F8:10:B3:7D:78:B4:CE:EC:19:19:C3:73:34:B9:C7:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication RootCA2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\137\073\214\362\370\020\263\175\170\264\316\354\031\031\303\163
\064\271\307\164
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\154\071\175\244\016\125\131\262\077\326\101\261\022\120\336\103
END
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Actalis Authentication Root CA"
#
Issuer: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
Serial Number:57:0a:11:97:42:c4:e3:cc
Subject: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
Not Valid Before: Thu Sep 22 11:22:02 2011
Not Valid After : Sun Sep 22 11:22:02 2030
Fingerprint (SHA-256):
55:92:60:84:EC:96:3A:64:B9:6E:2A:BE:01:CE:0B:A8:6A:64:FB:FE:BC:C7:AA:B5:AF:C1:55:B3:7F:D7:60:66
#

```



Fingerprint (SHA1): F3:73:B3:87:06:5A:28:84:8A:F2:F3:4A:CE:19:2B:DD:C7:8E:9C:AC

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Actalis Authentication Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\016\060\014\006\003\125\004\007\014\005\115\151\154\141\156\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\047\060\045\006\003\125\004\003\014\036\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\016\060\014\006\003\125\004\007\014\005\115\151\154\141\156\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\047\060\045\006\003\125\004\003\014\036\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\127\012\021\227\102\304\343\314
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\273\060\202\003\243\240\003\002\001\002\002\010\127
\012\021\227\102\304\343\314\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\153\061\013\060\011\006\003\125\004
\006\023\002\111\124\061\016\060\014\006\003\125\004\007\014\005
\115\151\154\141\156\061\043\060\041\006\003\125\004\012\014\032
\101\143\164\141\154\151\163\040\123\056\160\056\101\056\057\060
\063\063\065\070\065\062\060\071\066\067\061\047\060\045\006\003
\125\004\003\014\036\101\143\164\141\154\151\163\040\101\165\164
\150\145\156\164\151\143\141\164\151\157\156\040\122\157\157\164
\040\103\101\060\036\027\015\061\061\060\071\062\062\061\061\062
\062\060\062\132\027\015\063\060\060\071\062\062\061\061\062\062
\060\062\132\060\153\061\013\060\011\006\003\125\004\006\023\002
\111\124\061\016\060\014\006\003\125\004\007\014\005\115\151\154
\141\156\061\043\060\041\006\003\125\004\012\014\032\101\143\164
\141\154\151\163\040\123\056\160\056\101\056\057\060\063\063\065
\070\065\062\060\071\066\067\061\047\060\045\006\003\125\004\003
\014\036\101\143\164\141\154\151\163\040\101\165\164\150\145\156
```

\164\151\143\141\164\151\157\156\040\122\157\157\164\040\103\101  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\247\306\304\245\051\244\054\357\345\030\305\260\120\243\157  
\121\073\237\012\132\311\302\110\070\012\302\034\240\030\177\221  
\265\207\271\100\077\335\035\150\037\010\203\325\055\036\210\240  
\370\217\126\217\155\231\002\222\220\026\325\137\010\154\211\327  
\341\254\274\040\302\261\340\203\121\212\151\115\000\226\132\157  
\057\300\104\176\243\016\344\221\315\130\356\334\373\307\036\105  
\107\335\047\271\010\001\237\246\041\035\365\101\055\057\114\375  
\050\255\340\212\255\042\264\126\145\216\206\124\217\223\103\051  
\336\071\106\170\243\060\043\272\315\360\175\023\127\300\135\322  
\203\153\110\114\304\253\237\200\132\133\072\275\311\247\042\077  
\200\047\063\133\016\267\212\014\135\007\067\010\313\154\322\172  
\107\042\104\065\305\314\314\056\216\335\052\355\267\175\146\015  
\137\141\121\042\125\033\343\106\343\343\075\320\065\142\232\333  
\257\024\310\133\241\314\211\033\341\060\046\374\240\233\037\201  
\247\107\037\004\353\243\071\222\006\237\231\323\277\323\352\117  
\120\234\031\376\226\207\036\074\145\366\243\030\044\203\206\020  
\347\124\076\250\072\166\044\117\201\041\305\343\017\002\370\223  
\224\107\040\273\376\324\016\323\150\271\335\304\172\204\202\343  
\123\124\171\335\333\234\322\362\007\233\056\266\274\076\355\205  
\155\357\045\021\362\227\032\102\141\367\112\227\350\213\261\020  
\007\372\145\201\262\242\071\317\367\074\377\030\373\306\361\132  
\213\131\342\002\254\173\222\320\116\024\117\131\105\366\014\136  
\050\137\260\350\077\105\317\317\257\233\157\373\204\323\167\132  
\225\157\254\224\204\236\356\274\300\112\217\112\223\370\104\041  
\342\061\105\141\120\116\020\330\343\065\174\114\031\264\336\005  
\277\243\006\237\310\265\315\344\037\327\027\006\015\172\225\164  
\125\015\150\032\374\020\033\142\144\235\155\340\225\240\303\224  
\007\127\015\024\346\275\005\373\270\237\346\337\213\342\306\347  
\176\226\366\123\305\200\064\120\050\130\360\022\120\161\027\060  
\272\346\170\143\274\364\262\255\233\053\262\376\341\071\214\136  
\272\013\040\224\336\173\203\270\377\343\126\215\267\021\351\073  
\214\362\261\301\135\235\244\013\114\053\331\262\030\365\265\237  
\113\002\003\001\000\001\243\143\060\141\060\035\006\003\125\035  
\016\004\026\004\024\122\330\210\072\310\237\170\146\355\211\363  
\173\070\160\224\311\002\002\066\320\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035  
\043\004\030\060\026\200\024\122\330\210\072\310\237\170\146\355  
\211\363\173\070\160\224\311\002\002\066\320\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052  
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\013  
\173\162\207\300\140\246\111\114\210\130\346\035\210\367\024\144  
\110\246\330\130\012\016\117\023\065\337\065\035\324\355\006\061  
\310\201\076\152\325\335\073\032\062\356\220\075\021\322\056\364  
\216\303\143\056\043\146\260\147\276\157\266\300\023\071\140\252  
\242\064\045\223\165\122\336\247\235\255\016\207\211\122\161\152

\026\074\031\035\203\370\232\051\145\276\364\077\232\331\360\363  
\132\207\041\161\200\115\313\340\070\233\077\273\372\340\060\115  
\317\206\323\145\020\031\030\321\227\002\261\053\162\102\150\254  
\240\275\116\132\332\030\277\153\230\201\320\375\232\276\136\025  
\110\315\021\025\271\300\051\134\264\350\210\367\076\066\256\267  
\142\375\036\142\336\160\170\020\034\110\133\332\274\244\070\272  
\147\355\125\076\136\127\337\324\003\100\114\201\244\322\117\143  
\247\011\102\011\024\374\000\251\302\200\163\117\056\300\100\331  
\021\173\110\352\172\002\300\323\353\050\001\046\130\164\301\300  
\163\042\155\223\225\375\071\175\273\052\343\366\202\343\054\227  
\137\116\037\221\224\372\376\054\243\330\166\032\270\115\262\070  
\117\233\372\035\110\140\171\046\342\363\375\251\320\232\350\160  
\217\111\172\326\345\275\012\016\333\055\363\215\277\353\343\244  
\175\313\307\225\161\350\332\243\174\305\302\370\164\222\004\033  
\206\254\244\042\123\100\266\254\376\114\166\317\373\224\062\300  
\065\237\166\077\156\345\220\156\240\246\046\242\270\054\276\321  
\053\205\375\247\150\310\272\001\053\261\154\164\035\270\163\225  
\347\356\267\307\045\360\000\114\000\262\176\266\013\213\034\363  
\300\120\236\045\271\340\010\336\066\146\377\067\245\321\273\124  
\144\054\311\047\265\113\222\176\145\377\323\055\341\271\116\274  
\177\244\101\041\220\101\167\246\071\037\352\236\343\237\320\146  
\157\005\354\252\166\176\277\153\026\240\353\265\307\374\222\124  
\057\053\021\047\045\067\170\114\121\152\260\363\314\130\135\024  
\361\152\110\025\377\302\007\266\261\215\017\216\134\120\106\263  
\075\277\001\230\117\262\131\124\107\076\064\173\170\155\126\223  
\056\163\352\146\050\170\315\035\024\277\240\217\057\056\270\056  
\216\362\024\212\314\351\265\174\373\154\235\014\245\341\226

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Actalis Authentication Root CA"

# Issuer: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT

# Serial Number:57:0a:11:97:42:c4:e3:cc

# Subject: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT

# Not Valid Before: Thu Sep 22 11:22:02 2011

# Not Valid After : Sun Sep 22 11:22:02 2030

# Fingerprint (SHA-256):

55:92:60:84:EC:96:3A:64:B9:6E:2A:BE:01:CE:0B:A8:6A:64:FB:FE:BC:C7:AA:B5:AF:C1:55:B3:7F:D7:60:66

# Fingerprint (SHA1):

F3:73:B3:87:06:5A:28:84:8A:F2:F3:4A:CE:19:2B:DD:C7:8E:9C:AC

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Actalis Authentication Root CA"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\363\163\263\207\006\132\050\204\212\362\363\112\316\031\053\335
\307\216\234\254
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\151\301\015\117\007\243\033\303\376\126\075\004\274\021\366\246
END
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\016\060\014\006\003\125\004\007\014\005\115\151\154\141\156\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\047\060\045\006\003\125\004\003\014\036\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\127\012\021\227\102\304\343\314
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Buypass Class 2 Root CA"
#
Issuer: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO
Serial Number: 2 (0x2)
Subject: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO
Not Valid Before: Tue Oct 26 08:38:03 2010
Not Valid After : Fri Oct 26 08:38:03 2040
Fingerprint (SHA-256):
9A:11:40:25:19:7C:5B:B9:5D:94:E6:3D:55:CD:43:79:08:47:B6:46:B2:3C:DF:11:AD:A4:A0:0E:FF:15:FB:48
Fingerprint (SHA1): 49:0A:75:74:DE:87:0A:47:FE:58:EE:F6:C7:6B:EB:C6:0B:12:40:99
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Buypass Class 2 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101

```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061  
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163  
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040  
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163  
\040\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\002

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\131\060\202\003\101\240\003\002\001\002\002\001\002  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035  
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163  
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060  
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040  
\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101\060  
\036\027\015\061\060\061\060\062\066\060\070\063\070\060\063\132  
\027\015\064\060\061\060\062\066\060\070\063\070\060\063\132\060  
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035  
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163  
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060  
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040  
\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101\060  
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001  
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000  
\327\307\136\367\301\007\324\167\373\103\041\364\364\365\151\344  
\356\062\001\333\243\206\037\344\131\015\272\347\165\203\122\353  
\352\034\141\025\110\273\035\007\312\214\256\260\334\226\235\352  
\303\140\222\206\202\050\163\234\126\006\377\113\144\360\014\052  
\067\111\265\345\317\014\174\356\361\112\273\163\060\145\363\325  
\057\203\266\176\343\347\365\236\253\140\371\323\361\235\222\164  
\212\344\034\226\254\133\200\351\265\364\061\207\243\121\374\307  
\176\241\157\216\123\167\324\227\301\125\063\222\076\030\057\165  
\324\255\206\111\313\225\257\124\006\154\330\006\023\215\133\377  
\341\046\031\131\300\044\272\201\161\171\220\104\120\150\044\224  
\137\270\263\021\361\051\101\141\243\101\313\043\066\325\301\361  
\062\120\020\116\177\364\206\223\354\204\323\216\274\113\277\134  
\001\116\007\075\334\024\212\224\012\244\352\163\373\013\121\350  
\023\007\030\372\016\361\053\321\124\025\175\074\341\367\264\031  
\102\147\142\136\167\340\242\125\354\266\331\151\027\325\072\257  
\104\355\112\305\236\344\172\047\174\345\165\327\252\313\045\347  
\337\153\012\333\017\115\223\116\250\240\315\173\056\362\131\001  
\152\267\015\270\007\201\176\213\070\033\070\346\012\127\231\075

\356\041\350\243\365\014\026\335\213\354\064\216\234\052\034\000  
\025\027\215\150\203\322\160\237\030\010\315\021\150\325\311\153  
\122\315\304\106\217\334\265\363\330\127\163\036\351\224\071\004  
\277\323\336\070\336\264\123\354\151\034\242\176\304\217\344\033  
\160\255\362\242\371\373\367\026\144\146\151\237\111\121\242\342  
\025\030\147\006\112\177\325\154\265\115\263\063\340\141\353\135  
\276\351\230\017\062\327\035\113\074\056\132\001\122\221\011\362  
\337\352\215\330\006\100\143\252\021\344\376\303\067\236\024\122  
\077\364\342\314\362\141\223\321\375\147\153\327\122\256\277\150  
\253\100\103\240\127\065\123\170\360\123\370\141\102\007\144\306  
\327\157\233\114\070\015\143\254\142\257\066\213\242\163\012\015  
\365\041\275\164\252\115\352\162\003\111\333\307\137\035\142\143  
\307\375\335\221\354\063\356\365\155\264\156\060\150\336\310\326  
\046\260\165\136\173\264\007\040\230\241\166\062\270\115\154\117  
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035  
\016\004\026\004\024\311\200\167\340\142\222\202\365\106\234\363  
\272\367\114\303\336\270\243\255\071\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110  
\206\367\015\001\001\013\005\000\003\202\002\001\000\123\137\041  
\365\272\260\072\122\071\054\222\260\154\000\311\357\316\040\357  
\006\362\226\236\351\244\164\177\172\026\374\267\365\266\373\025  
\033\077\253\246\300\162\135\020\261\161\356\274\117\343\255\254  
\003\155\056\161\056\257\304\343\255\243\275\014\021\247\264\377  
\112\262\173\020\020\037\247\127\101\262\300\256\364\054\131\326  
\107\020\210\363\041\121\051\060\312\140\206\257\106\253\035\355  
\072\133\260\224\336\104\343\101\010\242\301\354\035\326\375\117  
\266\326\107\320\024\013\312\346\312\265\173\167\176\101\037\136  
\203\307\266\214\071\226\260\077\226\201\101\157\140\220\342\350  
\371\373\042\161\331\175\263\075\106\277\264\204\257\220\034\017  
\217\022\152\257\357\356\036\172\256\002\112\212\027\053\166\376  
\254\124\211\044\054\117\077\266\262\247\116\214\250\221\227\373  
\051\306\173\134\055\271\313\146\266\267\250\133\022\121\205\265  
\011\176\142\170\160\376\251\152\140\266\035\016\171\014\375\312  
\352\044\200\162\303\227\077\362\167\253\103\042\012\307\353\266  
\014\204\202\054\200\153\101\212\010\300\353\245\153\337\231\022  
\313\212\325\136\200\014\221\340\046\010\066\110\305\372\070\021  
\065\377\045\203\055\362\172\277\332\375\216\376\245\313\105\054  
\037\304\210\123\256\167\016\331\232\166\305\216\054\035\243\272  
\325\354\062\256\300\252\254\367\321\172\115\353\324\007\342\110  
\367\042\216\260\244\237\152\316\216\262\262\140\364\243\042\320  
\043\353\224\132\172\151\335\017\277\100\127\254\153\131\120\331  
\243\231\341\156\376\215\001\171\047\043\025\336\222\235\173\011  
\115\132\347\113\110\060\132\030\346\012\155\346\217\340\322\273  
\346\337\174\156\041\202\301\150\071\115\264\230\130\146\142\314  
\112\220\136\303\372\047\004\261\171\025\164\231\314\276\255\040  
\336\046\140\034\353\126\121\246\243\352\344\243\077\247\377\141  
\334\361\132\115\154\062\043\103\356\254\250\356\356\112\022\011

```
\074\135\161\302\276\171\372\302\207\150\035\013\375\134\151\314
\006\320\232\175\124\231\052\311\071\032\031\257\113\052\103\363
\143\135\132\130\342\057\343\035\344\251\326\320\012\320\236\277
\327\201\011\361\311\307\046\015\254\230\026\126\240
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Buypass Class 2 Root CA"

# Issuer: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO

# Serial Number: 2 (0x2)

# Subject: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO

# Not Valid Before: Tue Oct 26 08:38:03 2010

# Not Valid After : Fri Oct 26 08:38:03 2040

# Fingerprint (SHA-256):

9A:11:40:25:19:7C:5B:B9:5D:94:E6:3D:55:CD:43:79:08:47:B6:46:B2:3C:DF:11:AD:A4:A0:0E:FF:15:FB:48

# Fingerprint (SHA1): 49:0A:75:74:DE:87:0A:47:FE:58:EE:F6:C7:6B:EB:C6:0B:12:40:99

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Buypass Class 2 Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\111\012\165\164\336\207\012\107\376\130\356\366\307\153\353\306
\013\022\100\231
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\106\247\322\376\105\373\144\132\250\131\220\233\170\104\233\051
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\001\002
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

```

Certificate
"Buypass Class 3 Root CA"
#
Issuer: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
Serial Number: 2 (0x2)
Subject: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
Not Valid Before: Tue Oct 26 08:28:58 2010
Not Valid After : Fri Oct 26 08:28:58 2040
Fingerprint (SHA-256):
ED:F7:EB:BC:A2:7A:2A:38:4D:38:7B:7D:40:10:C6:66:E2:ED:B4:84:3E:4C:29:B4:AE:1D:5B:93:32:E6:B2:4D
Fingerprint (SHA1): DA:FA:F7:FA:66:84:EC:06:8F:14:50:BD:C7:C2:81:A5:BC:A9:64:57
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Buypass Class 3 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\131\060\202\003\101\240\003\002\001\002\002\001\002
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040
\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101\060
\036\027\015\061\060\061\060\062\066\060\070\062\070\065\070\132
\027\015\064\060\061\060\062\066\060\070\062\070\065\070\132\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163

```



\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060  
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040  
\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101\060  
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001  
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000  
\245\332\012\225\026\120\343\225\362\136\235\166\061\006\062\172  
\233\361\020\166\270\000\232\265\122\066\315\044\107\260\237\030  
\144\274\232\366\372\325\171\330\220\142\114\042\057\336\070\075  
\326\340\250\351\034\054\333\170\021\351\216\150\121\025\162\307  
\363\063\207\344\240\135\013\134\340\127\007\052\060\365\315\304  
\067\167\050\115\030\221\346\277\325\122\375\161\055\160\076\347  
\306\304\212\343\360\050\013\364\166\230\241\213\207\125\262\072  
\023\374\267\076\047\067\216\042\343\250\117\052\357\140\273\075  
\267\071\303\016\001\107\231\135\022\117\333\103\372\127\241\355  
\371\235\276\021\107\046\133\023\230\253\135\026\212\260\067\034  
\127\235\105\377\210\226\066\277\273\312\007\173\157\207\143\327  
\320\062\152\326\135\154\014\361\263\156\071\342\153\061\056\071  
\000\047\024\336\070\300\354\031\146\206\022\350\235\162\026\023  
\144\122\307\251\067\034\375\202\060\355\204\030\035\364\256\134  
\377\160\023\000\353\261\365\063\172\113\326\125\370\005\215\113  
\151\260\365\263\050\066\134\024\304\121\163\115\153\013\361\064  
\007\333\027\071\327\334\050\173\153\365\237\363\056\301\117\027  
\052\020\363\314\312\350\353\375\153\253\056\232\237\055\202\156  
\004\324\122\001\223\055\075\206\374\176\374\337\357\102\035\246  
\153\357\271\040\306\367\275\240\247\225\375\247\346\211\044\330  
\314\214\064\154\342\043\057\331\022\032\041\271\125\221\157\013  
\221\171\031\014\255\100\210\013\160\342\172\322\016\330\150\110  
\273\202\023\071\020\130\351\330\052\007\306\022\333\130\333\322  
\073\125\020\107\005\025\147\142\176\030\143\246\106\077\011\016  
\124\062\136\277\015\142\172\047\357\200\350\333\331\113\006\132  
\067\132\045\320\010\022\167\324\157\011\120\227\075\310\035\303  
\337\214\105\060\126\306\323\144\253\146\363\300\136\226\234\303  
\304\357\303\174\153\213\072\171\177\263\111\317\075\342\211\237  
\240\060\113\205\271\234\224\044\171\217\175\153\251\105\150\017  
\053\320\361\332\034\313\151\270\312\111\142\155\310\320\143\142  
\335\140\017\130\252\217\241\274\005\245\146\242\317\033\166\262  
\204\144\261\114\071\122\300\060\272\360\214\113\002\260\266\267  
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035  
\016\004\026\004\024\107\270\315\377\345\157\356\370\262\354\057  
\116\016\371\045\260\216\074\153\303\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110  
\206\367\015\001\001\013\005\000\003\202\002\001\000\000\040\043  
\101\065\004\220\302\100\142\140\357\342\065\114\327\077\254\342  
\064\220\270\241\157\166\372\026\026\244\110\067\054\351\220\302  
\362\074\370\012\237\330\201\345\273\133\332\045\054\244\247\125  
\161\044\062\366\310\013\362\274\152\370\223\254\262\007\302\137  
\237\333\314\310\212\252\276\152\157\341\111\020\314\061\327\200

\273\273\310\330\242\016\144\127\352\242\365\302\251\061\025\322  
\040\152\354\374\042\001\050\317\206\270\200\036\251\314\021\245  
\074\362\026\263\107\235\374\322\200\041\304\313\320\107\160\101  
\241\312\203\031\010\054\155\362\135\167\234\212\024\023\324\066  
\034\222\360\345\006\067\334\246\346\220\233\070\217\134\153\033  
\106\206\103\102\137\076\001\007\123\124\135\145\175\367\212\163  
\241\232\124\132\037\051\103\024\047\302\205\017\265\210\173\032  
\073\224\267\035\140\247\265\234\347\051\151\127\132\233\223\172  
\103\060\033\003\327\142\310\100\246\252\374\144\344\112\327\221  
\123\001\250\040\210\156\234\137\104\271\313\140\201\064\354\157  
\323\175\332\110\137\353\264\220\274\055\251\034\013\254\034\325  
\242\150\040\200\004\326\374\261\217\057\273\112\061\015\112\206  
\034\353\342\066\051\046\365\332\330\304\362\165\141\317\176\256  
\166\143\112\172\100\145\223\207\370\036\200\214\206\345\206\326  
\217\016\374\123\054\140\350\026\141\032\242\076\103\173\315\071  
\140\124\152\365\362\211\046\001\150\203\110\242\063\350\311\004  
\221\262\021\064\021\076\352\320\103\031\037\003\223\220\014\377  
\121\075\127\364\101\156\341\313\240\276\353\311\143\315\155\314  
\344\370\066\252\150\235\355\275\135\227\160\104\015\266\016\065  
\334\341\014\135\273\240\121\224\313\176\026\353\021\057\243\222  
\105\310\114\161\331\274\311\231\122\127\106\057\120\317\275\065  
\151\364\075\025\316\006\245\054\017\076\366\201\272\224\273\303  
\273\277\145\170\322\206\171\377\111\073\032\203\014\360\336\170  
\354\310\362\115\114\032\336\202\051\370\301\132\332\355\356\346  
\047\136\350\105\320\235\034\121\250\150\253\104\343\320\213\152  
\343\370\073\273\334\115\327\144\362\121\276\346\252\253\132\351  
\061\356\006\274\163\277\023\142\012\237\307\271\227

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Bypass Class 3 Root CA"

# Issuer: CN=Bypass Class 3 Root CA,O=Bypass AS-983163327,C=NO

# Serial Number: 2 (0x2)

# Subject: CN=Bypass Class 3 Root CA,O=Bypass AS-983163327,C=NO

# Not Valid Before: Tue Oct 26 08:28:58 2010

# Not Valid After : Fri Oct 26 08:28:58 2040

# Fingerprint (SHA-256):

ED:F7:EB:BC:A2:7A:2A:38:4D:38:7B:7D:40:10:C6:66:E2:ED:B4:84:3E:4C:29:B4:AE:1D:5B:93:32:E6:B2:4D

# Fingerprint (SHA1): DA:FA:F7:FA:66:84:EC:06:8F:14:50:BD:C7:C2:81:A5:BC:A9:64:57

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Bypass Class 3 Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\332\372\367\372\146\204\354\006\217\024\120\275\307\302\201\245  
\274\251\144\127

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

\075\073\030\236\054\144\132\350\325\210\316\016\371\067\302\354

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061

\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163

\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040

\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163

\040\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\002

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "T-TeleSec GlobalRoot Class 3"

#

# Issuer: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems Enterprise Services  
GmbH,C=DE

# Serial Number: 1 (0x1)

# Subject: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems  
Enterprise Services GmbH,C=DE

# Not Valid Before: Wed Oct 01 10:29:56 2008

# Not Valid After : Sat Oct 01 23:59:59 2033

# Fingerprint (SHA-256):

FD:73:DA:D3:1C:64:4F:F1:B4:3B:EF:0C:CD:DA:96:71:0B:9C:D9:87:5E:CA:7E:31:70:7A:F3:E9:6D:52:2B:BD

# Fingerprint (SHA1): 55:A6:72:3E:CB:F2:EC:CD:C3:23:74:70:19:9D:2A:BE:11:E3:81:D1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "T-TeleSec GlobalRoot Class 3"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105

\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163

\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040

\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060

\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155

\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045

\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123  
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154  
\141\163\163\040\063

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105  
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163  
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040  
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060  
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155  
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045  
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123  
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154  
\141\163\163\040\063

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\303\060\202\002\253\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163\164  
\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040\123  
\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060\035  
\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155\163  
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045\060  
\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123\145  
\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154\141  
\163\163\040\063\060\036\027\015\060\070\061\060\060\061\061\060  
\062\071\065\066\132\027\015\063\063\061\060\060\061\062\063\065  
\071\065\071\132\060\201\202\061\013\060\011\006\003\125\004\006  
\023\002\104\105\061\053\060\051\006\003\125\004\012\014\042\124  
\055\123\171\163\164\145\155\163\040\105\156\164\145\162\160\162  
\151\163\145\040\123\145\162\166\151\143\145\163\040\107\155\142  
\110\061\037\060\035\006\003\125\004\013\014\026\124\055\123\171  
\163\164\145\155\163\040\124\162\165\163\164\040\103\145\156\164  
\145\162\061\045\060\043\006\003\125\004\003\014\034\124\055\124  
\145\154\145\123\145\143\040\107\154\157\142\141\154\122\157\157  
\164\040\103\154\141\163\163\040\063\060\202\001\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017  
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\157\044\256\340\172\166\254\175\275\331\044\325\270\267\374\315  
\360\102\340\353\170\210\126\136\233\232\124\035\115\014\212\366  
\323\317\160\364\122\265\330\223\004\343\106\206\161\101\112\053  
\360\052\054\125\003\326\110\303\340\071\070\355\362\134\074\077

\104\274\223\075\141\253\116\315\015\276\360\040\047\130\016\104  
\177\004\032\207\245\327\226\024\066\220\320\111\173\241\165\373  
\032\153\163\261\370\316\251\011\054\362\123\325\303\024\104\270  
\206\245\366\213\053\071\332\243\063\124\331\372\162\032\367\042  
\025\034\210\221\153\177\146\345\303\152\200\260\044\363\337\206  
\105\210\375\031\177\165\207\037\037\261\033\012\163\044\133\271  
\145\340\054\124\310\140\323\146\027\077\341\314\124\063\163\221  
\002\072\246\177\173\166\071\242\037\226\266\070\256\265\310\223  
\164\035\236\271\264\345\140\235\057\126\321\340\353\136\133\114  
\022\160\014\154\104\040\253\021\330\364\031\366\322\234\122\067  
\347\372\266\302\061\073\112\324\024\231\255\307\032\365\135\137  
\372\007\270\174\015\037\326\203\036\263\002\003\001\000\001\243  
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\265  
\003\367\166\073\141\202\152\022\252\030\123\353\003\041\224\277  
\376\316\312\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\001\001\000\126\075\357\224\325\275\332\163\262  
\130\276\256\220\255\230\047\227\376\001\261\260\122\000\270\115  
\344\033\041\164\033\176\300\356\136\151\052\045\257\134\326\035  
\332\322\171\311\363\227\051\340\206\207\336\004\131\017\361\131  
\324\144\205\113\231\257\045\004\036\311\106\251\227\336\202\262  
\033\160\237\234\366\257\161\061\335\173\005\245\054\323\271\312  
\107\366\312\362\366\347\255\271\110\077\274\026\267\301\155\364  
\352\011\257\354\363\265\347\005\236\246\036\212\123\121\326\223  
\201\314\164\223\366\271\332\246\045\005\164\171\132\176\100\076  
\202\113\046\021\060\156\341\077\101\307\107\000\065\325\365\323  
\367\124\076\201\075\332\111\152\232\263\357\020\075\346\353\157  
\321\310\042\107\313\314\317\001\061\222\331\030\343\042\276\011  
\036\032\076\132\262\344\153\014\124\172\175\103\116\270\211\245  
\173\327\242\075\226\206\314\362\046\064\055\152\222\235\232\032  
\320\060\342\135\116\004\260\137\213\040\176\167\301\075\225\202  
\321\106\232\073\074\170\270\157\241\320\015\144\242\170\036\051  
\116\223\303\244\124\024\133

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "T-TeleSec GlobalRoot Class 3"

# Issuer: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems

Enterprise Services GmbH,C=DE

# Serial Number: 1 (0x1)

# Subject: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems Enterprise Services GmbH,C=DE

# Not Valid Before: Wed Oct 01 10:29:56 2008

# Not Valid After : Sat Oct 01 23:59:59 2033

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Fingerprint (SHA-256):
FD:73:DA:D3:1C:64:4F:F1:B4:3B:EF:0C:CD:DA:96:71:0B:9C:D9:87:5E:CA:7E:31:70:7A:F3:E9:6D:52:2B:BD
Fingerprint (SHA1): 55:A6:72:3E:CB:F2:EC:CD:C3:23:74:70:19:9D:2A:BE:11:E3:81:D1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\125\246\162\076\313\362\354\315\303\043\164\160\031\235\052\276
\021\343\201\321
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\312\373\100\250\116\071\222\212\035\376\216\057\304\047\352\357
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "D-TRUST Root Class 3 CA 2 2009"
#
Issuer: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
Serial Number: 623603 (0x983f3)
Subject: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
Not Valid Before: Thu Nov 05 08:35:58 2009
Not Valid After : Mon Nov 05 08:35:58
2029
Fingerprint (SHA-256):
49:E7:A4:42:AC:F0:EA:62:87:05:00:54:B5:25:64:B6:50:E4:F4:9E:42:E3:48:D6:AA:38:E0:39:E9:57:B1:C1
Fingerprint (SHA1): 58:E8:AB:B0:36:15:33:FB:80:F7:9B:1B:6D:29:D3:FF:8D:5F:00:F0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

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```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\011\203\363
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\063\060\202\003\033\240\003\002\001\002\002\003\011
\203\363\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
\163\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003
\014\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\154\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
\060\036\027\015\060\071\061\061\060\065\060\070\063\065\065\070
\132\027\015\062\071\061\061\060\065\060\070\063\065\065\070\132
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071\060
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000
\323\262\112\317\172\107\357\165\233\043\372\072\057\326\120\105
\211\065\072\306\153\333\376\333\000\150\250\340\003\021\035\067
\120\010\237\115\112\150\224\065\263\123\321\224\143\247\040\126
\257\336\121\170\354\052\075\363\110\110\120\076\012\337\106\125
\213\047\155\303\020\115\015\221\122\103\330\207\340\135\116\066
\265\041\312\137\071\100\004\137\133\176\314\243\306\053\251\100
\036\331\066\204\326\110\363\222\036\064\106\040\044\301\244\121
```

\216\112\032\357\120\077\151\135\031\177\105\303\307\001\217\121  
\311\043\350\162\256\264\274\126\011\177\022\313\034\261\257\051  
\220\012\311\125\314\017\323\264\032\355\107\065\132\112\355\234  
\163\004\041\320\252\275\014\023\265\000\312\046\154\304\153\014  
\224\132\225\224\332\120\232\361\377\245\053\146\061\244\311\070  
\240\337\035\037\270\011\056\363\247\350\147\122\253\225\037\340  
\106\076\330\244\303\312\132\305\061\200\350\110\232\237\224\151  
\376\031\335\330\163\174\201\312\226\336\216\355\263\062\005\145  
\204\064\346\346\375\127\020\265\137\166\277\057\260\020\015\305  
\002\003\001\000\001\243\202\001\032\060\202\001\026\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035  
\006\003\125\035\016\004\026\004\024\375\332\024\304\237\060\336  
\041\275\036\102\071\374\253\143\043\111\340\361\204\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\201\323  
\006\003\125\035\037\004\201\313\060\201\310\060\201\200\240\176  
\240\174\206\172\154\144\141\160\072\057\057\144\151\162\145\143  
\164\157\162\171\056\144\055\164\162\165\163\164\056\156\145\164  
\057\103\116\075\104\055\124\122\125\123\124\045\062\060\122\157  
\157\164\045\062\060\103\154\141\163\163\045\062\060\063\045\062  
\060\103\101\045\062\060\062\045\062\060\062\060\060\071\054\117  
\075\104\055\124\162\165\163\164\045\062\060\107\155\142\110\054  
\103\075\104\105\077\143\145\162\164\151\146\151\143\141\164\145  
\162\145\166\157\143\141\164\151\157\156\154\151\163\164\060\103  
\240\101\240\077\206\075\150\164\164\160\072\057\057\167\167\167  
\056\144\055\164\162\165\163\164\056\156\145\164\057\143\162\154  
\057\144\055\164\162\165\163\164\137\162\157\157\164\137\143\154  
\141\163\163\137\063\137\143\141\137\062\137\062\060\060\071\056  
\143\162\154\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\001\001\000\177\227\333\060\310\337\244\234\175  
\041\172\200\160\316\024\022\151\210\024\225\140\104\001\254\262  
\351\060\117\233\120\302\146\330\176\215\060\265\160\061\351\342  
\151\307\363\160\333\040\025\206\320\015\360\276\254\001\165\204  
\316\176\237\115\277\267\140\073\234\363\312\035\342\136\150\330  
\243\235\227\345\100\140\322\066\041\376\320\264\270\027\332\164  
\243\177\324\337\260\230\002\254\157\153\153\054\045\044\162\241  
\145\356\045\132\345\346\062\347\362\337\253\111\372\363\220\151  
\043\333\004\331\347\134\130\374\145\324\227\276\314\374\056\012  
\314\045\052\065\004\370\140\221\025\165\075\101\377\043\037\031  
\310\154\353\202\123\004\246\344\114\042\115\215\214\272\316\133  
\163\354\144\124\120\155\321\234\125\373\151\303\066\303\214\274  
\074\205\246\153\012\046\015\340\223\230\140\256\176\306\044\227  
\212\141\137\221\216\146\222\011\207\066\315\213\233\055\076\366  
\121\324\120\324\131\050\275\203\362\314\050\173\123\206\155\330  
\046\210\160\327\352\221\315\076\271\312\300\220\156\132\306\136  
\164\145\327\134\376\243\342

END

CKA\_NSS\_MOZILLA\_CA\_POLICY



```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "D-TRUST Root Class 3 CA 2 2009"
Issuer: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
Serial Number: 623603 (0x983f3)
Subject: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
Not Valid Before:
 Thu Nov 05 08:35:58 2009
Not Valid After : Mon Nov 05 08:35:58 2029
Fingerprint (SHA-256):
49:E7:A4:42:AC:F0:EA:62:87:05:00:54:B5:25:64:B6:50:E4:F4:9E:42:E3:48:D6:AA:38:E0:39:E9:57:B1:C1
Fingerprint (SHA1): 58:E8:AB:B0:36:15:33:FB:80:F7:9B:1B:6D:29:D3:FF:8D:5F:00:F0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 2009"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\130\350\253\260\066\025\063\373\200\367\233\033\155\051\323\377
\215\137\000\360
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\315\340\045\151\215\107\254\234\211\065\220\367\375\121\075\057
END
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\011\203\363
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "D-TRUST Root Class 3 CA 2 EV 2009"
#
Issuer: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE
Serial Number: 623604 (0x983f4)
Subject: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE

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Not Valid Before: Thu Nov 05 08:50:46 2009
Not Valid After : Mon Nov 05 08:50:46 2029
Fingerprint (SHA-256):
EE:C5:49:6B:98:8C:E9:86:25:B9:34:09:2E:EC:29:08:BE:D0:B0:F3:16:C2:D4:73:0C:84:EA:F1:F3:D3:48:81
Fingerprint (SHA1): 96:C9:1B:0B:95:B4:10:98:42:FA:D0:D8:22:79:FE:60:FA:B9:16:83
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA
 2 EV 2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003\014
\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062\060
\060\071
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003\014
\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062\060
\060\071
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\011\203\364
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\103\060\202\003\053\240\003\002\001\002\002\003\011
\203\364\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
\163\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003
\014\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\154\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062
\060\060\071\060\036\027\015\060\071\061\061\060\065\060\070\065
\060\064\066\132\027\015\062\071\061\061\060\065\060\070\065\060
\064\066\132\060\120\061\013\060\011\006\003\125\004\006\023\002
\104\105\061\025\060\023\006\003\125\004\012\014\014\104\055\124
\162\165\163\164\040\107\155\142\110\061\052\060\050\006\003\125
\004\003\014\041\104\055\124\122\125\123\124\040\122\157\157\164
\040\103\154\141\163\163\040\063\040\103\101\040\062\040\105\126
\040\062\060\060\071\060\202\001\042\060\015\006\011\052\206\110
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\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001  
\012\002\202\001\001\000\231\361\204\064\160\272\057\267\060\240  
\216\275\174\004\317\276\142\274\231\375\202\227\322\172\012\147  
\226\070\011\366\020\116\225\042\163\231\215\332\025\055\347\005  
\374\031\163\042\267\216\230\000\274\074\075\254\241\154\373\326  
\171\045\113\255\360\314\144\332\210\076\051\270\017\011\323\064  
\335\063\365\142\321\341\315\031\351\356\030\117\114\130\256\342  
\036\326\014\133\025\132\330\072\270\304\030\144\036\343\063\262  
\265\211\167\116\014\277\331\224\153\023\227\157\022\243\376\231  
\251\004\314\025\354\140\150\066\355\010\173\267\365\277\223\355  
\146\061\203\214\306\161\064\207\116\027\352\257\213\221\215\034  
\126\101\256\042\067\136\067\362\035\331\321\055\015\057\151\121  
\247\276\146\246\212\072\052\275\307\032\261\341\024\360\276\072  
\035\271\317\133\261\152\376\264\261\106\040\242\373\036\073\160  
\357\223\230\175\214\163\226\362\305\357\205\160\255\051\046\374  
\036\004\076\034\240\330\017\313\122\203\142\174\356\213\123\225  
\220\251\127\242\352\141\005\330\371\115\304\047\372\156\255\355  
\371\327\121\367\153\245\002\003\001\000\001\243\202\001\044\060  
\202\001\040\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\323  
\224\212\114\142\023\052\031\056\314\257\162\212\175\066\327\232  
\034\334\147\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\201\335\006\003\125\035\037\004\201\325\060\201  
\322\060\201\207\240\201\204\240\201\201\206\177\154\144\141\160  
\072\057\057\144\151\162\145\143\164\157\162\171\056\144\055\164  
\162\165\163\164\056\156\145\164\057\103\116\075\104\055\124\122  
\125\123\124\045\062\060\122\157\157\164\045\062\060\103\154\141  
\163\163\045\062\060\063\045\062\060\103\101\045\062\060\062\045  
\062\060\105\126\045\062\060\062\060\060\071\054\117\075\104\055  
\124\162\165\163\164\045\062\060\107\155\142\110\054\103\075\104  
\105\077\143\145\162\164\151\146\151\143\141\164\145\162\145\166  
\157\143\141\164\151\157\156\154\151\163\164\060\106\240\104\240  
\102\206\100\150\164\164\160\072\057\057\167\167\167\056\144\055  
\164\162\165\163\164\056\156\145\164\057\143\162\154\057\144\055  
\164\162\165\163\164\137\162\157\157\164\137\143\154\141\163\163  
\137\063\137\143\141\137\062\137\145\166\137\062\060\060\071\056  
\143\162\154\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\001\001\000\064\355\173\132\074\244\224\210\357  
\032\021\165\007\057\263\376\074\372\036\121\046\353\207\366\051  
\336\340\361\324\306\044\011\351\301\317\125\033\264\060\331\316  
\032\376\006\121\246\025\244\055\357\262\113\277\040\050\045\111  
\321\246\066\167\064\350\144\337\122\261\021\307\163\172\315\071  
\236\302\255\214\161\041\362\132\153\257\337\074\116\125\257\262  
\204\145\024\211\271\167\313\052\061\276\317\243\155\317\157\110  
\224\062\106\157\347\161\214\240\246\204\031\067\007\362\003\105  
\011\053\206\165\174\337\137\151\127\000\333\156\330\246\162\042  
\113\120\324\165\230\126\337\267\030\377\103\103\120\256\172\104  
\173\360\171\121\327\103\075\247\323\201\323\360\311\117\271\332

```

\306\227\206\320\202\303\344\102\155\376\260\342\144\116\016\046
\347\100\064\046\265\010\211\327\010\143\143\070\047\165\036\063
\352\156\250\335\237\231\117\164\115\201\211\200\113\335\232\227
\051\134\057\276\201\101\271\214\377\352\175\140\006\236\315\327
\075\323\056\243\025\274\250\346\046\345\157\303\334\270\003\041
\352\237\026\361\054\124\265
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "D-TRUST Root Class 3 CA 2 EV 2009"
Issuer: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE
Serial Number: 623604 (0x983f4)
Subject: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE
Not Valid Before: Thu Nov 05 08:50:46 2009
Not Valid After : Mon Nov 05 08:50:46 2029
Fingerprint (SHA-256):
EE:C5:49:6B:98:8C:E9:86:25:B9:34:09:2E:EC:29:08:BE:D0:B0:F3:16:C2:D4:73:0C:84:EA:F1:F3:D3:48:81
Fingerprint (SHA1): 96:C9:1B:0B:95:B4:10:98:42:FA:D0:D8:22:79:FE:60:FA:B9:16:83
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 EV 2009"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\226\311\033\013\225\264\020\230\102\372\320\330\042\171\376\140
\372\271\026\203
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\252\306\103\054\136\055\315\304\064\300\120\117\021\002\117\266
END
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003\014
\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062\060
\060\071
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\011\203\364
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

```

CKA\_TRUST\_STEP\_UP\_APPROVED

CK\_BBOOL CK\_FALSE

#

# Certificate "CA Disig Root R2"

#

# Issuer: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK

# Serial Number:00:92:b8:88:db:b0:8a:c1:63

# Subject: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK

# Not Valid Before: Thu Jul 19 09:15:30 2012

# Not Valid After : Sat Jul 19 09:15:30 2042

# Fingerprint (SHA-256):

E2:3D:4A:03:6D:7B:70:E9:F5:95:B1:42:20:79:D2:B9:1E:DF:BB:1F:B6:51:A0:63:3E:AA:8A:9D:C5:F8:07:03

# Fingerprint (SHA1): B5:61:EB:EA:A4:DE:E4:25:4B:69:1A:98:A5:57:47:C2:34:C7:D9:71

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CA Disig Root R2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061  
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163  
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104  
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125  
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157  
\164\040\122\062

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061  
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163  
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104  
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125  
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157  
\164\040\122\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\011\000\222\270\210\333\260\212\301\143

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\151\060\202\003\121\240\003\002\001\002\002\011\000  
\222\270\210\333\260\212\301\143\060\015\006\011\052\206\110\206  
\367\015\001\001\013\005\000\060\122\061\013\060\011\006\003\125  
\004\006\023\002\123\113\061\023\060\021\006\003\125\004\007\023  
\012\102\162\141\164\151\163\154\141\166\141\061\023\060\021\006  
\003\125\004\012\023\012\104\151\163\151\147\040\141\056\163\056

\061\031\060\027\006\003\125\004\003\023\020\103\101\040\104\151  
\163\151\147\040\122\157\157\164\040\122\062\060\036\027\015\061  
\062\060\067\061\071\060\071\061\065\063\060\132\027\015\064\062  
\060\067\061\071\060\071\061\065\063\060\132\060\122\061\013\060  
\011\006\003\125\004\006\023\002\123\113\061\023\060\021\006\003  
\125\004\007\023\012\102\162\141\164\151\163\154\141\166\141\061  
\023\060\021\006\003\125\004\012\023\012\104\151\163\151\147\040  
\141\056\163\056\061\031\060\027\006\003\125\004\003\023\020\103  
\101\040\104\151\163\151\147\040\122\157\157\164\040\122\062\060  
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001  
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000  
\242\243\304\000\011\326\205\135\055\155\024\366\302\303\163\236  
\065\302\161\125\176\201\373\253\106\120\340\301\174\111\170\346  
\253\171\130\074\332\377\174\034\237\330\227\002\170\076\153\101  
\004\351\101\275\276\003\054\105\366\057\144\324\253\135\243\107  
\075\144\233\351\150\232\306\314\033\077\272\276\262\213\064\002  
\056\230\125\031\374\214\157\252\137\332\114\316\115\003\041\243  
\330\322\064\223\126\226\313\114\014\000\026\074\137\032\315\310  
\307\154\246\255\323\061\247\274\350\345\341\146\326\322\373\003  
\264\101\145\311\020\256\016\005\143\306\200\152\151\060\375\322  
\356\220\357\015\047\337\237\225\163\364\341\045\332\154\026\336  
\101\070\064\352\213\374\321\350\004\024\141\055\101\176\254\307  
\167\116\313\121\124\373\136\222\030\033\004\132\150\306\311\304  
\372\267\023\240\230\267\021\053\267\326\127\314\174\236\027\321  
\313\045\376\206\116\044\056\126\014\170\115\236\001\022\246\053  
\247\001\145\156\174\142\035\204\204\337\352\300\153\265\245\052  
\225\203\303\123\021\014\163\035\013\262\106\220\321\102\072\316  
\100\156\225\255\377\306\224\255\156\227\204\216\175\157\236\212  
\200\015\111\155\163\342\173\222\036\303\363\301\363\353\056\005  
\157\331\033\317\067\166\004\310\264\132\344\027\247\313\335\166  
\037\320\031\166\350\054\005\263\326\234\064\330\226\334\141\207  
\221\005\344\104\010\063\301\332\271\010\145\324\256\262\066\015  
\353\272\070\272\014\345\233\236\353\215\146\335\231\317\326\211  
\101\366\004\222\212\051\051\155\153\072\034\347\165\175\002\161  
\016\363\300\347\275\313\031\335\235\140\262\302\146\140\266\261  
\004\356\311\346\206\271\232\146\100\250\347\021\355\201\105\003  
\213\366\147\131\350\301\006\021\275\335\317\200\002\117\145\100  
\170\134\107\120\310\233\346\037\201\173\344\104\250\133\205\232  
\342\336\132\325\307\371\072\104\146\113\344\062\124\174\344\154  
\234\263\016\075\027\242\262\064\022\326\176\262\250\111\273\321  
\172\050\100\276\242\026\037\337\344\067\037\021\163\373\220\012  
\145\103\242\015\174\370\006\001\125\063\175\260\015\270\364\365  
\256\245\102\127\174\066\021\214\173\136\304\003\235\214\171\235  
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125\035  
\016\004\026\004\024\265\231\370\257\260\224\365\343\040\326\012  
\255\316\116\126\244\056\156\102\355\060\015\006\011\052\206\110

\206\367\015\001\001\013\005\000\003\202\002\001\000\046\006\136  
\160\347\145\063\310\202\156\331\234\027\072\033\172\146\262\001  
\366\170\073\151\136\057\352\377\116\371\050\303\230\052\141\114  
\264\044\022\212\175\155\021\024\367\234\265\312\346\274\236\047  
\216\114\031\310\251\275\172\300\327\066\016\155\205\162\156\250  
\306\242\155\366\372\163\143\177\274\156\171\010\034\235\212\237  
\032\212\123\246\330\273\331\065\125\261\021\305\251\003\263\126  
\073\271\204\223\042\136\176\301\366\022\122\213\352\054\147\274  
\376\066\114\365\270\317\321\263\111\222\073\323\051\016\231\033  
\226\367\141\270\073\304\053\266\170\154\264\043\157\360\375\323  
\262\136\165\037\231\225\250\254\366\332\341\305\061\173\373\321  
\106\263\322\274\147\264\142\124\272\011\367\143\260\223\242\232  
\371\351\122\056\213\140\022\253\374\365\140\126\357\020\134\213  
\304\032\102\334\203\133\144\016\313\265\274\326\117\301\174\074  
\156\215\023\155\373\173\353\060\320\334\115\257\305\325\266\245  
\114\133\161\311\350\061\276\350\070\006\110\241\032\342\352\322  
\336\022\071\130\032\377\200\016\202\165\346\267\311\007\154\016  
\357\377\070\361\230\161\304\267\177\016\025\320\045\151\275\042  
\235\053\355\005\366\106\107\254\355\300\360\324\073\342\354\356  
\226\133\220\023\116\036\126\072\353\260\357\226\273\226\043\021  
\272\362\103\206\164\144\225\310\050\165\337\035\065\272\322\067  
\203\070\123\070\066\073\317\154\351\371\153\016\320\373\004\350  
\117\167\327\145\001\170\206\014\172\076\041\142\361\177\143\161  
\014\311\237\104\333\250\047\242\165\276\156\201\076\327\300\353  
\033\230\017\160\134\064\262\212\314\300\205\030\353\156\172\263  
\367\132\241\007\277\251\102\222\363\140\042\227\344\024\241\007  
\233\116\166\300\216\175\375\244\045\307\107\355\377\037\163\254  
\314\303\245\351\157\012\216\233\145\302\120\205\265\243\240\123  
\022\314\125\207\141\363\201\256\020\106\141\275\104\041\270\302  
\075\164\317\176\044\065\372\034\007\016\233\075\042\312\357\061  
\057\214\254\022\275\357\100\050\374\051\147\237\262\023\117\146  
\044\304\123\031\351\036\051\025\357\346\155\260\177\055\147\375  
\363\154\033\165\106\243\345\112\027\351\244\327\013

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "CA Disig Root R2"

# Issuer: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK

# Serial Number:00:92:b8:88:db:b0:8a:c1:63

# Subject: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK

# Not Valid Before: Thu Jul 19 09:15:30 2012

# Not Valid After : Sat Jul 19 09:15:30 2042

# Fingerprint (SHA-256):

E2:3D:4A:03:6D:7B:70:E9:F5:95:B1:42:20:79:D2:B9:1E:DF:BB:1F:B6:51:A0:63:3E:AA:8A:9D:C5:F8:07:03

# Fingerprint (SHA1): B5:61:EB:EA:A4:DE:E4:25:4B:69:1A:98:A5:57:47:C2:34:C7:D9:71

```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig Root R2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\265\141\353\352\244\336\344\045\113\151\032\230\245\127\107\302
\064\307\331\161
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\046\001\373\330\047\247\027\232\105\124\070\032\103\001\073\003
END
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\222\270\210\333\260\212\301\143
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "ACCVRAIZ1"
#
#
 Issuer: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1
 # Serial Number:5e:c3:b7:a6:43:7f:a4:e0
 # Subject: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1
 # Not Valid Before: Thu May 05 09:37:37 2011
 # Not Valid After : Tue Dec 31 09:37:37 2030
 # Fingerprint (SHA-256):
 9A:6E:C0:12:E1:A7:DA:9D:BE:34:19:4D:47:8A:D7:C0:DB:18:22:FB:07:1D:F1:29:81:49:6E:D1:04:38:41:13
 # Fingerprint (SHA1): 93:05:7A:88:15:C6:4F:CE:88:2F:FA:91:16:52:28:78:BC:53:64:17
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACCVRAIZ1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL

```



\060\102\061\022\060\020\006\003\125\004\003\014\011\101\103\103  
\126\122\101\111\132\061\061\020\060\016\006\003\125\004\013\014  
\007\120\113\111\101\103\103\126\061\015\060\013\006\003\125\004  
\012\014\004\101\103\103\126\061\013\060\011\006\003\125\004\006  
\023\002\105\123

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\102\061\022\060\020\006\003\125\004\003\014\011\101\103\103  
\126\122\101\111\132\061\061\020\060\016\006\003\125\004\013\014  
\007\120\113\111\101\103\103\126\061\015\060\013\006\003\125\004  
\012\014\004\101\103\103\126\061\013\060\011\006\003\125\004\006  
\023\002\105\123

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\010\136\303\267\246\103\177\244\340

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\007\323\060\202\005\273\240\003\002\001\002\002\010\136  
\303\267\246\103\177\244\340\060\015\006\011\052\206\110\206\367  
\015\001\001\005\005\000\060\102\061\022\060\020\006\003\125\004  
\003\014\011\101\103\103\126\122\101\111\132\061\061\020\060\016  
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CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "ACCVRAIZ1"
Issuer: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1
Serial Number:5e:c3:b7:a6:43:7f:a4:e0
Subject: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1
Not Valid Before: Thu May 05 09:37:37 2011
Not Valid After : Tue Dec 31 09:37:37 2030
Fingerprint (SHA-256):
9A:6E:C0:12:E1:A7:DA:9D:BE:34:19:4D:47:8A:D7:C0:DB:18:22:FB:07:1D:F1:29:81:49:6E:D1:04:38:41:13
#
Fingerprint (SHA1): 93:05:7A:88:15:C6:4F:CE:88:2F:FA:91:16:52:28:78:BC:53:64:17
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACCVRAIZ1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\223\005\172\210\025\306\117\316\210\057\372\221\026\122\050\170
\274\123\144\027
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\320\240\132\356\005\266\011\224\041\241\175\361\262\051\202\002
END
CKA_ISSUER MULTILINE_OCTAL
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\126\122\101\111\132\061\061\020\060\016\006\003\125\004\013\014
\007\120\113\111\101\103\103\126\061\015\060\013\006\003\125\004
\012\014\004\101\103\103\126\061\013\060\011\006\003\125\004\006
\023\002\105\123
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CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\136\303\267\246\103\177\244\340
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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "TWCA Global Root CA"
#
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Issuer: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
Serial Number: 3262 (0xcbe)
Subject: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
Not Valid Before: Wed Jun 27 06:28:33 2012
Not Valid After : Tue Dec 31 15:59:59 2030
Fingerprint (SHA-256):
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Fingerprint (SHA1): 9C:BB:48:53:F6:A4:F6:D3:52:A4:E8:32:52:55:60:13:F5:AD:AF:65
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Global Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\173\040\375\344\333\351\010\241\270\236\075\011\307\117\373\054  
\370\223\166\101\336\122\340\341\127\322\235\003\274\167\236\376  
\236\051\136\367\301\121\140\037\336\332\013\262\055\165\267\103  
\110\223\347\366\171\306\204\135\200\131\140\224\374\170\230\217  
\074\223\121\355\100\220\007\337\144\143\044\313\116\161\005\241  
\327\224\032\210\062\361\042\164\042\256\245\246\330\022\151\114  
\140\243\002\356\053\354\324\143\222\013\136\276\057\166\153\243  
\266\046\274\217\003\330\012\362\114\144\106\275\071\142\345\226  
\353\064\143\021\050\314\225\361\255\357\357\334\200\130\110\351  
\113\270\352\145\254\351\374\200\265\265\310\105\371\254\301\237  
\331\271\352\142\210\216\304\361\113\203\022\255\346\213\204\326  
\236\302\353\203\030\237\152\273\033\044\140\063\160\314\354\367  
\062\363\134\331\171\175\357\236\244\376\311\043\303\044\356\025  
\222\261\075\221\117\046\206\275\146\163\044\023\352\244\256\143  
\301\255\175\204\003\074\020\170\206\033\171\343\304\363\362\004  
\225\040\256\043\202\304\263\072\000\142\277\346\066\044\341\127  
\272\307\036\220\165\325\137\077\225\141\053\301\073\315\345\263  
\150\141\320\106\046\251\041\122\151\055\353\056\307\353\167\316  
\246\072\265\003\063\117\166\321\347\134\124\001\135\313\170\364  
\311\014\277\317\022\216\027\055\043\150\224\347\253\376\251\262  
\053\006\320\004\315

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "TWCA Global Root CA"

# Issuer: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW

# Serial Number: 3262 (0xcbe)

# Subject: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW

# Not Valid Before: Wed Jun 27 06:28:33 2012

# Not Valid After : Tue Dec 31 15:59:59 2030

# Fingerprint (SHA-256):

59:76:90:07:F7:68:5D:0F:CD:50:87:2F:9F:95:D5:75:5A:5B:2B:45:7D:81:F3:69:2B:61:0A:98:67:2F:0E:1B

# Fingerprint (SHA1): 9C:BB:48:53:F6:A4:F6:D3:52:A4:E8:32:52:55:60:13:F5:AD:AF:65

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "TWCA Global Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\234\273\110\123\366\244\366\323\122\244\350\062\122\125\140\023

\365\255\257\145

```

END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\371\003\176\317\346\236\074\163\172\052\220\007\151\377\053\226
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\023\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\034\060\032\006\003\125\004\003\023\023
\124\127\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\014\276
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "TeliaSonera Root CA v1"
#
Issuer: CN=TeliaSonera Root CA v1,O=TeliaSonera
Serial Number:00:95:be:16:a0:f7:2e:46:f1:7b:39:82:72:fa:8b:cd:96
Subject: CN=TeliaSonera Root CA v1,O=TeliaSonera
#
Not Valid Before: Thu Oct 18 12:00:50 2007
Not Valid After : Mon Oct 18 12:00:50 2032
Fingerprint (SHA-256):
DD:69:36:FE:21:F8:F0:77:C1:23:A1:A5:21:C1:22:24:F7:22:55:B7:3E:03:A7:26:06:93:E8:A2:4B:0F:A3:89
Fingerprint (SHA1): 43:13:BB:96:F1:D5:86:9B:C1:4E:6A:92:F6:CF:F6:34:69:87:82:37
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TeliaSonera Root CA v1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154
\151\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004
\003\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122
\157\157\164\040\103\101\040\166\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154

```



\151\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004  
\003\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122  
\157\157\164\040\103\101\040\166\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\021\000\225\276\026\240\367\056\106\361\173\071\202\162\372  
\213\315\226

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\070\060\202\003\040\240\003\002\001\002\002\021\000  
\225\276\026\240\367\056\106\361\173\071\202\162\372\213\315\226  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154\151  
\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004\003  
\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122\157  
\157\164\040\103\101\040\166\061\060\036\027\015\060\067\061\060  
\061\070\061\062\060\060\065\060\132\027\015\063\062\061\060\061  
\070\061\062\060\060\065\060\132\060\067\061\024\060\022\006\003  
\125\004\012\014\013\124\145\154\151\141\123\157\156\145\162\141  
\061\037\060\035\006\003\125\004\003\014\026\124\145\154\151\141  
\123\157\156\145\162\141\040\122\157\157\164\040\103\101\040\166  
\061\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002  
\001\000\302\276\353\047\360\041\243\363\151\046\125\176\235\305  
\125\026\221\134\375\357\041\277\123\200\172\055\322\221\214\143  
\061\360\354\044\360\303\245\322\162\174\020\155\364\067\267\345  
\346\174\171\352\214\265\202\213\256\110\266\254\000\334\145\165  
\354\052\115\137\301\207\365\040\145\053\201\250\107\076\211\043  
\225\060\026\220\177\350\127\007\110\347\031\256\277\105\147\261  
\067\033\006\052\376\336\371\254\175\203\373\136\272\344\217\227  
\147\276\113\216\215\144\007\127\070\125\151\064\066\075\023\110  
\357\117\342\323\146\036\244\317\032\267\136\066\063\324\264\006  
\275\030\001\375\167\204\120\000\105\365\214\135\350\043\274\176  
\376\065\341\355\120\173\251\060\215\031\323\011\216\150\147\135  
\277\074\227\030\123\273\051\142\305\312\136\162\301\307\226\324  
\333\055\240\264\037\151\003\354\352\342\120\361\014\074\360\254  
\363\123\055\360\034\365\355\154\071\071\163\200\026\310\122\260  
\043\315\340\076\334\335\074\107\240\273\065\212\342\230\150\213  
\276\345\277\162\356\322\372\245\355\022\355\374\230\030\251\046  
\166\334\050\113\020\040\034\323\177\026\167\055\355\157\200\367  
\111\273\123\005\273\135\150\307\324\310\165\026\077\211\132\213  
\367\027\107\324\114\361\322\211\171\076\115\075\230\250\141\336  
\072\036\322\370\136\003\340\301\311\034\214\323\215\115\323\225  
\066\263\067\137\143\143\233\063\024\360\055\046\153\123\174\211  
\214\062\302\156\354\075\041\000\071\311\241\150\342\120\203\056  
\260\072\053\363\066\240\254\057\344\157\141\302\121\011\071\076  
\213\123\271\273\147\332\334\123\271\166\131\066\235\103\345\040

\340\075\062\140\205\042\121\267\307\063\273\335\025\057\244\170  
\246\007\173\201\106\066\004\206\335\171\065\307\225\054\073\260  
\243\027\065\345\163\037\264\134\131\357\332\352\020\145\173\172  
\320\177\237\263\264\052\067\073\160\213\233\133\271\053\267\354  
\262\121\022\227\123\051\132\324\360\022\020\334\117\002\273\022  
\222\057\142\324\077\151\103\174\015\326\374\130\165\001\210\235  
\130\026\113\336\272\220\377\107\001\211\006\152\366\137\262\220  
\152\263\002\246\002\210\277\263\107\176\052\331\325\372\150\170  
\065\115\002\003\001\000\001\243\077\060\075\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\013\006\003  
\125\035\017\004\004\003\002\001\006\060\035\006\003\125\035\016  
\004\026\004\024\360\217\131\070\000\263\365\217\232\226\014\325  
\353\372\173\252\027\350\023\022\060\015\006\011\052\206\110\206  
\367\015\001\001\005\005\000\003\202\002\001\000\276\344\134\142  
\116\044\364\014\010\377\360\323\014\150\344\223\111\042\077\104  
\047\157\273\155\336\203\146\316\250\314\015\374\365\232\006\345  
\167\024\221\353\235\101\173\231\052\204\345\377\374\041\301\135  
\360\344\037\127\267\165\251\241\137\002\046\377\327\307\367\116  
\336\117\370\367\034\106\300\172\117\100\054\042\065\360\031\261  
\320\153\147\054\260\250\340\300\100\067\065\366\204\134\134\343  
\257\102\170\376\247\311\015\120\352\015\204\166\366\121\357\203  
\123\306\172\377\016\126\111\056\217\172\326\014\346\047\124\343  
\115\012\140\162\142\315\221\007\326\245\277\310\231\153\355\304  
\031\346\253\114\021\070\305\157\061\342\156\111\310\077\166\200  
\046\003\046\051\340\066\366\366\040\123\343\027\160\064\027\235  
\143\150\036\153\354\303\115\206\270\023\060\057\135\106\015\107  
\103\325\033\252\131\016\271\134\215\006\110\255\164\207\137\307  
\374\061\124\101\023\342\307\041\016\236\340\036\015\341\300\173  
\103\205\220\305\212\130\306\145\012\170\127\362\306\043\017\001  
\331\040\113\336\017\373\222\205\165\052\134\163\215\155\173\045  
\221\312\356\105\256\006\113\000\314\323\261\131\120\332\072\210  
\073\051\103\106\136\227\053\124\316\123\157\215\112\347\226\372  
\277\161\016\102\213\174\375\050\240\320\110\312\332\304\201\114  
\273\242\163\223\046\310\353\014\326\046\210\266\300\044\317\273  
\275\133\353\165\175\351\010\216\206\063\054\171\167\011\151\245  
\211\374\263\160\220\207\166\217\323\042\273\102\316\275\163\013  
\040\046\052\320\233\075\160\036\044\154\315\207\166\251\027\226  
\267\317\015\222\373\216\030\251\230\111\321\236\376\140\104\162  
\041\271\031\355\302\365\061\361\071\110\210\220\044\165\124\026  
\255\316\364\370\151\024\144\071\373\243\270\272\160\100\307\047  
\034\277\304\126\123\372\143\145\320\363\034\016\026\365\153\206  
\130\115\030\324\344\015\216\245\235\133\221\334\166\044\120\077  
\306\052\373\331\267\234\265\326\346\320\331\350\031\213\025\161  
\110\255\267\352\330\131\210\324\220\277\026\263\331\351\254\131  
\141\124\310\034\272\312\301\312\341\271\040\114\217\072\223\211  
\245\240\314\277\323\366\165\244\165\226\155\126

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "TeliaSonera Root CA v1"
Issuer: CN=TeliaSonera Root CA v1,O=TeliaSonera
Serial Number:00:95:be:16:a0:f7:2e:46:f1:7b:39:82:72:fa:8b:cd:96
Subject: CN=TeliaSonera Root CA v1,O=TeliaSonera
#
Not Valid Before: Thu Oct 18 12:00:50 2007
Not Valid After : Mon Oct 18 12:00:50 2032
Fingerprint (SHA-256):
DD:69:36:FE:21:F8:F0:77:C1:23:A1:A5:21:C1:22:24:F7:22:55:B7:3E:03:A7:26:06:93:E8:A2:4B:0F:A3:89
Fingerprint (SHA1): 43:13:BB:96:F1:D5:86:9B:C1:4E:6A:92:F6:CF:F6:34:69:87:82:37
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TeliaSonera Root CA v1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\103\023\273\226\361\325\206\233\301\116\152\222\366\317\366\064
\151\207\202\067
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\067\101\111\033\030\126\232\046\365\255\302\146\373\100\245\114
END
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154
\151\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004
\003\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122
\157\157\164\040\103\101\040\166\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\225\276\026\240\367\056\106\361\173\071\202\162\372
\213\315\226
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "T-TeleSec GlobalRoot Class 2"
#
Issuer: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
Serial Number: 1 (0x1)

```

```
Subject: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
Not Valid Before: Wed Oct 01 10:40:14 2008
Not Valid After : Sat Oct 01 23:59:59 2033
Fingerprint (SHA-256):
91:E2:F5:78:8D:58:10:EB:A7:BA:58:73:7D:E1:54:8A:8E:CA:CD:01:45:98:BC:0B:14:3E:04:1B:17:05:25:52
Fingerprint (SHA1): 59:0D:2D:7D:88:4F:40:2E:61:7E:A5:62:32:17:65:CF:17:D8:94:E9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\303\060\202\002\253\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163\164
\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040\123
\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060\035
```

\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155\163  
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045\060  
\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123\145  
\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154\141  
\163\163\040\062\060\036\027\015\060\070\061\060\060\061\061\060  
\064\060\061\064\132\027\015\063\063\061\060\060\061\062\063\065  
\071\065\071\132\060\201\202\061\013\060\011\006\003\125\004\006  
\023\002\104\105\061\053\060\051\006\003\125\004\012\014\042\124  
\055\123\171\163\164\145\155\163\040\105\156\164\145\162\160\162  
\151\163\145\040\123\145\162\166\151\143\145\163\040\107\155\142  
\110\061\037\060\035\006\003\125\004\013\014\026\124\055\123\171  
\163\164\145\155\163\040\124\162\165\163\164\040\103\145\156\164  
\145\162\061\045\060\043\006\003\125\004\003\014\034\124\055\124  
\145\154\145\123\145\143\040\107\154\157\142\141\154\122\157\157  
\164\040\103\154\141\163\163\040\062\060\202\001\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017  
\000\060\202\001\012\002\202\001\001\000\252\137\332\033\137\350  
\163\221\345\332\134\364\242\346\107\345\363\150\125\140\005\035  
\002\244\263\233\131\363\036\212\257\064\255\374\015\302\331\110  
\031\356\151\217\311\040\374\041\252\007\031\355\260\134\254\145  
\307\137\355\002\174\173\174\055\033\326\272\271\200\302\030\202  
\026\204\372\146\260\010\306\124\043\201\344\315\271\111\077\366  
\117\156\067\110\050\070\017\305\276\347\150\160\375\071\227\115  
\322\307\230\221\120\252\304\104\263\043\175\071\107\351\122\142  
\326\022\223\136\267\061\226\102\005\373\166\247\036\243\365\302  
\374\351\172\305\154\251\161\117\352\313\170\274\140\257\307\336  
\364\331\313\276\176\063\245\156\224\203\360\064\372\041\253\352  
\216\162\240\077\244\336\060\133\357\206\115\152\225\133\103\104  
\250\020\025\034\345\001\127\305\230\361\346\006\050\221\252\040  
\305\267\123\046\121\103\262\013\021\225\130\341\300\017\166\331  
\300\215\174\201\363\162\160\236\157\376\032\216\331\137\065\306  
\262\157\064\174\276\110\117\342\132\071\327\330\235\170\236\237  
\206\076\003\136\031\213\104\242\325\307\002\003\001\000\001\243  
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\277  
\131\040\066\000\171\240\240\042\153\214\325\362\141\322\270\054  
\313\202\112\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\001\001\000\061\003\242\141\013\037\164\350\162  
\066\306\155\371\115\236\372\042\250\341\201\126\317\315\273\237  
\352\253\221\031\070\257\252\174\025\115\363\266\243\215\245\364  
\216\366\104\251\247\350\041\225\255\076\000\142\026\210\360\002  
\272\374\141\043\346\063\233\060\172\153\066\142\173\255\004\043  
\204\130\145\342\333\053\212\347\045\123\067\142\123\137\274\332  
\001\142\051\242\246\047\161\346\072\042\176\301\157\035\225\160  
\040\112\007\064\337\352\377\025\200\345\272\327\172\330\133\165  
\174\005\172\051\107\176\100\250\061\023\167\315\100\073\264\121  
\107\172\056\021\343\107\021\336\235\146\320\213\325\124\146\372

```
\203\125\352\174\302\051\211\033\351\157\263\316\342\005\204\311
\057\076\170\205\142\156\311\137\301\170\143\164\130\300\110\030
\014\231\071\353\244\314\032\265\171\132\215\025\234\330\024\015
\366\172\007\127\307\042\203\005\055\074\233\045\046\075\030\263
\251\103\174\310\310\253\144\217\016\243\277\234\033\235\060\333
\332\320\031\056\252\074\361\373\063\200\166\344\315\255\031\117
\005\047\216\023\241\156\302
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "T-TeleSec GlobalRoot Class 2"

# Issuer: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services  
GmbH,C=DE

# Serial Number: 1 (0x1)

# Subject: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services  
GmbH,C=DE

# Not Valid Before: Wed Oct 01 10:40:14 2008

# Not Valid After : Sat Oct 01 23:59:59 2033

# Fingerprint (SHA-256):

91:E2:F5:78:8D:58:10:EB:A7:BA:58:73:7D:E1:54:8A:8E:CA:CD:01:45:98:BC:0B:14:3E:04:1B:17:05:25:52

# Fingerprint (SHA1): 59:0D:2D:7D:88:4F:40:2E:61:7E:A5:62:32:17:65:CF:17:D8:94:E9

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "T-TeleSec GlobalRoot Class 2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\131\015\055\175\210\117\100\056\141\176\245\142\062\027\145\317
\027\330\224\351
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\053\233\236\344\173\154\037\000\162\032\314\301\167\171\337\152
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\062
```

END

```

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Atos TrustedRoot 2011"
#
Issuer: C=DE,O=Atos,CN=Atos TrustedRoot 2011
Serial Number:5c:33:cb:62:2c:5f:b3:32
Subject: C=DE,O=Atos,CN=Atos TrustedRoot 2011
Not Valid Before: Thu Jul 07 14:58:30 2011
Not Valid After : Tue Dec 31 23:59:59 2030
Fingerprint (SHA-256):
F3:56:BE:A2:44:B7:A9:1E:B3:5D:53:CA:9A:D7:86:4A:CE:01:8E:2D:35:D5:F8:F9:6D:DF:68:A6:F4:1A:A4:74
Fingerprint (SHA1): 2B:B1:F5:3E:55:0C:1D:C5:F1:D4:E6:B7:6A:46:4B:55:06:02:AC:21
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot 2011"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\074\061\036\060\034\006\003\125\004\003\014\025\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\062\060
\061\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\036\060\034\006\003\125\004\003\014\025\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\062\060
\061\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\134\063\313\142\054\137\263\062
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\167\060\202\002\137\240\003\002\001\002\002\010\134
\063\313\142\054\137\263\062\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\074\061\036\060\034\006\003\125\004
\003\014\025\101\164\157\163\040\124\162\165\163\164\145\144\122

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\157\157\164\040\062\060\061\061\061\015\060\013\006\003\125\004  
\012\014\004\101\164\157\163\061\013\060\011\006\003\125\004\006  
\023\002\104\105\060\036\027\015\061\061\060\067\060\067\061\064  
\065\070\063\060\132\027\015\063\060\061\062\063\061\062\063\065  
\071\065\071\132\060\074\061\036\060\034\006\003\125\004\003\014  
\025\101\164\157\163\040\124\162\165\163\164\145\144\122\157\157  
\164\040\062\060\061\061\061\015\060\013\006\003\125\004\012\014  
\004\101\164\157\163\061\013\060\011\006\003\125\004\006\023\002  
\104\105\060\202\001\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202  
\001\001\000\225\205\073\227\157\052\073\056\073\317\246\363\051  
\065\276\317\030\254\076\252\331\370\115\240\076\032\107\271\274  
\232\337\362\376\314\076\107\350\172\226\302\044\216\065\364\251  
\014\374\202\375\155\301\162\142\047\275\352\153\353\347\212\314  
\124\076\220\120\317\200\324\225\373\350\265\202\324\024\305\266  
\251\125\045\127\333\261\120\366\260\140\144\131\172\151\317\003  
\267\157\015\276\312\076\157\164\162\352\252\060\052\163\142\276  
\111\221\141\310\021\376\016\003\052\367\152\040\334\002\025\015  
\136\025\152\374\343\202\301\265\305\235\144\011\154\243\131\230  
\007\047\307\033\226\053\141\164\161\154\103\361\367\065\211\020  
\340\236\354\125\241\067\042\242\207\004\005\054\107\175\264\034  
\271\142\051\146\050\312\267\341\223\365\244\224\003\231\271\160  
\205\265\346\110\352\215\120\374\331\336\314\157\007\016\335\013  
\162\235\200\060\026\007\225\077\050\016\375\305\165\117\123\326  
\164\232\264\044\056\216\002\221\317\166\305\233\036\125\164\234  
\170\041\261\360\055\361\013\237\302\325\226\030\037\360\124\042  
\172\214\007\002\003\001\000\001\243\175\060\173\060\035\006\003  
\125\035\016\004\026\004\024\247\245\006\261\054\246\011\140\356  
\321\227\351\160\256\274\073\031\154\333\041\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003  
\125\035\043\004\030\060\026\200\024\247\245\006\261\054\246\011  
\140\356\321\227\351\160\256\274\073\031\154\333\041\060\030\006  
\003\125\035\040\004\021\060\017\060\015\006\013\053\006\001\004  
\001\260\055\003\004\001\001\060\016\006\003\125\035\017\001\001  
\377\004\004\003\002\001\206\060\015\006\011\052\206\110\206\367  
\015\001\001\013\005\000\003\202\001\001\000\046\167\064\333\224  
\110\206\052\101\235\054\076\006\220\140\304\214\254\013\124\270  
\037\271\173\323\007\071\344\372\076\173\262\075\116\355\237\043  
\275\227\363\153\134\357\356\375\100\246\337\241\223\241\012\206  
\254\357\040\320\171\001\275\170\367\031\330\044\061\064\004\001  
\246\272\025\232\303\047\334\330\117\017\314\030\143\377\231\017  
\016\221\153\165\026\341\041\374\330\046\307\107\267\246\317\130  
\162\161\176\272\341\115\225\107\073\311\257\155\241\264\301\354  
\211\366\264\017\070\265\342\144\334\045\317\246\333\353\232\134  
\231\241\305\010\336\375\346\332\325\326\132\105\014\304\267\302  
\265\024\357\264\021\377\016\025\265\365\365\333\306\275\353\132  
\247\360\126\042\251\074\145\124\306\025\250\275\206\236\315\203  
\226\150\172\161\201\211\341\013\341\352\021\033\150\010\314\151



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\236\354\236\101\236\104\062\046\172\342\207\012\161\075\353\344
\132\244\322\333\305\315\306\336\140\177\271\363\117\104\222\357
\052\267\030\076\247\031\331\013\175\261\067\101\102\260\272\140
\035\362\376\011\021\260\360\207\173\247\235
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "Atos TrustedRoot 2011"
Issuer: C=DE,O=Atos,CN=Atos TrustedRoot 2011
Serial Number:5c:33:cb:62:2c:5f:b3:32
Subject: C=DE,O=Atos,CN=Atos TrustedRoot 2011
Not Valid Before: Thu Jul 07 14:58:30 2011
Not Valid After : Tue Dec 31 23:59:59 2030
Fingerprint (SHA-256):
F3:56:BE:A2:44:B7:A9:1E:B3:5D:53:CA:9A:D7:86:4A:CE:01:8E:2D:35:D5:F8:F9:6D:DF:68:A6:F4:1A:A4:74
Fingerprint (SHA1): 2B:B1:F5:3E:55:0C:1D:C5:F1:D4:E6:B7:6A:46:4B:55:06:02:AC:21
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8
"Atos TrustedRoot 2011"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\053\261\365\076\125\014\035\305\361\324\346\267\152\106\113\125
\006\002\254\041
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\256\271\304\062\113\254\177\135\146\314\167\224\273\052\167\126
END
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\036\060\034\006\003\125\004\003\014\025\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\062\060
\061\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\134\063\313\142\054\137\263\062
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "QuoVadis Root CA 1 G3"

```

```
#
Issuer: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM
Serial Number:78:58:5f:2e:ad:2c:19:4b:e3:37:07:35:34:13:28:b5:96:d4:65:93
#
Subject: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM
Not Valid Before: Thu Jan 12 17:27:44 2012
Not Valid After : Sun Jan 12 17:27:44 2042
Fingerprint (SHA-256):
8A:86:6F:D1:B2:76:B5:7E:57:8E:92:1C:65:82:8A:2B:ED:58:E9:F2:F2:88:05:41:34:B7:F1:F4:BF:C9:CC:74
Fingerprint (SHA1): 1B:8E:EA:57:96:29:1A:C9:39:EA:B8:0A:81:1A:73:73:C0:93:79:67
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 1 G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\061\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\061\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\170\130\137\056\255\054\031\113\343\067\007\065\064\023
\050\265\226\324\145\223
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\140\060\202\003\110\240\003\002\001\002\002\024\170
\130\137\056\255\054\031\113\343\067\007\065\064\023\050\265\226
\324\145\223\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\110\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\036\060\034
\006\003\125\004\003\023\025\121\165\157\126\141\144\151\163\040
\122\157\157\164\040\103\101\040\061\040\107\063\060\036\027\015
\061\062\060\061\061\062\061\067\062\067\064\064\132\027\015\064
\062\060\061\061\062\061\067\062\067\064\064\132\060\110\061\013
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006
```

\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114  
\151\155\151\164\145\144\061\036\060\034\006\003\125\004\003\023  
\025\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103  
\101\040\061\040\107\063\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202  
\002\012\002\202\002\001\000\240\276\120\020\216\351\362\154\100  
\264\004\234\205\271\061\312\334\055\344\021\251\004\074\033\125  
\301\347\130\060\035\044\264\303\357\205\336\214\054\341\301\075  
\337\202\346\117\255\107\207\154\354\133\111\301\112\325\273\217  
\354\207\254\177\202\232\206\354\075\003\231\122\001\322\065\236  
\254\332\360\123\311\146\074\324\254\002\001\332\044\323\073\250  
\002\106\257\244\034\343\370\163\130\166\267\366\016\220\015\265  
\360\317\314\372\371\306\114\345\303\206\060\012\215\027\176\065  
\353\305\337\273\016\234\300\215\207\343\210\070\205\147\372\076  
\307\253\340\023\234\005\030\230\317\223\365\261\222\264\374\043  
\323\317\325\304\047\111\340\236\074\233\010\243\213\135\052\041  
\340\374\071\252\123\332\175\176\317\032\011\123\274\135\005\004  
\317\241\112\217\213\166\202\015\241\370\322\307\024\167\133\220  
\066\007\201\233\076\006\372\122\136\143\305\246\000\376\245\351  
\122\033\122\265\222\071\162\003\011\142\275\260\140\026\156\246  
\335\045\302\003\146\335\363\004\321\100\342\116\213\206\364\157  
\345\203\240\047\204\136\004\301\365\220\275\060\075\304\357\250  
\151\274\070\233\244\244\226\321\142\332\151\300\001\226\256\313  
\304\121\064\352\014\252\377\041\216\131\217\112\134\344\141\232  
\247\322\351\052\170\215\121\075\072\025\356\242\131\216\251\134  
\336\305\371\220\042\345\210\105\161\335\221\231\154\172\237\075  
\075\230\174\136\366\276\026\150\240\136\256\013\043\374\132\017  
\252\042\166\055\311\241\020\035\344\323\104\043\220\210\237\306  
\052\346\327\365\232\263\130\036\057\060\211\010\033\124\242\265  
\230\043\354\010\167\034\225\135\141\321\313\211\234\137\242\112  
\221\232\357\041\252\111\026\010\250\275\141\050\061\311\164\255  
\205\366\331\305\261\213\321\345\020\062\115\137\213\040\072\074  
\111\037\063\205\131\015\333\313\011\165\103\151\163\373\153\161  
\175\360\337\304\114\175\306\243\056\310\225\171\313\163\242\216  
\116\115\044\373\136\344\004\276\162\033\246\047\055\111\132\231  
\172\327\134\011\040\267\177\224\271\117\361\015\034\136\210\102  
\033\021\267\347\221\333\236\154\364\152\337\214\006\230\003\255  
\314\050\357\245\107\363\123\002\003\001\000\001\243\102\060\100  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\035\006\003\125\035\016\004\026\004\024\243\227\326\363  
\136\242\020\341\253\105\237\074\027\144\074\356\001\160\234\314  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003  
\202\002\001\000\030\372\133\165\374\076\172\307\137\167\307\312  
\337\317\137\303\022\304\100\135\324\062\252\270\152\327\325\025  
\025\106\230\043\245\346\220\133\030\231\114\343\255\102\243\202  
\061\066\210\315\351\373\304\004\226\110\213\001\307\215\001\317  
\133\063\006\226\106\146\164\035\117\355\301\266\271\264\015\141

\314\143\176\327\056\167\214\226\034\052\043\150\153\205\127\166  
\160\063\023\376\341\117\246\043\167\030\372\032\214\350\275\145  
\311\317\077\364\311\027\334\353\307\274\300\004\056\055\106\057  
\151\146\303\033\217\376\354\076\323\312\224\277\166\012\045\015  
\251\173\002\034\251\320\073\137\013\300\201\072\075\144\341\277  
\247\055\116\275\115\304\330\051\306\042\030\320\305\254\162\002  
\202\077\252\072\242\072\042\227\061\335\010\143\303\165\024\271  
\140\050\055\133\150\340\026\251\146\202\043\121\365\353\123\330  
\061\233\173\351\267\235\113\353\210\026\317\371\135\070\212\111  
\060\217\355\361\353\031\364\167\032\061\030\115\147\124\154\057  
\157\145\371\333\075\354\041\354\136\364\364\213\312\140\145\124  
\321\161\144\364\371\246\243\201\063\066\063\161\360\244\170\137  
\116\255\203\041\336\064\111\215\350\131\254\235\362\166\132\066  
\362\023\364\257\340\011\307\141\052\154\367\340\235\256\273\206  
\112\050\157\056\356\264\171\315\220\063\303\263\166\372\365\360  
\154\235\001\220\372\236\220\366\234\162\317\107\332\303\037\344  
\065\040\123\362\124\321\337\141\203\246\002\342\045\070\336\205  
\062\055\136\163\220\122\135\102\304\316\075\113\341\371\031\204  
\035\325\242\120\314\101\373\101\024\303\275\326\311\132\243\143  
\146\002\200\275\005\072\073\107\234\354\000\046\114\365\210\121  
\277\250\043\177\030\007\260\013\355\213\046\241\144\323\141\112  
\353\134\237\336\263\257\147\003\263\037\335\155\135\151\150\151  
\253\136\072\354\174\151\274\307\073\205\116\236\025\271\264\025  
\117\303\225\172\130\327\311\154\351\154\271\363\051\143\136\264  
\054\360\055\075\355\132\145\340\251\133\100\302\110\231\201\155  
\236\037\006\052\074\022\264\213\017\233\242\044\360\246\215\326  
\172\340\113\266\144\226\143\225\204\302\112\315\034\056\044\207  
\063\140\345\303

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "QuoVadis Root CA 1 G3"

# Issuer: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM

# Serial Number:78:58:5f:2e:ad:2c:19:4b:e3:37:07:35:34:13:28:b5:96:d4:65:93

# Subject: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM

# Not Valid Before: Thu Jan 12 17:27:44 2012

# Not Valid After : Sun Jan 12 17:27:44 2042

# Fingerprint (SHA-256):

8A:86:6F:D1:B2:76:B5:7E:57:8E:92:1C:65:82:8A:2B:ED:58:E9:F2:F2:88:05:41:34:B7:F1:F4:BF:C9:CC:74

# Fingerprint (SHA1): 1B:8E:EA:57:96:29:1A:C9:39:EA:B8:0A:81:1A:73:73:C0:93:79:67

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "QuoVadis Root CA 1 G3"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\033\216\352\127\226\051\032\311\071\352\270\012\201\032\163\163
\300\223\171\147
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\244\274\133\077\376\067\232\372\144\360\342\372\005\075\013\253
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\061\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\170\130\137\056\255\054\031\113\343\067\007\065\064\023
\050\265\226\324\145\223
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "QuoVadis Root CA 2 G3"
#
Issuer: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM
Serial Number:44:57:34:24:5b:81:89:9b:35:f2:ce:b8:2b:3b:5b:a7:26:f0:75:28
Subject: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM
#
Not Valid Before: Thu Jan 12 18:59:32 2012
Not Valid After : Sun Jan 12 18:59:32 2042
Fingerprint (SHA-256):
8F:E4:FB:0A:F9:3A:4D:0D:67:DB:0B:EB:B2:3E:37:C7:1B:F3:25:DC:BC:DD:24:0E:A0:4D:AF:58:B4:7E:18:40
Fingerprint (SHA1): 09:3C:61:F3:8B:8B:DC:7D:55:DF:75:38:02:05:00:E1:25:F5:C8:36
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2 G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\040\107\063

```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061  
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144  
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003  
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157  
\157\164\040\103\101\040\062\040\107\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\024\104\127\064\044\133\201\211\233\065\362\316\270\053\073  
\133\247\046\360\165\050

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\140\060\202\003\110\240\003\002\001\002\002\024\104  
\127\064\044\133\201\211\233\065\362\316\270\053\073\133\247\046  
\360\165\050\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\060\110\061\013\060\011\006\003\125\004\006\023\002\102  
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126  
\141\144\151\163\040\114\151\155\151\164\145\144\061\036\060\034  
\006\003\125\004\003\023\025\121\165\157\126\141\144\151\163\040  
\122\157\157\164\040\103\101\040\062\040\107\063\060\036\027\015  
\061\062\060\061\061\062\061\070\065\071\063\062\132\027\015\064  
\062\060\061\061\062\061\070\065\071\063\062\132\060\110\061\013  
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006  
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114  
\151\155\151\164\145\144\061\036\060\034\006\003\125\004\003\023  
\025\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103  
\101\040\062\040\107\063\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202  
\002\012\002\202\002\001\000\241\256\045\262\001\030\334\127\210  
\077\106\353\371\257\342\353\043\161\342\232\321\141\146\041\137  
\252\257\047\121\345\156\033\026\324\055\175\120\260\123\167\275  
\170\072\140\342\144\002\233\174\206\233\326\032\216\255\377\037  
\025\177\325\225\036\022\313\346\024\204\004\301\337\066\263\026  
\237\212\343\311\333\230\064\316\330\063\027\050\106\374\247\311  
\360\322\264\325\115\011\162\111\371\362\207\343\251\332\175\241  
\175\153\262\072\045\251\155\122\104\254\370\276\156\373\334\246  
\163\221\220\141\246\003\024\040\362\347\207\243\210\255\255\240  
\214\377\246\013\045\122\045\347\026\001\325\313\270\065\201\014  
\243\073\360\341\341\374\132\135\316\200\161\155\370\111\253\076  
\073\272\270\327\200\001\373\245\353\133\263\305\136\140\052\061  
\240\257\067\350\040\072\237\250\062\054\014\314\011\035\323\236  
\216\135\274\114\230\356\305\032\150\173\354\123\246\351\024\065  
\243\337\315\200\237\014\110\373\034\364\361\277\112\270\372\325  
\214\161\112\307\037\255\376\101\232\263\203\135\362\204\126\357  
\245\127\103\316\051\255\214\253\125\277\304\373\133\001\335\043

\041\241\130\000\216\303\320\152\023\355\023\343\022\053\200\334  
\147\346\225\262\315\036\042\156\052\370\101\324\362\312\024\007  
\215\212\125\022\306\151\365\270\206\150\057\123\136\260\322\252  
\041\301\230\346\060\343\147\125\307\233\156\254\031\250\125\246  
\105\006\320\043\072\333\353\145\135\052\021\021\360\073\117\312  
\155\364\064\304\161\344\377\000\132\366\134\256\043\140\205\163  
\361\344\020\261\045\256\325\222\273\023\301\014\340\071\332\264  
\071\127\265\253\065\252\162\041\073\203\065\347\061\337\172\041  
\156\270\062\010\175\035\062\221\025\112\142\162\317\343\167\241  
\274\325\021\033\166\001\147\010\340\101\013\303\353\025\156\370  
\244\031\331\242\253\257\342\047\122\126\053\002\212\054\024\044  
\371\277\102\002\277\046\310\306\217\340\156\070\175\123\055\345  
\355\230\263\225\143\150\177\371\065\364\337\210\305\140\065\222  
\300\174\151\034\141\225\026\320\353\336\013\257\076\004\020\105  
\145\130\120\070\257\110\362\131\266\026\362\074\015\220\002\306  
\160\056\001\255\074\025\327\002\003\001\000\001\243\102\060\100  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\035\006\003\125\035\016\004\026\004\024\355\347\157\166  
\132\277\140\354\111\133\306\245\167\273\162\026\161\233\304\075  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003  
\202\002\001\000\221\337\200\077\103\011\176\161\302\367\353\263  
\210\217\341\121\262\274\075\165\371\050\135\310\274\231\233\173  
\135\252\345\312\341\012\367\350\262\323\237\335\147\061\176\272  
\001\252\307\152\101\073\220\324\010\134\262\140\152\220\360\310  
\316\003\142\371\213\355\373\156\052\334\006\115\074\051\017\211  
\026\212\130\114\110\017\350\204\141\352\074\162\246\167\344\102  
\256\210\243\103\130\171\176\256\312\245\123\015\251\075\160\275  
\040\031\141\244\154\070\374\103\062\341\301\107\377\370\354\361  
\021\042\062\226\234\302\366\133\151\226\173\040\014\103\101\232  
\133\366\131\031\210\336\125\210\067\121\013\170\134\012\036\243  
\102\375\307\235\210\017\300\362\170\002\044\124\223\257\211\207  
\210\311\112\200\035\352\320\156\076\141\056\066\273\065\016\047  
\226\375\146\064\073\141\162\163\361\026\134\107\006\124\111\000  
\172\130\022\260\012\357\205\375\261\270\063\165\152\223\034\022  
\346\140\136\157\035\177\311\037\043\313\204\141\237\036\202\104  
\371\137\255\142\125\044\232\122\230\355\121\347\241\176\227\072  
\346\057\037\021\332\123\200\054\205\236\253\065\020\333\042\137  
\152\305\136\227\123\362\062\002\011\060\243\130\360\015\001\325  
\162\306\261\174\151\173\303\365\066\105\314\141\156\136\114\224  
\305\136\256\350\016\136\213\277\367\315\340\355\241\016\033\063  
\356\124\030\376\017\276\357\176\204\153\103\343\160\230\333\135  
\165\262\015\131\007\205\025\043\071\326\361\337\251\046\017\326  
\110\307\263\246\042\365\063\067\132\225\107\237\173\272\030\025  
\157\377\326\024\144\203\111\322\012\147\041\333\017\065\143\140  
\050\042\343\261\225\203\315\205\246\335\057\017\347\147\122\156  
\273\057\205\174\365\112\163\347\305\076\300\275\041\022\005\077  
\374\267\003\111\002\133\310\045\346\342\124\070\365\171\207\214

```
\035\123\262\116\205\173\006\070\307\054\370\370\260\162\215\045
\345\167\122\364\003\034\110\246\120\137\210\040\060\156\362\202
\103\253\075\227\204\347\123\373\041\301\117\017\042\232\206\270
\131\052\366\107\075\031\210\055\350\205\341\236\354\205\010\152
\261\154\064\311\035\354\110\053\073\170\355\146\304\216\171\151
\203\336\177\214
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL

CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "QuoVadis Root CA 2 G3"

# Issuer: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM

# Serial Number:44:57:34:24:5b:81:89:9b:35:f2:ce:b8:2b:3b:5b:a7:26:f0:75:28

# Subject: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM

# Not Valid Before: Thu Jan 12 18:59:32 2012

# Not Valid After : Sun Jan 12 18:59:32 2042

# Fingerprint (SHA-256):

8F:E4:FB:0A:F9:3A:4D:0D:67:DB:0B:EB:B2:3E:37:C7:1B:F3:25:DC:BC:DD:24:0E:A0:4D:AF:58:B4:7E:18:40

# Fingerprint (SHA1): 09:3C:61:F3:8B:8B:DC:7D:55:DF:75:38:02:05:00:E1:25:F5:C8:36

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "QuoVadis Root CA 2 G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\011\074\141\363\213\213\334\175\125\337\165\070\002\005\000\341
```

```
\045\365\310\066
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\257\014\206\156\277\100\055\177\013\076\022\120\272\022\075\006
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
```

```
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
```

```
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
```

```
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
```

```
\157\164\040\103\101\040\062\040\107\063
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\024\104\127\064\044\133\201\211\233\065\362\316\270\053\073
```

```
\133\247\046\360\165\050
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST



CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "QuoVadis Root CA 3 G3"

#

# Issuer: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM

# Serial Number:2e:f5:9b:02:28:a7:db:7a:ff:d5:a3:a9:ee:bd:03:a0:cf:12:6a:1d

# Subject: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM

# Not Valid Before: Thu Jan 12 20:26:32 2012

# Not Valid

After : Sun Jan 12 20:26:32 2042

# Fingerprint (SHA-256):

88:EF:81:DE:20:2E:B0:18:45:2E:43:F8:64:72:5C:EA:5F:BD:1F:C2:D9:D2:05:73:07:09:C5:D8:B8:69:0F:46

# Fingerprint (SHA1): 48:12:BD:92:3C:A8:C4:39:06:E7:30:6D:27:96:E6:A4:CF:22:2E:7D

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "QuoVadis Root CA 3 G3"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061  
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144  
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003  
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157  
\157\164\040\103\101\040\063\040\107\063

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061  
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144  
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003  
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157  
\157\164\040\103\101\040\063\040\107\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\024\056\365\233\002\050\247\333\172\377\325\243\251\356\275  
\003\240\317\022\152\035

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\140\060\202\003\110\240\003\002\001\002\002\024\056  
\365\233\002\050\247\333\172\377\325\243\251\356\275\003\240\317  
\022\152\035\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\060\110\061\013\060\011\006\003\125\004\006\023\002\102  
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126  
\141\144\151\163\040\114\151\155\151\164\145\144\061\036\060\034

\006\003\125\004\003\023\025\121\165\157\126\141\144\151\163\040  
\122\157\157\164\040\103\101\040\063\040\107\063\060\036\027\015  
\061\062\060\061\061\062\062\060\062\066\063\062\132\027\015\064  
\062\060\061\061\062\062\060\062\066\063\062\132\060\110\061\013  
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006  
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114  
\151\155\151\164\145\144\061\036\060\034\006\003\125\004\003\023  
\025\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103  
\101\040\063\040\107\063\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202  
\002\012\002\202\002\001\000\263\313\016\020\147\216\352\024\227  
\247\062\052\012\126\066\177\150\114\307\263\157\072\043\024\221  
\377\031\177\245\312\254\356\263\166\235\172\351\213\033\253\153  
\061\333\372\013\123\114\257\305\245\032\171\074\212\114\377\254  
\337\045\336\116\331\202\062\013\104\336\312\333\214\254\243\156  
\026\203\073\246\144\113\062\211\373\026\026\070\176\353\103\342  
\323\164\112\302\142\012\163\012\335\111\263\127\322\260\012\205  
\235\161\074\336\243\313\300\062\363\001\071\040\103\033\065\321  
\123\263\261\356\305\223\151\202\076\026\265\050\106\241\336\352  
\211\011\355\103\270\005\106\212\206\365\131\107\276\033\157\001  
\041\020\271\375\251\322\050\312\020\071\011\312\023\066\317\234  
\255\255\100\164\171\053\002\077\064\377\372\040\151\175\323\356  
\141\365\272\263\347\060\320\067\043\206\162\141\105\051\110\131  
\150\157\167\246\056\201\276\007\115\157\257\316\304\105\023\221  
\024\160\006\217\037\237\370\207\151\261\016\357\303\211\031\353  
\352\034\141\374\172\154\212\334\326\003\013\236\046\272\022\335  
\324\124\071\253\046\243\063\352\165\201\332\055\315\017\117\344  
\003\321\357\025\227\033\153\220\305\002\220\223\146\002\041\261  
\107\336\213\232\112\200\271\125\217\265\242\057\300\326\063\147  
\332\176\304\247\264\004\104\353\107\373\346\130\271\367\014\360  
\173\053\261\300\160\051\303\100\142\055\073\110\151\334\043\074  
\110\353\173\011\171\251\155\332\250\060\230\317\200\162\003\210  
\246\133\106\256\162\171\174\010\003\041\145\256\267\341\034\245  
\261\052\242\061\336\146\004\367\300\164\350\161\336\377\075\131  
\314\226\046\022\213\205\225\127\032\253\153\165\013\104\075\021  
\050\074\173\141\267\342\217\147\117\345\354\074\114\140\200\151  
\127\070\036\001\133\215\125\350\307\337\300\314\167\043\064\111  
\165\174\366\230\021\353\055\336\355\101\056\024\005\002\177\340  
\376\040\353\065\347\021\254\042\316\127\075\336\311\060\155\020  
\003\205\315\361\377\214\026\265\301\262\076\210\154\140\177\220  
\117\225\367\366\055\255\001\071\007\004\372\165\200\175\277\111  
\120\355\357\311\304\174\034\353\200\176\333\266\320\335\023\376  
\311\323\234\327\262\227\251\002\003\001\000\001\243\102\060\100  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\035\006\003\125\035\016\004\026\004\024\306\027\320\274  
\250\352\002\103\362\033\006\231\135\053\220\040\271\327\234\344  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003

\202\002\001\000\064\141\331\126\265\022\207\125\115\335\243\065  
\061\106\273\244\007\162\274\137\141\142\350\245\373\013\067\261  
\074\266\263\372\051\235\177\002\365\244\311\250\223\267\172\161  
\050\151\217\163\341\122\220\332\325\276\072\345\267\166\152\126  
\200\041\337\135\346\351\072\236\345\076\366\242\151\307\052\012  
\260\030\107\334\040\160\175\122\243\076\131\174\301\272\311\310  
\025\100\141\312\162\326\160\254\322\267\360\034\344\206\051\360  
\316\357\150\143\320\265\040\212\025\141\232\176\206\230\264\311  
\302\166\373\314\272\060\026\314\243\141\306\164\023\345\153\357  
\243\025\352\003\376\023\213\144\344\323\301\322\350\204\373\111  
\321\020\115\171\146\353\252\375\364\215\061\036\160\024\255\334  
\336\147\023\114\201\025\141\274\267\331\221\167\161\031\201\140  
\273\360\130\245\265\234\013\367\217\042\125\047\300\113\001\155  
\073\231\015\324\035\233\143\147\057\320\356\015\312\146\274\224  
\117\246\255\355\374\356\143\254\127\077\145\045\317\262\206\217  
\320\010\377\270\166\024\156\336\345\047\354\253\170\265\123\271  
\266\077\350\040\371\322\250\276\141\106\312\207\214\204\363\371  
\361\240\150\233\042\036\201\046\233\020\004\221\161\300\006\037  
\334\240\323\271\126\247\343\230\055\177\203\235\337\214\053\234  
\062\216\062\224\360\001\074\042\052\237\103\302\056\303\230\071  
\007\070\173\374\136\000\102\037\363\062\046\171\203\204\366\345  
\360\301\121\022\300\013\036\004\043\014\124\245\114\057\111\305  
\112\321\266\156\140\015\153\374\153\213\205\044\144\267\211\016  
\253\045\107\133\074\317\176\111\275\307\351\012\306\332\367\176  
\016\027\010\323\110\227\320\161\222\360\017\071\076\064\152\034  
\175\330\362\042\256\273\151\364\063\264\246\110\125\321\017\016  
\046\350\354\266\013\055\247\205\065\315\375\131\310\237\321\315  
\076\132\051\064\271\075\204\316\261\145\324\131\221\221\126\165  
\041\301\167\236\371\172\341\140\235\323\255\004\030\364\174\353  
\136\223\217\123\112\042\051\370\110\053\076\115\206\254\133\177  
\313\006\231\131\140\330\130\145\225\215\104\321\367\177\176\047  
\177\175\256\200\365\007\114\266\076\234\161\124\231\004\113\375  
\130\371\230\364

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Trust for "QuoVadis Root CA 3 G3"

# Issuer: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM

# Serial Number:2e:f5:9b:02:28:a7:db:7a:ff:d5:a3:a9:ee:bd:03:a0:cf:12:6a:1d

# Subject: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM

# Not Valid Before: Thu Jan 12 20:26:32 2012

# Not Valid After : Sun Jan 12 20:26:32 2042

# Fingerprint (SHA-256):

88:EF:81:DE:20:2E:B0:18:45:2E:43:F8:64:72:5C:EA:5F:BD:1F:C2:D9:D2:05:73:07:09:C5:D8:B8:69:0F:46

```

Fingerprint (SHA1): 48:12:BD:92:3C:A8:C4:39:06:E7:30:6D:27:96:E6:A4:CF:22:2E:7D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 3 G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\110\022\275\222\074\250\304\071\006\347\060\155\047\226\346\244
\317\042\056\175
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\337\175\271\255\124\157\150\241\337\211\127\003\227\103\260\327
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\056\365\233\002\050\247\333\172\377\325\243\251\356\275
\003\240\317\022\152\035
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

#
Certificate "DigiCert Assured ID Root G2"
#
Issuer: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
Serial Number:0b:93:1c:3a:d6:39:67:ea:67:23:bf:c3:af:9a:f4:4b
Subject: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
Not Valid Before: Thu Aug 01 12:00:00 2013
Not Valid After : Fri Jan 15 12:00:00
2038
Fingerprint (SHA-256):
7D:05:EB:B6:82:33:9F:8C:94:51:EE:09:4E:EB:FE:FA:79:53:A1:14:ED:B2:F4:49:49:45:2F:AB:7D:2F:C1:85
Fingerprint (SHA1): A1:4B:48:D9:43:EE:0A:0E:40:90:4F:3C:E0:A4:C0:91:93:51:5D:3F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

```

CKA\_SUBJECT MULTILINE\_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145  
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023  
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151  
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040  
\122\157\157\164\040\107\062

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145  
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023  
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151  
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040  
\122\157\157\164\040\107\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\013\223\034\072\326\071\147\352\147\043\277\303\257\232  
\364\113

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\226\060\202\002\176\240\003\002\001\002\002\020\013  
\223\034\072\326\071\147\352\147\043\277\303\257\232\364\113\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\145  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060  
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164  
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167  
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061  
\044\060\042\006\003\125\004\003\023\033\104\151\147\151\103\145  
\162\164\040\101\163\163\165\162\145\144\040\111\104\040\122\157  
\157\164\040\107\062\060\036\027\015\061\063\060\070\060\061\061  
\062\060\060\060\060\132\027\015\063\070\060\061\061\065\061\062  
\060\060\060\060\132\060\145\061\013\060\011\006\003\125\004\006  
\023\002\125\123\061\025\060\023\006\003\125\004\012\023\014\104  
\151\147\151\103\145\162\164\040\111\156\143\061\031\060\027\006  
\003\125\004\013\023\020\167\167\167\056\144\151\147\151\143\145  
\162\164\056\143\157\155\061\044\060\042\006\003\125\004\003\023  
\033\104\151\147\151\103\145\162\164\040\101\163\163\165\162\145  
\144\040\111\104\040\122\157\157\164\040\107\062\060\202\001\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\001\017\000\060\202\001\012\002\202\001\001\000\331\347\050  
\057\122\077\066\162\111\210\223\064\363\370\152\036\061\124\200  
\237\255\124\101\265\107\337\226\250\324\257\200\055\271\012\317  
\165\375\211\245\175\044\372\343\042\014\053\274\225\027\013\063

\277\031\115\101\006\220\000\275\014\115\020\376\007\265\347\034  
\156\042\125\061\145\227\275\323\027\322\036\142\363\333\352\154  
\120\214\077\204\014\226\317\267\313\003\340\312\155\241\024\114  
\033\211\335\355\000\260\122\174\257\221\154\261\070\023\321\351  
\022\010\300\000\260\034\053\021\332\167\160\066\233\256\316\171  
\207\334\202\160\346\011\164\160\125\151\257\243\150\237\277\335  
\266\171\263\362\235\160\051\125\364\253\377\225\141\363\311\100  
\157\035\321\276\223\273\323\210\052\273\235\277\162\132\126\161  
\073\077\324\363\321\012\376\050\357\243\356\331\231\257\003\323  
\217\140\267\362\222\241\261\275\211\211\037\060\315\303\246\056  
\142\063\256\026\002\167\104\132\347\201\012\074\247\104\056\171  
\270\077\004\274\134\240\207\341\033\257\121\216\315\354\054\372  
\370\376\155\360\072\174\252\213\344\147\225\061\215\002\003\001  
\000\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001  
\377\004\004\003\002\001\206\060\035\006\003\125\035\016\004\026  
\004\024\316\303\112\271\231\125\362\270\333\140\277\251\176\275  
\126\265\227\066\247\326\060\015\006\011\052\206\110\206\367\015  
\001\001\013\005\000\003\202\001\001\000\312\245\125\214\343\310  
\101\156\151\047\247\165\021\357\074\206\066\157\322\235\306\170  
\070\035\151\226\242\222\151\056\070\154\233\175\004\324\211\245  
\261\061\067\212\311\041\314\253\154\315\213\034\232\326\277\110  
\322\062\146\301\212\300\363\057\072\357\300\343\324\221\206\321  
\120\343\003\333\163\167\157\112\071\123\355\336\046\307\265\175  
\257\053\102\321\165\142\343\112\053\002\307\120\113\340\151\342  
\226\154\016\104\146\020\104\217\255\005\353\370\171\254\246\033  
\350\067\064\235\123\311\141\252\242\122\257\112\160\026\206\302  
\072\310\261\023\160\066\330\317\356\364\012\064\325\133\114\375  
\007\234\242\272\331\001\162\134\363\115\301\335\016\261\034\015  
\304\143\276\255\364\024\373\211\354\242\101\016\114\314\310\127  
\100\320\156\003\252\315\014\216\211\231\231\154\360\074\060\257  
\070\337\157\274\243\276\051\040\047\253\164\377\023\042\170\336  
\227\122\125\036\203\265\124\040\003\356\256\300\117\126\336\067  
\314\303\177\252\004\047\273\323\167\270\142\333\027\174\234\050  
\042\023\163\154\317\046\365\212\051\347

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert Assured ID Root G2"

# Issuer: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US

# Serial Number:0b:93:1c:3a:d6:39:67:ea:67:23:bf:c3:af:9a:f4:4b

# Subject: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US

# Not Valid Before: Thu Aug 01 12:00:00 2013

# Not Valid After : Fri Jan 15 12:00:00 2038

# Fingerprint (SHA-256):

```

7D:05:EB:B6:82:33:9F:8C:94:51:EE:09:4E:EB:FE:FA:79:53:A1:14:ED:B2:F4:49:49:45:2F:AB:7D:2F:C1:85
Fingerprint (SHA1): A1:4B:48:D9:43:EE:0A:0E:40:90:4F:3C:E0:A4:C0:91:93:51:5D:3F
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL
CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\241\113\110\331\103\356\012\016\100\220\117\074\340\244\300\221
\223\121\135\077
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\222\070\271\370\143\044\202\145\054\127\063\346\376\201\217\235
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\013\223\034\072\326\071\147\352\147\043\277\303\257\232
\364\113
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST
CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "DigiCert Assured ID Root G3"
#
Issuer: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
Serial Number:0b:a1:5a:fa:1d:df:a0:b5:49:44:af:cd:24:a0:6c:ec
Subject: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
Not Valid Before: Thu Aug 01 12:00:00 2013
Not Valid After : Fri Jan 15 12:00:00 2038
Fingerprint (SHA-256):
7E:37:CB:8B:4C:47:09:0C:AB:36:55:1B:A6:F4:5D:B8:40:68:0F:BA:16:6A:95:2D:B1:00:71:7F:43:05:3F:C2
Fingerprint (SHA1): F5:17:A2:4F:9A:48:C6:C9:F8:A2:00:26:9F:DC:0F:48:2C:AB:30:89
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\013\241\132\372\035\337\240\265\111\104\257\315\044\240
\154\354
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\106\060\202\001\315\240\003\002\001\002\002\020\013
\241\132\372\035\337\240\265\111\104\257\315\044\240\154\354\060
\012\006\010\052\206\110\316\075\004\003\003\060\145\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006\003
\125\004\012\023\014\104\151\147\151\103\145\162\164\040\111\156
\143\061\031\060\027\006\003\125\004\013\023\020\167\167\167\056
\144\151\147\151\143\145\162\164\056\143\157\155\061\044\060\042
\006\003\125\004\003\023\033\104\151\147\151\103\145\162\164\040
\101\163\163\165\162\145\144\040\111\104\040\122\157\157\164\040
\107\063\060\036\027\015\061\063\060\070\060\061\061\062\060\060
\060\060\132\027\015\063\070\060\061\061\065\061\062\060\060\060
\060\132\060\145\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151
\103\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004
\013\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056
\143\157\155\061\044\060\042\006\003\125\004\003\023\033\104\151
\147\151\103\145\162\164\040\101\163\163\165\162\145\144\040\111
\104\040\122\157\157\164\040\107\063\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\031\347\274\254\104\145\355\315\270\077\130\373\215\261\127
```



```
\251\104\055\005\025\362\357\013\377\020\164\237\265\142\122\137
\146\176\037\345\334\033\105\171\013\314\306\123\012\235\215\135
\002\331\251\131\336\002\132\366\225\052\016\215\070\112\212\111
\306\274\306\003\070\007\137\125\332\176\011\156\342\177\136\320
\105\040\017\131\166\020\326\240\044\360\055\336\066\362\154\051
\071\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\035\006\003\125\035\016\004\026\004
\024\313\320\275\251\341\230\005\121\241\115\067\242\203\171\316
\215\035\052\344\204\060\012\006\010\052\206\110\316\075\004\003
\003\003\147\000\060\144\002\060\045\244\201\105\002\153\022\113
\165\164\117\310\043\343\160\362\165\162\336\174\211\360\317\221
\162\141\236\136\020\222\131\126\271\203\307\020\347\070\351\130
\046\066\175\325\344\064\206\071\002\060\174\066\123\360\060\345
\142\143\072\231\342\266\243\073\233\064\372\036\332\020\222\161
\136\221\023\247\335\244\156\222\314\062\326\365\041\146\307\057
\352\226\143\152\145\105\222\225\001\264
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert Assured ID Root G3"

# Issuer: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US

# Serial Number:0b:a1:5a:fa:1d:df:a0:b5:49:44:af:cd:24:a0:6c:ec

# Subject: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US

# Not Valid Before: Thu Aug 01 12:00:00 2013

# Not Valid After : Fri Jan 15 12:00:00 2038

# Fingerprint (SHA-256):

7E:37:CB:8B:4C:47:09:0C:AB:36:55:1B:A6:F4:5D:B8:40:68:0F:BA:16:6A:95:2D:B1:00:71:7F:43:05:3F:C2

# Fingerprint

(SHA1): F5:17:A2:4F:9A:48:C6:C9:F8:A2:00:26:9F:DC:0F:48:2C:AB:30:89

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert Assured ID Root G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\365\027\242\117\232\110\306\311\370\242\000\046\237\334\017\110
\054\253\060\211
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\174\177\145\061\014\201\337\215\272\076\231\342\134\255\156\373
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
```

\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023  
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151  
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040  
\122\157\157\164\040\107\063

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\013\241\132\372\035\337\240\265\111\104\257\315\044\240  
\154\354

END

CKA\_TRUST\_SERVER\_AUTH

CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "DigiCert Global Root G2"

#

# Issuer: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US

# Serial Number:03:3a:f1:e6:a7:11:a9:a0:bb:28:64:b1:1d:09:fa:e5

# Subject: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US

# Not Valid Before: Thu Aug 01 12:00:00 2013

# Not Valid After : Fri Jan 15 12:00:00 2038

# Fingerprint (SHA-256):

CB:3C:CB:B7:60:31:E5:E0:13:8F:8D:D3:9A:23:F9:DE:47:FF:C3:5E:43:C1:14:4C:EA:27:D4:6A:5A:B1:CB:5F

# Fingerprint (SHA1): DF:3C:24:F9:BF:D6:66:76:1B:26:80:73:FE:06:D1:CC:8D:4F:82:A4

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert Global Root G2"

CKA\_CERTIFICATE\_TYPE

CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145  
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023  
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151  
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164  
\040\107\062

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145  
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023

\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151  
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164  
\040\107\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\003\072\361\346\247\021\251\240\273\050\144\261\035\011  
\372\345

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\003\216\060\202\002\166\240\003\002\001\002\002\020\003  
\072\361\346\247\021\251\240\273\050\144\261\035\011\372\345\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\141  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060  
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164  
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167  
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061  
\040\060\036\006\003\125\004\003\023\027\104\151\147\151\103\145  
\162\164\040\107\154\157\142\141\154\040\122\157\157\164\040\107  
\062\060\036\027\015\061\063\060\070\060\061\061\062\060\060\060  
\060\132\027\015\063\070\060\061\061\065\061\062\060\060\060\060  
\132\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103  
\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013  
\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143  
\157\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147  
\151\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157  
\164\040\107\062\060\202\001\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012  
\002\202\001\001\000\273\067\315\064\334\173\153\311\262\150\220  
\255\112\165\377\106\272\041\012\010\215\365\031\124\311\373\210  
\333\363\256\362\072\211\221\074\172\346\253\006\032\153\317\254  
\055\350\136\011\044\104\272\142\232\176\326\243\250\176\340\124  
\165\040\005\254\120\267\234\143\032\154\060\334\332\037\031\261  
\327\036\336\375\327\340\313\224\203\067\256\354\037\103\116\335  
\173\054\322\275\056\245\057\344\251\270\255\072\324\231\244\266  
\045\351\233\153\000\140\222\140\377\117\041\111\030\367\147\220  
\253\141\006\234\217\362\272\351\264\351\222\062\153\265\363\127  
\350\135\033\315\214\035\253\225\004\225\111\363\065\055\226\343  
\111\155\335\167\343\373\111\113\264\254\125\007\251\217\225\263  
\264\043\273\114\155\105\360\366\251\262\225\060\264\375\114\125  
\214\047\112\127\024\174\202\235\315\163\222\323\026\112\006\014  
\214\120\321\217\036\011\276\027\241\346\041\312\375\203\345\020  
\274\203\245\012\304\147\050\366\163\024\024\075\106\166\303\207  
\024\211\041\064\115\257\017\105\014\246\111\241\272\273\234\305  
\261\063\203\051\205\002\003\001\000\001\243\102\060\100\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060

```
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\035\006\003\125\035\016\004\026\004\024\116\042\124\040\030\225
\346\343\156\346\017\372\372\271\022\355\006\027\217\071\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\140\147\050\224\157\016\110\143\353\061\335\352\147\030
\325\211\175\074\305\213\112\177\351\276\333\053\027\337\260\137
\163\167\052\062\023\071\201\147\102\204\043\362\105\147\065\354
\210\277\370\217\260\141\014\064\244\256\040\114\204\306\333\370
\065\341\166\331\337\246\102\273\307\104\010\206\177\066\164\044
\132\332\154\015\024\131\065\275\362\111\335\266\037\311\263\015
\107\052\075\231\057\273\134\273\265\324\040\341\231\137\123\106
\025\333\150\233\360\363\060\325\076\061\342\215\204\236\343\212
\332\332\226\076\065\023\245\137\360\371\160\120\160\107\101\021
\127\031\116\300\217\256\006\304\225\023\027\057\033\045\237\165
\362\261\216\231\241\157\023\261\101\161\376\210\052\310\117\020
\040\125\327\363\024\105\345\340\104\364\352\207\225\062\223\016
\376\123\106\372\054\235\377\213\042\271\113\331\011\105\244\336
\244\270\232\130\335\033\175\122\237\216\131\103\210\201\244\236
\046\325\157\255\335\015\306\067\175\355\003\222\033\345\167\137
\166\356\074\215\304\135\126\133\242\331\146\156\263\065\067\345
\062\266
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert Global Root G2"

# Issuer: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert  
Inc,C=US

# Serial Number:03:3a:f1:e6:a7:11:a9:a0:bb:28:64:b1:1d:09:fa:e5

# Subject: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US

# Not Valid Before: Thu Aug 01 12:00:00 2013

# Not Valid After : Fri Jan 15 12:00:00 2038

# Fingerprint (SHA-256):

CB:3C:CB:B7:60:31:E5:E0:13:8F:8D:D3:9A:23:F9:DE:47:FF:C3:5E:43:C1:14:4C:EA:27:D4:6A:5A:B1:CB:5F

# Fingerprint (SHA1): DF:3C:24:F9:BF:D6:66:76:1B:26:80:73:FE:06:D1:CC:8D:4F:82:A4

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert Global Root G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\337\074\044\371\277\326\146\166\033\046\200\163\376\006\321\314
\215\117\202\244
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\344\246\212\310\124\254\122\102\106\012\375\162\110\033\052\104
```

```

END
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\003\072\361\346\247\021\251\240\273\050\144\261\035\011
\372\345
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "DigiCert Global Root G3"
#
Issuer: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
Serial Number:05:55:56:bc:f2:5e:a4:35:35:c3:a4:0f:d5:ab:45:72
Subject: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
Not Valid Before: Thu Aug 01 12:00:00 2013
Not Valid After : Fri Jan 15 12:00:00 2038
Fingerprint (SHA-256):
31:AD:66:48:F8:10:41:38:C7:38:F3:9E:A4:32:01:33:39:3E:3A:18:CC:02:29:6E:F9:7C:2A:C9:EF:67:31:D0
Fingerprint (SHA1): 7E:04:DE:89:6A:3E:66:6D:00:E6:87:D3:3F:FA:D9:3B:E8:3D:34:9E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL

```

\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145  
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023  
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151  
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164  
\040\107\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\005\125\126\274\362\136\244\065\065\303\244\017\325\253  
\105\162

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\077\060\202\001\305\240\003\002\001\002\002\020\005  
\125\126\274\362\136\244\065\065\303\244\017\325\253\105\162\060  
\012\006\010\052\206\110\316\075\004\003\003\060\141\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006\003  
\125\004\012\023\014\104\151\147\151\103\145\162\164\040\111\156  
\143\061\031\060\027\006\003\125\004\013\023\020\167\167\167\056  
\144\151\147\151\143\145\162\164\056\143\157\155\061\040\060\036  
\006\003\125\004\003\023\027\104\151\147\151\103\145\162\164\040  
\107\154\157\142\141\154\040\122\157\157\164\040\107\063\060\036  
\027\015\061\063\060\070\060\061\061\062\060\060\060\060\132\027  
\015\063\070\060\061\061\065\061\062\060\060\060\060\132\060\141  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060  
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164  
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167  
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061  
\040\060\036\006\003\125\004\003\023\027\104\151\147\151\103\145  
\162\164\040\107\154\157\142\141\154\040\122\157\157\164\040\107  
\063\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005  
\053\201\004\000\042\003\142\000\004\335\247\331\273\212\270\013  
\373\013\177\041\322\360\276\276\163\363\063\135\032\274\064\352  
\336\306\233\274\320\225\366\360\314\320\013\272\141\133\121\106  
\176\236\055\237\356\216\143\014\027\354\007\160\365\317\204\056  
\100\203\234\350\077\101\155\073\255\323\244\024\131\066\170\235  
\003\103\356\020\023\154\162\336\256\210\247\241\153\265\103\316  
\147\334\043\377\003\034\243\342\076\243\102\060\100\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\035  
\006\003\125\035\016\004\026\004\024\263\333\110\244\371\241\305  
\330\256\066\101\314\021\143\151\142\051\274\113\306\060\012\006  
\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002\061  
\000\255\274\362\154\077\022\112\321\055\071\303\012\011\227\163  
\364\210\066\214\210\047\273\346\210\215\120\205\247\143\371\236  
\062\336\146\223\017\361\314\261\011\217\335\154\253\372\153\177  
\240\002\060\071\146\133\302\144\215\270\236\120\334\250\325\111

```
\242\355\307\334\321\111\177\027\001\270\310\206\217\116\214\210
\053\250\232\251\212\305\321\000\275\370\124\342\232\345\133\174
\263\047\027
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert Global Root G3"

# Issuer: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert  
Inc,C=US

# Serial Number:05:55:56:bc:f2:5e:a4:35:35:c3:a4:0f:d5:ab:45:72

# Subject: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US

# Not Valid Before: Thu Aug 01 12:00:00 2013

# Not Valid After : Fri Jan 15 12:00:00 2038

# Fingerprint (SHA-256):

31:AD:66:48:F8:10:41:38:C7:38:F3:9E:A4:32:01:33:39:3E:3A:18:CC:02:29:6E:F9:7C:2A:C9:EF:67:31:D0

# Fingerprint (SHA1): 7E:04:DE:89:6A:3E:66:6D:00:E6:87:D3:3F:FA:D9:3B:E8:3D:34:9E

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert Global Root G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\176\004\336\211\152\076\146\155\000\346\207\323\077\372\331\073
\350\075\064\236
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\365\135\244\120\245\373\050\176\036\017\015\314\226\127\126\312
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\063
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\005\125\126\274\362\136\244\065\065\303\244\017\325\253
\105\162
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "DigiCert Trusted Root G4"

#

# Issuer: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US

# Serial Number:05:9b:1b:57:9e:8e:21:32:e2:39:07:bd:a7:77:75:5c

# Subject: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US

# Not Valid Before: Thu Aug 01 12:00:00 2013

# Not Valid After : Fri Jan 15 12:00:00 2038

# Fingerprint

(SHA-256):

55:2F:7B:DC:F1:A7:AF:9E:6C:E6:72:01:7F:4F:12:AB:F7:72:40:C7:8E:76:1A:C2:03:D1:D9:D2:0A:C8:99:88

# Fingerprint (SHA1): DD:FB:16:CD:49:31:C9:73:A2:03:7D:3F:C8:3A:4D:7D:77:5D:05:E4

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert Trusted Root G4"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145  
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023  
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151  
\103\145\162\164\040\124\162\165\163\164\145\144\040\122\157\157  
\164\040\107\064

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145  
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023  
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157  
\155\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151  
\103\145\162\164\040\124\162\165\163\164\145\144\040\122\157\157  
\164\040\107\064

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\005\233\033\127\236\216\041\062\342\071\007\275\247\167  
\165\134

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\220\060\202\003\170\240\003\002\001\002\002\020\005  
\233\033\127\236\216\041\062\342\071\007\275\247\167\165\134\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\142



\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060  
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164  
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167  
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061  
\041\060\037\006\003\125\004\003\023\030\104\151\147\151\103\145  
\162\164\040\124\162\165\163\164\145\144\040\122\157\157\164\040  
\107\064\060\036\027\015\061\063\060\070\060\061\061\062\060\060  
\060\060\132\027\015\063\070\060\061\061\065\061\062\060\060\060  
\060\132\060\142\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151  
\103\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004  
\013\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056  
\143\157\155\061\041\060\037\006\003\125\004\003\023\030\104\151  
\147\151\103\145\162\164\040\124\162\165\163\164\145\144\040\122  
\157\157\164\040\107\064\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202  
\002\012\002\202\002\001\000\277\346\220\163\150\336\273\344\135  
\112\074\060\042\060\151\063\354\302\247\045\056\311\041\075\362  
\212\330\131\302\341\051\247\075\130\253\166\232\315\256\173\033  
\204\015\304\060\037\363\033\244\070\026\353\126\306\227\155\035  
\253\262\171\362\312\021\322\344\137\326\005\074\122\017\122\037  
\306\236\025\245\176\276\237\251\127\026\131\125\162\257\150\223  
\160\302\262\272\165\231\152\163\062\224\321\020\104\020\056\337  
\202\363\007\204\346\164\073\155\161\342\055\014\033\356\040\325  
\311\040\035\143\051\055\316\354\136\116\310\223\370\041\141\233  
\064\353\005\306\136\354\133\032\274\353\311\317\315\254\064\100  
\137\261\172\146\356\167\310\110\250\146\127\127\237\124\130\216  
\014\053\267\117\247\060\331\126\356\312\173\135\343\255\311\117  
\136\345\065\347\061\313\332\223\136\334\216\217\200\332\266\221  
\230\100\220\171\303\170\307\266\261\304\265\152\030\070\003\020  
\215\330\324\067\244\056\005\175\210\365\202\076\020\221\160\253  
\125\202\101\062\327\333\004\163\052\156\221\001\174\041\114\324  
\274\256\033\003\165\135\170\146\331\072\061\104\232\063\100\277  
\010\327\132\111\244\302\346\251\240\147\335\244\047\274\241\117  
\071\265\021\130\027\367\044\134\106\217\144\367\301\151\210\166  
\230\166\075\131\135\102\166\207\211\227\151\172\110\360\340\242  
\022\033\146\232\164\312\336\113\036\347\016\143\256\346\324\357  
\222\222\072\236\075\334\000\344\105\045\211\266\232\104\031\053  
\176\300\224\264\322\141\155\353\063\331\305\337\113\004\000\314  
\175\034\225\303\217\367\041\262\262\021\267\273\177\362\325\214  
\160\054\101\140\252\261\143\030\104\225\032\166\142\176\366\200  
\260\373\350\144\246\063\321\211\007\341\275\267\346\103\244\030  
\270\246\167\001\341\017\224\014\041\035\262\124\051\045\211\154  
\345\016\122\121\107\164\276\046\254\266\101\165\336\172\254\137  
\215\077\311\274\323\101\021\022\133\345\020\120\353\061\305\312  
\162\026\042\011\337\174\114\165\077\143\354\041\137\304\040\121  
\153\157\261\253\206\213\117\302\326\105\137\235\040\374\241\036  
\305\300\217\242\261\176\012\046\231\365\344\151\057\230\035\055

\365\331\251\262\035\345\033\002\003\001\000\001\243\102\060\100  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\206\060\035\006\003\125\035\016\004\026\004\024\354\327\343\202  
\322\161\135\144\114\337\056\147\077\347\272\230\256\034\017\117  
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003  
\202\002\001\000\273\141\331\175\251\154\276\027\304\221\033\303  
\241\242\000\215\343\144\150\017\126\317\167\256\160\371\375\232  
\112\231\271\311\170\134\014\014\137\344\346\024\051\126\013\066  
\111\135\104\143\340\255\234\226\030\146\033\043\015\075\171\351  
\155\153\326\124\370\322\074\301\103\100\256\035\120\365\122\374  
\220\073\273\230\231\151\153\307\301\247\250\150\244\047\334\235  
\371\047\256\060\205\271\366\147\115\072\076\217\131\071\042\123  
\104\353\310\135\003\312\355\120\172\175\142\041\012\200\310\163  
\146\321\240\005\140\137\350\245\264\247\257\250\367\155\065\234  
\174\132\212\326\242\070\231\363\170\213\364\115\322\040\013\336  
\004\356\214\233\107\201\162\015\300\024\062\357\060\131\056\256  
\340\161\362\126\344\152\227\157\222\120\155\226\215\150\172\232  
\262\066\024\172\006\362\044\271\011\021\120\327\010\261\270\211  
\172\204\043\141\102\051\345\243\315\242\040\101\327\321\234\144  
\331\352\046\241\213\024\327\114\031\262\120\101\161\075\077\115  
\160\043\206\014\112\334\201\322\314\062\224\204\015\010\011\227  
\034\117\300\356\153\040\164\060\322\340\071\064\020\205\041\025  
\001\010\350\125\062\336\161\111\331\050\027\120\115\346\276\115  
\321\165\254\320\312\373\101\270\103\245\252\323\303\005\104\117  
\054\066\233\342\372\342\105\270\043\123\154\006\157\147\125\177  
\106\265\114\077\156\050\132\171\046\322\244\250\142\227\322\036  
\342\355\112\213\274\033\375\107\112\015\337\147\146\176\262\133  
\101\320\073\344\364\073\364\004\143\351\357\302\124\000\121\240  
\212\052\311\316\170\314\325\352\207\004\030\263\316\257\111\210  
\257\363\222\231\266\263\346\141\017\322\205\000\347\120\032\344  
\033\225\235\031\241\271\234\261\233\261\000\036\357\320\017\117  
\102\154\311\012\274\356\103\372\072\161\245\310\115\046\245\065  
\375\211\135\274\205\142\035\062\322\240\053\124\355\232\127\301  
\333\372\020\317\031\267\213\112\033\217\001\266\047\225\123\350  
\266\211\155\133\274\150\324\043\350\213\121\242\126\371\360\246  
\200\240\326\036\263\274\017\017\123\165\051\252\352\023\167\344  
\336\214\201\041\255\007\020\107\021\255\207\075\007\321\165\274  
\317\363\146\176

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert Trusted Root G4"

# Issuer: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US

# Serial Number:05:9b:1b:57:9e:8e:21:32:e2:39:07:bd:a7:77:75:5c

```
Subject: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US
Not Valid Before: Thu Aug 01 12:00:00 2013
Not Valid After : Fri Jan 15 12:00:00 2038
Fingerprint (SHA-256):
55:2F:7B:DC:F1:A7:AF:9E:6C:E6:72:01:7F:4F:12:AB:F7:72:40:C7:8E:76:1A:C2:03:D1:D9:D2:0A:C8:99:88
Fingerprint (SHA1): DD:FB:16:CD:49:31:C9:73:A2:03:7D:3F:C8:3A:4D:7D:77:5D:05:E4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Trusted Root G4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\335\373\026\315\111\061\311\163\242\003\175\077\310\072\115\175
\167\135\005\344
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\170\362\374\252\140\037\057\264\353\311\067\272\123\056\165\111
END
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151
\103\145\162\164\040\124\162\165\163\164\145\144\040\122\157\157
\164\040\107\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\005\233\033\127\236\216\041\062\342\071\007\275\247\167
\165\134
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "COMODO RSA Certification Authority"
#
Issuer: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
Serial Number:4c:aa:f9:ca:db:63:6f:e0:1f:f7:4e:d8:5b:03:86:9d
Subject: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
Not Valid Before: Tue Jan 19 00:00:00 2010
Not Valid After : Mon Jan 18 23:59:59 2038
```

```
Fingerprint (SHA-256):
52:F0:E1:C4:E5:8E:C6:29:29:1B:60:31:7F:07:46:71:B8:5D:7E:A8:0D:5B:07:27:34:63:53:4B:32:B4:02:34
Fingerprint (SHA1): AF:E5:D2:44:A8:D1:19:42:30:FF:47:9F:E2:F8:97:BB:CD:7A:8C:B4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO RSA Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
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\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\122\123\101
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\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
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\060\031\006\003\125\004\010\023\022\107\162\145\141\164\145\162
\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016\006
\003\125\004\007\023\007\123\141\154\146\157\162\144\061\032\060
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "COMODO RSA Certification Authority"

# Issuer: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB

# Serial Number:4c:aa:f9:ca:db:63:6f:e0:1f:f7:4e:d8:5b:03:86:9d

# Subject: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater

```
Manchester,C=GB
Not Valid Before: Tue Jan 19 00:00:00 2010
Not Valid After : Mon Jan 18 23:59:59 2038
Fingerprint (SHA-256):
52:F0:E1:C4:E5:8E:C6:29:29:1B:60:31:7F:07:46:71:B8:5D:7E:A8:0D:5B:07:27:34:63:53:4B:32:B4:02:34
#
Fingerprint (SHA1): AF:E5:D2:44:A8:D1:19:42:30:FF:47:9F:E2:F8:97:BB:CD:7A:8C:B4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO RSA Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\257\345\322\104\250\321\031\102\060\377\107\237\342\370\227\273
\315\172\214\264
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\061\260\161\100\066\314\024\066\221\255\304\076\375\354\030
END
CKA_ISSUER MULTILINE_OCTAL
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\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
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CKA_SERIAL_NUMBER
MULTILINE_OCTAL
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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "USERTrust RSA Certification Authority"
#
Issuer: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
Serial Number:01:fd:6d:30:fc:a3:ca:51:a8:1b:bc:64:0e:35:03:2d
Subject: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
```

```
Not Valid Before: Mon Feb 01 00:00:00 2010
Not Valid After : Mon Jan 18 23:59:59 2038
Fingerprint (SHA-256):
E7:93:C9:B0:2F:D8:AA:13:E2:1C:31:22:8A:CC:B0:81:19:64:3B:74:9C:89:89:64:B1:74:6D:46:C3:D4:CB:D2
#
Fingerprint (SHA1): 2B:8F:1B:57:33:0D:BB:A2:D0:7A:6C:51:F7:0E:E9:0D:DA:B9:AD:8E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust RSA Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
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\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
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END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
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\060\021\006\003\125\004\010\023\012\116\145\167\040\112\145\162
\163\145\171\061\024\060\022\006\003\125\004\007\023\013\112\145
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\101\165\164\150\157\162\151\164\171\060\036\027\015\061\060\060  
\062\060\061\060\060\060\060\060\060\060\132\027\015\063\070\060\061  
\061\070\062\063\065\071\065\071\132\060\201\210\061\013\060\011  
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\060\022\006\003\125\004\007\023\013\112\145\162\163\145\171\040  
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\123\105\122\124\162\165\163\164\040\122\123\101\040\103\145\162  
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\036\017\143\326\351\142\272\326\137\125\056\352\134\306\050\010

\004\045\071\270\016\053\251\362\114\227\034\007\077\015\122\365  
\355\357\057\202\017\002\003\001\000\001\243\102\060\100\060\035  
\006\003\125\035\016\004\026\004\024\123\171\277\132\252\053\112  
\317\124\200\341\330\233\300\235\362\262\003\146\313\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\015  
\006\011\052\206\110\206\367\015\001\001\014\005\000\003\202\002  
\001\000\134\324\174\015\317\367\001\175\101\231\145\014\163\305  
\122\237\313\370\317\231\006\177\033\332\103\025\237\236\002\125  
\127\226\024\361\122\074\047\207\224\050\355\037\072\001\067\242  
\166\374\123\120\300\204\233\306\153\116\272\214\041\117\242\216  
\125\142\221\363\151\025\330\274\210\343\304\252\013\375\357\250  
\351\113\125\052\006\040\155\125\170\051\031\356\137\060\134\113  
\044\021\125\377\044\232\156\136\052\053\356\013\115\237\177\367  
\001\070\224\024\225\103\007\011\373\140\251\356\034\253\022\214  
\240\232\136\247\230\152\131\155\213\077\010\373\310\321\105\257  
\030\025\144\220\022\017\163\050\056\305\342\044\116\374\130\354  
\360\364\105\376\042\263\353\057\216\322\331\105\141\005\301\227  
\157\250\166\162\217\213\214\066\257\277\015\005\316\161\215\346  
\246\157\037\154\246\161\142\305\330\320\203\162\014\361\147\021  
\211\014\234\023\114\162\064\337\274\325\161\337\252\161\335\341  
\271\154\214\074\022\135\145\332\275\127\022\266\103\153\377\345  
\336\115\146\021\121\317\231\256\354\027\266\350\161\221\214\336  
\111\376\335\065\161\242\025\047\224\034\317\141\343\046\273\157  
\243\147\045\041\135\346\335\035\013\056\150\033\073\202\257\354  
\203\147\205\324\230\121\164\261\271\231\200\211\377\177\170\031  
\134\171\112\140\056\222\100\256\114\067\052\054\311\307\142\310  
\016\135\367\066\133\312\340\045\045\001\264\335\032\007\234\167  
\000\077\320\334\325\354\075\324\372\273\077\314\205\326\157\177  
\251\055\337\271\002\367\365\227\232\265\065\332\303\147\260\207  
\112\251\050\236\043\216\377\134\047\153\341\260\117\363\007\356  
\000\056\324\131\207\313\122\101\225\352\364\107\327\356\144\101  
\125\174\215\131\002\225\335\142\235\302\271\356\132\050\164\204  
\245\233\267\220\307\014\007\337\365\211\066\164\062\326\050\301  
\260\260\013\340\234\114\303\034\326\374\343\151\265\107\106\201  
\057\242\202\253\323\143\104\160\304\215\377\055\063\272\255\217  
\173\265\160\210\256\076\031\317\100\050\330\374\310\220\273\135  
\231\042\365\122\346\130\305\037\210\061\103\356\210\035\327\306  
\216\074\103\152\035\247\030\336\175\075\026\361\142\371\312\220  
\250\375

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "USERTrust RSA Certification

```
Authority"
Issuer: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
Serial Number:01:fd:6d:30:fc:a3:ca:51:a8:1b:bc:64:0e:35:03:2d
Subject: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
Not Valid Before: Mon Feb 01 00:00:00 2010
Not Valid After : Mon Jan 18 23:59:59 2038
Fingerprint (SHA-256):
E7:93:C9:B0:2F:D8:AA:13:E2:1C:31:22:8A:CC:B0:81:19:64:3B:74:9C:89:89:64:B1:74:6D:46:C3:D4:CB:D2
Fingerprint (SHA1): 2B:8F:1B:57:33:0D:BB:A2:D0:7A:6C:51:F7:0E:E9:0D:DA:B9:AD:8E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust RSA Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\053\217\033\127\063\015\273\242\320\172\154\121\367\016\351\015
\332\271\255\216
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\376\151\321\221\267\031\063\243\162\250\017\341\125\345\265
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\122\123\101\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\001\375\155\060\374\243\312\121\250\033\274\144\016\065
\003\055
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "USERTrust ECC Certification Authority"
#
Issuer: CN=USERTrust
```

ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US  
# Serial Number:5c:8b:99:c5:5a:94:c5:d2:71:56:de:cd:89:80:cc:26  
# Subject: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US  
# Not Valid Before: Mon Feb 01 00:00:00 2010  
# Not Valid After : Mon Jan 18 23:59:59 2038  
# Fingerprint (SHA-256):  
4F:F4:60:D5:4B:9C:86:DA:BF:BC:FC:57:12:E0:40:0D:2B:ED:3F:BC:4D:4F:BD:AA:86:E0:6A:DC:D2:A9:AD:7A  
# Fingerprint (SHA1): D1:CB:CA:5D:B2:D5:2A:7F:69:3B:67:4D:E5:F0:5A:1D:0C:95:7D:F0  
CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "USERTrust ECC Certification Authority"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509  
CKA\_SUBJECT MULTILINE\_OCTAL  
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112  
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013  
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006  
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122  
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006  
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040  
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171  
END  
CKA\_ID  
UTF8 "0"  
CKA\_ISSUER MULTILINE\_OCTAL  
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112  
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013  
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006  
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122  
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006  
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040  
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171  
END  
CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\020\134\213\231\305\132\224\305\322\161\126\336\315\211\200  
\314\046  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\002\217\060\202\002\025\240\003\002\001\002\002\020\134  
\213\231\305\132\224\305\322\161\126\336\315\211\200\314\046\060  
\012\006\010\052\206\110\316\075\004\003\003\060\201\210\061\013

\060\011\006\003\125\004\006\023\002\125\123\061\023\060\021\006  
\003\125\004\010\023\012\116\145\167\040\112\145\162\163\145\171  
\061\024\060\022\006\003\125\004\007\023\013\112\145\162\163\145  
\171\040\103\151\164\171\061\036\060\034\006\003\125\004\012\023  
\025\124\150\145\040\125\123\105\122\124\122\125\123\124\040\116  
\145\164\167\157\162\153\061\056\060\054\006\003\125\004\003\023  
\045\125\123\105\122\124\162\165\163\164\040\105\103\103\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\060\036\027\015\061\060\060\062\060\061  
\060\060\060\060\060\060\132\027\015\063\070\060\061\061\070\062  
\063\065\071\065\071\132\060\201\210\061\013\060\011\006\003\125  
\004\006\023\002\125\123\061\023\060\021\006\003\125\004\010\023  
\012\116\145\167\040\112\145\162\163\145\171\061\024\060\022\006  
\003\125\004\007\023\013\112\145\162\163\145\171\040\103\151\164  
\171\061\036\060\034\006\003\125\004\012\023\025\124\150\145\040  
\125\123\105\122\124\122\125\123\124\040\116\145\164\167\157\162  
\153\061\056\060\054\006\003\125\004\003\023\045\125\123\105\122  
\124\162\165\163\164\040\105\103\103\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
\171\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005  
\053\201\004\000\042\003\142\000\004\032\254\124\132\251\371\150  
\043\347\172\325\044\157\123\306\132\330\113\253\306\325\266\321  
\346\163\161\256\335\234\326\014\141\375\333\240\211\003\270\005  
\024\354\127\316\356\135\077\342\041\263\316\367\324\212\171\340  
\243\203\176\055\227\320\141\304\361\231\334\045\221\143\253\177  
\060\243\264\160\342\307\241\063\234\363\277\056\134\123\261\137  
\263\175\062\177\212\064\343\171\171\243\102\060\100\060\035\006  
\003\125\035\016\004\026\004\024\072\341\011\206\324\317\031\302  
\226\166\164\111\166\334\340\065\306\143\143\232\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\012\006  
\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002\060  
\066\147\241\026\010\334\344\227\000\101\035\116\276\341\143\001  
\317\073\252\102\021\144\240\235\224\071\002\021\171\134\173\035  
\372\144\271\356\026\102\263\277\212\302\011\304\354\344\261\115  
\002\061\000\351\052\141\107\214\122\112\113\116\030\160\366\326  
\104\326\156\365\203\272\155\130\275\044\331\126\110\352\357\304  
\242\106\201\210\152\072\106\321\251\233\115\311\141\332\321\135  
\127\152\030

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "USERTrust ECC Certification

Authority"

# Issuer: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New

```

Jersey,C=US
Serial Number:5c:8b:99:c5:5a:94:c5:d2:71:56:de:cd:89:80:cc:26
Subject: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
Not Valid Before: Mon Feb 01 00:00:00 2010
Not Valid After : Mon Jan 18 23:59:59 2038
Fingerprint (SHA-256):
4F:F4:60:D5:4B:9C:86:DA:BF:BC:FC:57:12:E0:40:0D:2B:ED:3F:BC:4D:4F:BD:AA:86:E0:6A:DC:D2:A9:AD:7A
Fingerprint (SHA1): D1:CB:CA:5D:B2:D5:2A:7F:69:3B:67:4D:E5:F0:5A:1D:0C:95:7D:F0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust ECC Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\321\313\312\135\262\325\052\177\151\073\147\115\345\360\132\035
\014\225\175\360
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\372\150\274\331\265\177\255\375\311\035\006\203\050\314\044\301
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\134\213\231\305\132\224\305\322\161\126\336\315\211\200
\314\046
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "GlobalSign ECC Root CA - R5"
#
Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign
ECC Root CA - R5
Serial Number:60:59:49:e0:26:2e:bb:55:f9:0a:77:8a:71:f9:4a:d8:6c

```

```
Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5
Not Valid Before: Tue Nov 13 00:00:00 2012
Not Valid After : Tue Jan 19 03:14:07 2038
Fingerprint (SHA-256):
17:9F:BC:14:8A:3D:D0:0F:D2:4E:A1:34:58:CC:43:BF:A7:F5:9C:81:82:D7:83:A5:13:F6:EB:EC:10:0C:89:24
Fingerprint (SHA1): 1F:24:C6:30:CD:A4:18:EF:20:69:FF:AD:4F:DD:5F:46:3A:1B:69:AA
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign ECC Root CA - R5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\065\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\065\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\140\131\111\340\046\056\273\125\371\012\167\212\161\371
\112\330\154
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\036\060\202\001\244\240\003\002\001\002\002\021\140
\131\111\340\046\056\273\125\371\012\167\212\161\371\112\330\154
\060\012\006\010\052\206\110\316\075\004\003\003\060\120\061\044
\060\042\006\003\125\004\013\023\033\107\154\157\142\141\154\123
\151\147\156\040\105\103\103\040\122\157\157\164\040\103\101\040
\055\040\122\065\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156\060\036
\027\015\061\062\061\061\061\063\060\060\060\060\060\060\132\027
\015\063\070\060\061\061\071\060\063\061\064\060\067\132\060\120
\061\044\060\042\006\003\125\004\013\023\033\107\154\157\142\141
\154\123\151\147\156\040\105\103\103\040\122\157\157\164\040\103
\101\040\055\040\122\065\061\023\060\021\006\003\125\004\012\023
```

\012\107\154\157\142\141\154\123\151\147\156\061\023\060\021\006  
\003\125\004\003\023\012\107\154\157\142\141\154\123\151\147\156  
\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053  
\201\004\000\042\003\142\000\004\107\105\016\226\373\175\135\277  
\351\071\321\041\370\237\013\266\325\173\036\222\072\110\131\034  
\360\142\061\055\300\172\050\376\032\247\134\263\266\314\227\347  
\105\324\130\372\321\167\155\103\242\300\207\145\064\012\037\172  
\335\353\074\063\241\305\235\115\244\157\101\225\070\177\311\036  
\204\353\321\236\111\222\207\224\207\014\072\205\112\146\237\235  
\131\223\115\227\141\006\206\112\243\102\060\100\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006  
\003\125\035\016\004\026\004\024\075\346\051\110\233\352\007\312  
\041\104\112\046\336\156\336\322\203\320\237\131\060\012\006\010  
\052\206\110\316\075\004\003\003\003\150\000\060\145\002\061\000  
\345\151\022\311\156\333\306\061\272\011\101\341\227\370\373\375  
\232\342\175\022\311\355\174\144\323\313\005\045\213\126\331\240  
\347\136\135\116\013\203\234\133\166\051\240\011\046\041\152\142  
\002\060\161\322\265\217\134\352\073\341\170\011\205\250\165\222  
\073\310\134\375\110\357\015\164\042\250\010\342\156\305\111\316  
\307\014\274\247\141\151\361\367\073\341\052\313\371\053\363\146  
\220\067

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GlobalSign ECC Root CA - R5"

#

Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5

# Serial Number:60:59:49:e0:26:2e:bb:55:f9:0a:77:8a:71:f9:4a:d8:6c

# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5

# Not Valid Before: Tue Nov 13 00:00:00 2012

# Not Valid After : Tue Jan 19 03:14:07 2038

# Fingerprint (SHA-256):

17:9F:BC:14:8A:3D:D0:0F:D2:4E:A1:34:58:CC:43:BF:A7:F5:9C:81:82:D7:83:A5:13:F6:EB:EC:10:0C:89:24

# Fingerprint (SHA1): 1F:24:C6:30:CD:A4:18:EF:20:69:FF:AD:4F:DD:5F:46:3A:1B:69:AA

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GlobalSign ECC Root CA - R5"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\037\044\306\060\315\244\030\357\040\151\377\255\117\335\137\106  
\072\033\151\252

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL



\237\255\073\034\002\036\212\272\027\164\070\201\014\242\274\010

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157  
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164  
\040\103\101\040\055\040\122\065\061\023\060\021\006\003\125\004  
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060  
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151  
\147\156

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\021\140\131\111\340\046\056\273\125\371\012\167\212\161\371  
\112\330\154

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Staat der Nederlanden Root CA - G3"

#

# Issuer: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL

# Serial Number: 10003001 (0x98a239)

# Subject: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL

# Not Valid Before: Thu Nov 14 11:28:42 2013

# Not Valid After : Mon Nov 13 23:00:00 2028

# Fingerprint (SHA-256):

3C:4F:B0:B9:5A:B8:B3:00:32:F4:32:B8:6F:53:5F:E1:72:C1:85:D0:FD:39:86:58:37:CF:36:18:7F:A6:F4:28

#

Fingerprint (SHA1): D8:EB:6B:41:51:92:59:E0:F3:E7:85:00:C0:3D:B6:88:97:C9:EE:FC

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Staat der Nederlanden Root CA - G3"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061  
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040  
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061  
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040  
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040  
\122\157\157\164\040\103\101\040\055\040\107\063

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061  
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040  
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061  
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040  
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040  
\122\157\157\164\040\103\101\040\055\040\107\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\004\000\230\242\071

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\164\060\202\003\134\240\003\002\001\002\002\004\000  
\230\242\071\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\060\132\061\013\060\011\006\003\125\004\006\023\002\116  
\114\061\036\060\034\006\003\125\004\012\014\025\123\164\141\141  
\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145  
\156\061\053\060\051\006\003\125\004\003\014\042\123\164\141\141  
\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145  
\156\040\122\157\157\164\040\103\101\040\055\040\107\063\060\036  
\027\015\061\063\061\061\061\064\061\061\062\070\064\062\132\027  
\015\062\070\061\061\061\063\062\063\060\060\060\060\132\060\132  
\061\013\060\011\006\003\125\004\006\023\002\116\114\061\036\060  
\034\006\003\125\004\012\014\025\123\164\141\141\164\040\144\145  
\162\040\116\145\144\145\162\154\141\156\144\145\156\061\053\060  
\051\006\003\125\004\003\014\042\123\164\141\141\164\040\144\145  
\162\040\116\145\144\145\162\154\141\156\144\145\156\040\122\157  
\157\164\040\103\101\040\055\040\107\063\060\202\002\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002  
\017\000\060\202\002\012\002\202\002\001\000\276\062\242\124\017  
\160\373\054\134\131\353\154\304\244\121\350\205\052\263\314\112  
\064\362\260\137\363\016\307\034\075\123\036\210\010\150\330\157  
\075\255\302\236\314\202\147\007\047\207\150\161\072\237\165\226  
\042\106\005\260\355\255\307\133\236\052\336\234\374\072\306\225  
\247\365\027\147\030\347\057\111\010\014\134\317\346\314\064\355  
\170\373\120\261\334\153\062\360\242\376\266\074\344\354\132\227  
\307\077\036\160\010\060\240\334\305\263\155\157\320\202\162\021  
\253\322\201\150\131\202\027\267\170\222\140\372\314\336\077\204  
\353\215\070\063\220\012\162\043\372\065\314\046\161\061\321\162  
\050\222\331\133\043\155\146\265\155\007\102\353\246\063\316\222  
\333\300\366\154\143\170\315\312\116\075\265\345\122\233\361\276  
\073\346\124\140\260\146\036\011\253\007\376\124\211\021\102\321  
\367\044\272\140\170\032\230\367\311\021\375\026\301\065\032\124  
\165\357\103\323\345\256\116\316\347\173\303\306\116\141\121\113  
\253\232\105\113\241\037\101\275\110\123\025\161\144\013\206\263  
\345\056\276\316\244\033\301\051\204\242\265\313\010\043\166\103  
\042\044\037\027\004\324\156\234\306\374\177\053\146\032\354\212  
\345\326\317\115\365\143\011\267\025\071\326\173\254\353\343\174

\351\116\374\165\102\310\355\130\225\014\006\102\242\234\367\344  
\160\263\337\162\157\132\067\100\211\330\205\244\327\361\013\336  
\103\031\324\112\130\054\214\212\071\236\277\204\207\361\026\073  
\066\014\351\323\264\312\154\031\101\122\011\241\035\260\152\277  
\202\357\160\121\041\062\334\005\166\214\313\367\144\344\003\120  
\257\214\221\147\253\305\362\356\130\330\336\276\367\347\061\317  
\154\311\073\161\301\325\210\265\145\274\300\350\027\027\007\022  
\265\134\322\253\040\223\264\346\202\203\160\066\305\315\243\215  
\255\213\354\243\301\103\207\346\103\342\064\276\225\213\065\355  
\007\071\332\250\035\172\237\066\236\022\260\014\145\022\220\025  
\140\331\046\100\104\343\126\140\245\020\324\152\074\375\101\334  
\016\132\107\266\357\227\141\165\117\331\376\307\262\035\324\355  
\135\111\263\251\152\313\146\204\023\325\134\240\334\337\156\167  
\006\321\161\165\310\127\157\257\017\167\133\002\003\001\000\001  
\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024  
\124\255\372\307\222\127\256\312\065\234\056\022\373\344\272\135  
\040\334\224\127\060\015\006\011\052\206\110\206\367\015\001\001  
\013\005\000\003\202\002\001\000\060\231\235\005\062\310\136\016  
\073\230\001\072\212\244\347\007\367\172\370\347\232\337\120\103  
\123\227\052\075\312\074\107\230\056\341\025\173\361\222\363\141  
\332\220\045\026\145\300\237\124\135\016\003\073\133\167\002\234  
\204\266\015\230\137\064\335\073\143\302\303\050\201\302\234\051  
\056\051\342\310\303\001\362\063\352\052\252\314\011\010\367\145  
\147\306\315\337\323\266\053\247\275\314\321\016\160\137\270\043  
\321\313\221\116\012\364\310\172\345\331\143\066\301\324\337\374  
\042\227\367\140\135\352\051\057\130\262\275\130\275\215\226\117  
\020\165\277\110\173\075\121\207\241\074\164\042\302\374\007\177  
\200\334\304\254\376\152\301\160\060\260\351\216\151\342\054\151  
\201\224\011\272\335\376\115\300\203\214\224\130\300\106\040\257  
\234\037\002\370\065\125\111\057\106\324\300\360\240\226\002\017  
\063\305\161\363\236\043\175\224\267\375\072\323\011\203\006\041  
\375\140\075\256\062\300\322\356\215\246\360\347\264\202\174\012  
\314\160\311\171\200\370\376\114\367\065\204\031\212\061\373\012  
\331\327\177\233\360\242\232\153\303\005\112\355\101\140\024\060  
\321\252\021\102\156\323\043\002\004\013\306\145\335\335\122\167  
\332\201\153\262\250\372\001\070\271\226\352\052\154\147\227\211  
\224\236\274\341\124\325\344\152\170\357\112\275\053\232\075\100  
\176\306\300\165\322\156\373\150\060\354\354\213\235\371\111\065  
\232\032\054\331\263\225\071\325\036\222\367\246\271\145\057\345  
\075\155\072\110\114\010\334\344\050\022\050\276\175\065\134\352  
\340\026\176\023\033\152\327\076\327\236\374\055\165\262\301\024  
\325\043\003\333\133\157\013\076\170\057\015\336\063\215\026\267  
\110\347\203\232\201\017\173\301\103\115\125\004\027\070\112\121  
\325\131\242\211\164\323\237\276\036\113\327\306\155\267\210\044  
\157\140\221\244\202\205\133\126\101\274\320\104\253\152\023\276  
\321\054\130\267\022\063\130\262\067\143\334\023\365\224\035\077

```
\100\121\365\117\365\072\355\310\305\353\302\036\035\026\225\172
\307\176\102\161\223\156\113\025\267\060\337\252\355\127\205\110
\254\035\152\335\071\151\344\341\171\170\276\316\005\277\241\014
\367\200\173\041\147\047\060\131
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Staat der Nederlanden Root CA - G3"

# Issuer: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL

# Serial Number: 10003001 (0x98a239)

# Subject: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL

# Not Valid Before: Thu Nov 14 11:28:42 2013

# Not Valid After : Mon Nov 13 23:00:00 2028

# Fingerprint (SHA-256):

3C:4F:B0:B9:5A:B8:B3:00:32:F4:32:B8:6F:53:5F:E1:72:C1:85:D0:FD:39:86:58:37:CF:36:18:7F:A6:F4:28

# Fingerprint (SHA1): D8:EB:6B:41:51:92:59:E0:F3:E7:85:00:C0:3D:B6:88:97:C9:EE:FC

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Staat der Nederlanden Root CA - G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\330\353\153\101\121\222\131\340\363\347\205\000\300\075\266\210
```

```
\227\311\356\374
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\013\106\147\007\333\020\057\031\214\065\120\140\321\013\364\067
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061
```

```
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040
```

```
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
```

```
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040
```

```
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
```

```
\122\157\157\164\040\103\101\040\055\040\107\063
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\004\000\230\242\071
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

```

#
Certificate "IdenTrust Commercial Root CA 1"
#
Issuer: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US
Serial Number:0a:01:42:80:00:00:01:45:23:c8:44:b5:00:00:00:02
Subject: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US
Not Valid
 Before: Thu Jan 16 18:12:23 2014
Not Valid After : Mon Jan 16 18:12:23 2034
Fingerprint (SHA-256):
5D:56:49:9B:E4:D2:E0:8B:CF:CA:D0:8A:3E:38:72:3D:50:50:3B:DE:70:69:48:E4:2F:55:60:30:19:E5:28:AE
Fingerprint (SHA1): DF:71:7E:AA:4A:D9:4E:C9:55:84:99:60:2D:48:DE:5F:BC:F0:3A:25
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Commercial Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\047\060\045\006\003\125\004\003\023\036\111\144
\145\156\124\162\165\163\164\040\103\157\155\155\145\162\143\151
\141\154\040\122\157\157\164\040\103\101\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\047\060\045\006\003\125\004\003\023\036\111\144
\145\156\124\162\165\163\164\040\103\157\155\155\145\162\143\151
\141\154\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\310\104\265\000\000
\000\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\140\060\202\003\110\240\003\002\001\002\002\020\012
\001\102\200\000\000\001\105\043\310\104\265\000\000\000\002\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\112
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060
\020\006\003\125\004\012\023\011\111\144\145\156\124\162\165\163
\164\061\047\060\045\006\003\125\004\003\023\036\111\144\145\156
\124\162\165\163\164\040\103\157\155\155\145\162\143\151\141\154
\040\122\157\157\164\040\103\101\040\061\060\036\027\015\061\064
\060\061\061\066\061\070\061\062\062\063\132\027\015\063\064\060

```

\061\061\066\061\070\061\062\062\063\132\060\112\061\013\060\011  
\006\003\125\004\006\023\002\125\123\061\022\060\020\006\003\125  
\004\012\023\011\111\144\145\156\124\162\165\163\164\061\047\060  
\045\006\003\125\004\003\023\036\111\144\145\156\124\162\165\163  
\164\040\103\157\155\155\145\162\143\151\141\154\040\122\157\157  
\164\040\103\101\040\061\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202  
\002\012\002\202\002\001\000\247\120\031\336\077\231\075\324\063  
\106\361\157\121\141\202\262\251\117\217\147\211\135\204\331\123  
\335\014\050\331\327\360\377\256\225\103\162\231\371\265\135\174  
\212\301\102\341\061\120\164\321\201\015\174\315\233\041\253\103  
\342\254\255\136\206\156\363\011\212\037\132\062\275\242\353\224  
\371\350\134\012\354\377\230\322\257\161\263\264\123\237\116\207  
\357\222\274\275\354\117\062\060\210\113\027\136\127\304\123\302  
\366\002\227\215\331\142\053\277\044\037\142\215\337\303\270\051  
\113\111\170\074\223\140\210\042\374\231\332\066\310\302\242\324  
\054\124\000\147\065\156\163\277\002\130\360\244\335\345\260\242  
\046\172\312\340\066\245\031\026\365\375\267\357\256\077\100\365  
\155\132\004\375\316\064\312\044\334\164\043\033\135\063\023\022  
\135\304\001\045\366\060\335\002\135\237\340\325\107\275\264\353  
\033\241\273\111\111\330\237\133\002\363\212\344\044\220\344\142  
\117\117\301\257\213\016\164\027\250\321\162\210\152\172\001\111  
\314\264\106\171\306\027\261\332\230\036\007\131\372\165\041\205  
\145\335\220\126\316\373\253\245\140\235\304\235\371\122\260\213  
\275\207\371\217\053\043\012\043\166\073\367\063\341\311\000\363  
\151\371\113\242\340\116\274\176\223\071\204\007\367\104\160\176  
\376\007\132\345\261\254\321\030\314\362\065\345\111\111\010\312  
\126\311\075\373\017\030\175\213\073\301\023\302\115\217\311\117  
\016\067\351\037\241\016\152\337\142\056\313\065\006\121\171\054  
\310\045\070\364\372\113\247\211\134\234\322\343\015\071\206\112  
\164\174\325\131\207\302\077\116\014\134\122\364\075\367\122\202  
\361\352\243\254\375\111\064\032\050\363\101\210\072\023\356\350  
\336\377\231\035\137\272\313\350\036\362\271\120\140\300\061\323  
\163\345\357\276\240\355\063\013\164\276\040\040\304\147\154\360  
\010\003\172\125\200\177\106\116\226\247\364\036\076\341\366\330  
\011\341\063\144\053\143\327\062\136\237\371\300\173\017\170\157  
\227\274\223\232\371\234\022\220\170\172\200\207\025\327\162\164  
\234\125\164\170\261\272\341\156\160\004\272\117\240\272\150\303  
\173\377\061\360\163\075\075\224\052\261\013\101\016\240\376\115  
\210\145\153\171\063\264\327\002\003\001\000\001\243\102\060\100  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\035\006\003\125\035\016\004\026\004\024\355\104\031\300  
\323\360\006\213\356\244\173\276\102\347\046\124\310\216\066\166  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003  
\202\002\001\000\015\256\220\062\366\246\113\174\104\166\031\141  
\036\047\050\315\136\124\357\045\274\343\010\220\371\051\327\256  
\150\010\341\224\000\130\357\056\056\176\123\122\214\266\134\007

\352\210\272\231\213\120\224\327\202\200\337\141\011\000\223\255  
\015\024\346\316\301\362\067\224\170\260\137\234\263\242\163\270  
\217\005\223\070\315\215\076\260\270\373\300\317\261\362\354\055  
\055\033\314\354\252\232\263\252\140\202\033\055\073\303\204\075  
\127\212\226\036\234\165\270\323\060\315\140\010\203\220\323\216  
\124\361\115\146\300\135\164\003\100\243\356\205\176\302\037\167  
\234\006\350\301\247\030\135\122\225\355\311\335\045\236\155\372  
\251\355\243\072\064\320\131\173\332\355\120\363\065\277\355\353  
\024\115\061\307\140\364\332\361\207\234\342\110\342\306\305\067  
\373\006\020\372\165\131\146\061\107\051\332\166\232\034\351\202  
\256\357\232\271\121\367\210\043\232\151\225\142\074\345\125\200  
\066\327\124\002\377\361\271\135\316\324\043\157\330\105\204\112  
\133\145\357\211\014\335\024\247\040\313\030\245\045\264\015\371  
\001\360\242\322\364\000\310\164\216\241\052\110\216\145\333\023  
\304\342\045\027\175\353\276\207\133\027\040\124\121\223\112\123  
\003\013\354\135\312\063\355\142\375\105\307\057\133\334\130\240  
\200\071\346\372\327\376\023\024\246\355\075\224\112\102\164\324  
\303\167\131\163\315\217\106\276\125\070\357\372\350\221\062\352  
\227\130\004\042\336\070\303\314\274\155\311\063\072\152\012\151  
\077\240\310\352\162\217\214\143\206\043\275\155\074\226\236\225  
\340\111\114\252\242\271\052\033\234\066\201\170\355\303\350\106  
\342\046\131\104\165\036\331\165\211\121\315\020\204\235\141\140  
\313\135\371\227\042\115\216\230\346\343\177\366\133\273\256\315  
\312\112\201\153\136\013\363\121\341\164\053\351\176\047\247\331  
\231\111\116\370\245\200\333\045\017\034\143\142\212\311\063\147  
\153\074\020\203\306\255\336\250\315\026\216\215\360\007\067\161  
\237\362\253\374\101\365\301\213\354\000\067\135\011\345\116\200  
\357\372\261\134\070\006\245\033\112\341\334\070\055\074\334\253  
\037\220\032\325\112\234\356\321\160\154\314\356\364\127\370\030  
\272\204\156\207

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "IdenTrust Commercial Root CA 1"

# Issuer: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US

# Serial Number:0a:01:42:80:00:00:01:45:23:c8:44:b5:00:00:00:02

# Subject: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US

# Not Valid Before: Thu Jan 16 18:12:23 2014

# Not Valid After : Mon Jan 16 18:12:23 2034

# Fingerprint (SHA-256):

5D:56:49:9B:E4:D2:E0:8B:CF:CA:D0:8A:3E:38:72:3D:50:50:3B:DE:70:69:48:E4:2F:55:60:30:19:E5:28:AE

# Fingerprint (SHA1): DF:71:7E:AA:4A:D9:4E:C9:55:84:99:60:2D:48:DE:5F:BC:F0:3A:25

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Commercial Root CA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\337\161\176\252\112\331\116\311\125\204\231\140\055\110\336\137
\274\360\072\045
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\263\076\167\163\165\356\240\323\343\176\111\143\111\131\273\307
END
CKA_ISSUER
MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\047\060\045\006\003\125\004\003\023\036\111\144
\145\156\124\162\165\163\164\040\103\157\155\155\145\162\143\151
\141\154\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\310\104\265\000\000
\000\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "IdenTrust Public Sector Root CA 1"
#
Issuer: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
Serial Number:0a:01:42:80:00:00:01:45:23:cf:46:7c:00:00:00:02
Subject: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
Not Valid Before: Thu Jan 16 17:53:32 2014
Not Valid
 After : Mon Jan 16 17:53:32 2034
Fingerprint (SHA-256):
30:D0:89:5A:9A:44:8A:26:20:91:63:55:22:D1:F5:20:10:B5:86:7A:CA:E1:2C:78:EF:95:8F:D4:F4:38:9F:2F
Fingerprint (SHA1): BA:29:41:60:77:98:3F:F4:F3:EF:F2:31:05:3B:2E:EA:6D:4D:45:FD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Public Sector Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162

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\165\163\164\061\052\060\050\006\003\125\004\003\023\041\111\144
\145\156\124\162\165\163\164\040\120\165\142\154\151\143\040\123
\145\143\164\157\162\040\122\157\157\164\040\103\101\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\052\060\050\006\003\125\004\003\023\041\111\144
\145\156\124\162\165\163\164\040\120\165\142\154\151\143\040\123
\145\143\164\157\162\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\317\106\174\000\000
\000\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\146\060\202\003\116\240\003\002\001\002\002\020\012
\001\102\200\000\000\001\105\043\317\106\174\000\000\000\002\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\115
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060
\020\006\003\125\004\012\023\011\111\144\145\156\124\162\165\163
\164\061\052\060\050\006\003\125\004\003\023\041\111\144\145\156
\124\162\165\163\164\040\120\165\142\154\151\143\040\123\145\143
\164\157\162\040\122\157\157\164\040\103\101\040\061\060\036\027
\015\061\064\060\061\061\066\061\067\065\063\063\062\132\027\015
\063\064\060\061\061\066\061\067\065\063\063\062\132\060\115\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060\020
\006\003\125\004\012\023\011\111\144\145\156\124\162\165\163\164
\061\052\060\050\006\003\125\004\003\023\041\111\144\145\156\124
\162\165\163\164\040\120\165\142\154\151\143\040\123\145\143\164
\157\162\040\122\157\157\164\040\103\101\040\061\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\266\042\224
\374\244\110\257\350\107\153\012\373\047\166\344\362\077\212\073
\172\112\054\061\052\214\215\260\251\303\061\153\250\167\166\204
\046\266\254\201\102\015\010\353\125\130\273\172\370\274\145\175
\362\240\155\213\250\107\351\142\166\036\021\356\010\024\321\262
\104\026\364\352\320\372\036\057\136\333\313\163\101\256\274\000
\260\112\053\100\262\254\341\073\113\302\055\235\344\241\233\354
\032\072\036\360\010\263\320\344\044\065\007\237\234\264\311\122
\155\333\007\312\217\265\133\360\203\363\117\307\055\245\310\255
\313\225\040\244\061\050\127\130\132\344\215\033\232\253\236\015
\014\362\012\063\071\042\071\012\227\056\363\123\167\271\104\105
\375\204\313\066\040\201\131\055\232\157\155\110\110\141\312\114
\337\123\321\257\122\274\104\237\253\057\153\203\162\357\165\200
\332\006\063\033\135\310\332\143\306\115\315\254\146\061\315\321
```

\336\076\207\020\066\341\271\244\172\357\140\120\262\313\312\246  
\126\340\067\257\253\064\023\071\045\350\071\146\344\230\172\252  
\022\230\234\131\146\206\076\255\361\260\312\076\006\017\173\360  
\021\113\067\240\104\155\173\313\250\214\161\364\325\265\221\066  
\314\360\025\306\053\336\121\027\261\227\114\120\075\261\225\131  
\174\005\175\055\041\325\000\277\001\147\242\136\173\246\134\362  
\367\042\361\220\015\223\333\252\104\121\146\314\175\166\003\353  
\152\250\052\070\031\227\166\015\153\212\141\371\274\366\356\166  
\375\160\053\335\051\074\370\012\036\133\102\034\213\126\057\125  
\033\034\241\056\265\307\026\346\370\252\074\222\216\151\266\001  
\301\265\206\235\211\017\013\070\224\124\350\352\334\236\075\045  
\274\123\046\355\325\253\071\252\305\100\114\124\253\262\264\331  
\331\370\327\162\333\034\274\155\275\145\137\357\210\065\052\146  
\057\356\366\263\145\360\063\215\174\230\101\151\106\017\103\034  
\151\372\233\265\320\141\152\315\312\113\331\114\220\106\253\025  
\131\241\107\124\051\056\203\050\137\034\302\242\253\162\027\000  
\006\216\105\354\213\342\063\075\177\332\031\104\344\142\162\303  
\337\042\306\362\126\324\335\137\225\162\355\155\137\367\110\003  
\133\375\305\052\240\366\163\043\204\020\033\001\347\002\003\001  
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\343\161\340\236\330\247\102\331\333\161\221\153\224\223  
\353\303\243\321\024\243\060\015\006\011\052\206\110\206\367\015  
\001\001\013\005\000\003\202\002\001\000\107\372\335\012\260\021  
\221\070\255\115\135\367\345\016\227\124\031\202\110\207\124\214  
\252\144\231\330\132\376\210\001\305\130\245\231\261\043\124\043  
\267\152\035\040\127\345\001\142\101\027\323\011\333\165\313\156  
\124\220\165\376\032\237\201\012\302\335\327\367\011\320\133\162  
\025\344\036\011\152\075\063\363\041\232\346\025\176\255\121\325  
\015\020\355\175\102\300\217\356\300\232\010\325\101\326\134\016  
\041\151\156\200\141\016\025\300\270\317\305\111\022\122\314\276  
\072\314\324\056\070\005\336\065\375\037\157\270\200\150\230\075  
\115\240\312\100\145\322\163\174\365\213\331\012\225\077\330\077  
\043\155\032\321\052\044\031\331\205\263\027\357\170\156\251\130  
\321\043\323\307\023\355\162\045\177\135\261\163\160\320\177\006  
\227\011\204\051\200\141\035\372\136\377\163\254\240\343\211\270  
\034\161\025\306\336\061\177\022\334\341\155\233\257\347\350\237  
\165\170\114\253\106\073\232\316\277\005\030\135\115\025\074\026  
\232\031\120\004\232\262\232\157\145\213\122\137\074\130\004\050  
\045\300\146\141\061\176\271\340\165\271\032\250\201\326\162\027  
\263\305\003\061\065\021\170\170\242\340\351\060\214\177\200\337  
\130\337\074\272\047\226\342\200\064\155\343\230\323\144\047\254  
\110\176\050\167\134\306\045\141\045\370\205\014\145\372\304\062  
\057\245\230\005\344\370\013\147\026\026\306\202\270\062\031\371  
\371\271\171\334\037\315\353\257\253\016\335\033\333\105\344\172  
\347\002\342\225\135\374\151\360\123\151\141\225\165\171\013\136  
\125\346\070\034\224\251\131\063\236\310\161\164\171\177\121\211

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\266\310\152\270\060\310\152\070\303\156\236\341\067\026\352\005
\142\114\133\022\107\355\247\264\263\130\126\307\111\363\177\022
\150\011\061\161\360\155\370\116\107\373\326\205\356\305\130\100
\031\244\035\247\371\113\103\067\334\150\132\117\317\353\302\144
\164\336\264\025\331\364\124\124\032\057\034\327\227\161\124\220
\216\331\040\235\123\053\177\253\217\342\352\060\274\120\067\357
\361\107\265\175\174\054\004\354\150\235\264\111\104\020\364\162
\113\034\144\347\374\346\153\220\335\151\175\151\375\000\126\245
\267\254\266\255\267\312\076\001\357\234
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL

CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "IdenTrust Public Sector Root CA 1"

# Issuer: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US

# Serial Number:0a:01:42:80:00:00:01:45:23:cf:46:7c:00:00:00:02

# Subject: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US

# Not Valid Before: Thu Jan 16 17:53:32 2014

# Not Valid After : Mon Jan 16 17:53:32 2034

# Fingerprint (SHA-256):

30:D0:89:5A:9A:44:8A:26:20:91:63:55:22:D1:F5:20:10:B5:86:7A:CA:E1:2C:78:EF:95:8F:D4:F4:38:9F:2F

# Fingerprint (SHA1): BA:29:41:60:77:98:3F:F4:F3:EF:F2:31:05:3B:2E:EA:6D:4D:45:FD

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "IdenTrust Public Sector Root CA 1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\272\051\101\140\167\230\077\364\363\357\362\061\005\073\056\352
\155\115\105\375
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\067\006\245\260\374\211\235\272\364\153\214\032\144\315\325\272
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\052\060\050\006\003\125\004\003\023\041\111\144
\145\156\124\162\165\163\164\040\120\165\142\154\151\143\040\123
\145\143\164\157\162\040\122\157\157\164\040\103\101\040\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\020\012\001\102\200\000\000\001\105\043\317\106\174\000\000
\000\002
```

```

END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Entrust Root Certification Authority - G2"
#
Issuer: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
Serial Number: 1246989352 (0x4a538c28)
#
Subject: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
Not Valid Before: Tue Jul 07 17:25:54 2009
Not Valid After : Sat Dec 07 17:55:54 2030
Fingerprint (SHA-256):
43:DF:57:74:B0:3E:7F:EF:5F:E4:0D:93:1A:7B:ED:F1:BB:2E:6B:42:73:8C:4E:6D:38:41:10:3D:3A:A7:F3:39
Fingerprint (SHA1): 8C:F4:27:FD:79:0C:3A:D1:66:06:8D:E8:1E:57:EF:BB:93:22:72:D4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\060\071\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
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UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165

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\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162  
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051  
\040\062\060\060\071\040\105\156\164\162\165\163\164\054\040\111  
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162  
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060  
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040  
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\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\004\112\123\214\050

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\076\060\202\003\046\240\003\002\001\002\002\004\112  
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\005\000\060\201\276\061\013\060\011\006\003\125\004\006\023\002  
\125\123\061\026\060\024\006\003\125\004\012\023\015\105\156\164  
\162\165\163\164\054\040\111\156\143\056\061\050\060\046\006\003  
\125\004\013\023\037\123\145\145\040\167\167\167\056\145\156\164  
\162\165\163\164\056\156\145\164\057\154\145\147\141\154\055\164  
\145\162\155\163\061\071\060\067\006\003\125\004\013\023\060\050  
\143\051\040\062\060\060\071\040\105\156\164\162\165\163\164\054  
\040\111\156\143\056\040\055\040\146\157\162\040\141\165\164\150  
\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171\061  
\062\060\060\006\003\125\004\003\023\051\105\156\164\162\165\163  
\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141  
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055  
\040\107\062\060\036\027\015\060\071\060\067\060\067\061\067\062  
\065\065\064\132\027\015\063\060\061\062\060\067\061\067\065\065  
\065\064\132\060\201\276\061\013\060\011\006\003\125\004\006\023  
\002\125\123\061\026\060\024\006\003\125\004\012\023\015\105\156  
\164\162\165\163\164\054\040\111\156\143\056\061\050\060\046\006  
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\164\145\162\155\163\061\071\060\067\006\003\125\004\013\023\060  
\050\143\051\040\062\060\060\071\040\105\156\164\162\165\163\164  
\054\040\111\156\143\056\040\055\040\146\157\162\040\141\165\164  
\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171  
\061\062\060\060\006\003\125\004\003\023\051\105\156\164\162\165  
\163\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040  
\055\040\107\062\060\202\001\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012  
\002\202\001\001\000\272\204\266\162\333\236\014\153\342\231\351  
\060\001\247\166\352\062\270\225\101\032\311\332\141\116\130\162  
\317\376\366\202\171\277\163\141\006\012\245\047\330\263\137\323

\105\116\034\162\326\116\062\362\162\212\017\367\203\031\320\152  
\200\200\000\105\036\260\307\347\232\277\022\127\047\034\243\150  
\057\012\207\275\152\153\016\136\145\363\034\167\325\324\205\215  
\160\041\264\263\062\347\213\242\325\206\071\002\261\270\322\107  
\316\344\311\111\304\073\247\336\373\124\175\127\276\360\350\156  
\302\171\262\072\013\125\342\120\230\026\062\023\134\057\170\126  
\301\302\224\263\362\132\344\047\232\237\044\327\306\354\320\233  
\045\202\343\314\302\304\105\305\214\227\172\006\153\052\021\237  
\251\012\156\110\073\157\333\324\021\031\102\367\217\007\277\365  
\123\137\234\076\364\027\054\346\151\254\116\062\114\142\167\352  
\267\350\345\273\064\274\031\213\256\234\121\347\267\176\265\123  
\261\063\042\345\155\317\160\074\032\372\342\233\147\266\203\364  
\215\245\257\142\114\115\340\130\254\144\064\022\003\370\266\215  
\224\143\044\244\161\002\003\001\000\001\243\102\060\100\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\035\006\003\125\035\016\004\026\004\024\152\162\046\172\320\036  
\357\175\347\073\151\121\324\154\215\237\220\022\146\253\060\015  
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001  
\001\000\171\237\035\226\306\266\171\077\042\215\207\323\207\003  
\004\140\152\153\232\056\131\211\163\021\254\103\321\365\023\377  
\215\071\053\300\362\275\117\160\214\251\057\352\027\304\013\124  
\236\324\033\226\230\063\074\250\255\142\242\000\166\253\131\151  
\156\006\035\176\304\271\104\215\230\257\022\324\141\333\012\031  
\106\107\363\353\367\143\301\100\005\100\245\322\267\364\265\232  
\066\277\251\210\166\210\004\125\004\053\234\207\177\032\067\074  
\176\055\245\032\330\324\211\136\312\275\254\075\154\330\155\257  
\325\363\166\017\315\073\210\070\042\235\154\223\232\304\075\277  
\202\033\145\077\246\017\135\252\374\345\262\025\312\265\255\306  
\274\075\320\204\350\352\006\162\260\115\071\062\170\277\076\021  
\234\013\244\235\232\041\363\360\233\013\060\170\333\301\334\207  
\103\376\274\143\232\312\305\302\034\311\307\215\377\073\022\130  
\010\346\266\075\354\172\054\116\373\203\226\316\014\074\151\207  
\124\163\244\163\302\223\377\121\020\254\025\124\001\330\374\005  
\261\211\241\177\164\203\232\111\327\334\116\173\212\110\157\213  
\105\366

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL

CK\_FALSE

# Trust for "Entrust Root Certification Authority - G2"

# Issuer: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US

# Serial Number: 1246989352 (0x4a538c28)

# Subject: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use

```
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
Not Valid Before: Tue Jul 07 17:25:54 2009
Not Valid After : Sat Dec 07 17:55:54 2030
Fingerprint (SHA-256):
43:DF:57:74:B0:3E:7F:EF:5F:E4:0D:93:1A:7B:ED:F1:BB:2E:6B:42:73:8C:4E:6D:38:41:10:3D:3A:A7:F3:39
Fingerprint (SHA1): 8C:F4:27:FD:79:0C:3A:D1:66:06:8D:E8:1E:57:EF:BB:93:22:72:D4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\214\364\047\375\171\014\072\321\146\006\215\350\036\127\357\273
\223\042\162\324
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\113\342\311\221\226\145\014\364\016\132\223\222\240\012\376\262
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\060\071\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\112\123\214\050
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Entrust Root Certification Authority - EC1"
#
Issuer: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
```

```
Serial Number:00:a6:8b:79:29:00:00:00:50:d0:91:f9
Subject: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
Not Valid Before: Tue Dec 18 15:25:36 2012
Not Valid After : Fri Dec 18 15:55:36 2037
Fingerprint (SHA-256):
02:ED:0E:B2:8C:14:DA:45:16:5C:56:67:91:70:0D:64:51:D7:FB:56:F0:B2:AB:1D:3B:8E:B0:70:E5:6E:DF:F5
Fingerprint (SHA1): 20:D8:06:40:DF:9B:25:F5:12:25:3A:11:EA:F7:59:8A:EB:14:B5:47
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - EC1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\277\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\062\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\063\060
\061\006\003\125\004\003\023\052\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\105
\103\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\062\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\063\060
\061\006\003\125\004\003\023\052\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\105
\103\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
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\002\015\000\246\213\171\051\000\000\000\000\120\320\221\371  
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\246\213\171\051\000\000\000\000\120\320\221\371\060\012\006\010  
\052\206\110\316\075\004\003\003\060\201\277\061\013\060\011\006  
\003\125\004\006\023\002\125\123\061\026\060\024\006\003\125\004  
\012\023\015\105\156\164\162\165\163\164\054\040\111\156\143\056  
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\167\167\056\145\156\164\162\165\163\164\056\156\145\164\057\154  
\145\147\141\154\055\164\145\162\155\163\061\071\060\067\006\003  
\125\004\013\023\060\050\143\051\040\062\060\061\062\040\105\156  
\164\162\165\163\164\054\040\111\156\143\056\040\055\040\146\157  
\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145  
\040\157\156\154\171\061\063\060\061\006\003\125\004\003\023\052  
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\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171\040\055\040\105\103\061\060\036\027\015\061\062  
\061\062\061\070\061\065\062\065\063\066\132\027\015\063\067\061  
\062\061\070\061\065\065\065\063\066\132\060\201\277\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\026\060\024\006\003  
\125\004\012\023\015\105\156\164\162\165\163\164\054\040\111\156  
\143\056\061\050\060\046\006\003\125\004\013\023\037\123\145\145  
\040\167\167\167\056\145\156\164\162\165\163\164\056\156\145\164  
\057\154\145\147\141\154\055\164\145\162\155\163\061\071\060\067  
\006\003\125\004\013\023\060\050\143\051\040\062\060\061\062\040  
\105\156\164\162\165\163\164\054\040\111\156\143\056\040\055\040  
\146\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165  
\163\145\040\157\156\154\171\061\063\060\061\006\003\125\004\003  
\023\052\105\156\164\162\165\163\164\040\122\157\157\164\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\040\055\040\105\103\061\060\166\060\020  
\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042  
\003\142\000\004\204\023\311\320\272\155\101\173\342\154\320\353  
\125\137\146\002\032\044\364\133\211\151\107\343\270\302\175\361  
\362\002\305\237\240\366\133\325\213\006\031\206\117\123\020\155  
\007\044\047\241\240\370\325\107\031\141\114\175\312\223\047\352  
\164\014\357\157\226\011\376\143\354\160\135\066\255\147\167\256  
\311\235\174\125\104\072\242\143\121\037\365\343\142\324\251\107  
\007\076\314\040\243\102\060\100\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016  
\004\026\004\024\267\143\347\032\335\215\351\010\246\125\203\244  
\340\152\120\101\145\021\102\111\060\012\006\010\052\206\110\316  
\075\004\003\003\003\147\000\060\144\002\060\141\171\330\345\102  
\107\337\034\256\123\231\027\266\157\034\175\341\277\021\224\321  
\003\210\165\344\215\211\244\212\167\106\336\155\141\357\002\365

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\373\265\337\314\376\116\377\376\251\346\247\002\060\133\231\327
\205\067\006\265\173\010\375\353\047\213\112\224\371\341\372\247
\216\046\010\350\174\222\150\155\163\330\157\046\254\041\002\270
\231\267\046\101\133\045\140\256\320\110\032\356\006
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Entrust Root Certification Authority - EC1"

# Issuer: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US

# Serial Number:00:a6:8b:79:29:00:00:00:50:d0:91:f9

# Subject: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US

# Not Valid Before: Tue Dec 18 15:25:36 2012

# Not Valid After : Fri Dec 18 15:55:36 2037

# Fingerprint (SHA-256):

02:ED:0E:B2:8C:14:DA:45:16:5C:56:67:91:70:0D:64:51:D7:FB:56:F0:B2:AB:1D:3B:8E:B0:70:E5:6E:DF:F5

# Fingerprint (SHA1): 20:D8:06:40:DF:9B:25:F5:12:25:3A:11:EA:F7:59:8A:EB:14:B5:47

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Entrust Root Certification Authority - EC1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\040\330\006\100\337\233\045\365\022\045\072\021\352\367\131\212
\353\024\265\107
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END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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\266\176\035\360\130\305\111\154\044\073\075\355\230\030\355\274
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END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\277\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\062\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\063\060
\061\006\003\125\004\003\023\052\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\105
\103\061
```

```

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\000\246\213\171\051\000\000\000\000\120\320\221\371
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "CFCA EV ROOT"
#
Issuer: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN
Serial Number: 407555286 (0x184accd6)
Subject: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN
Not Valid Before: Wed Aug 08 03:07:01 2012
Not Valid After : Mon Dec 31 03:07:01 2029
Fingerprint (SHA-256):
5C:C3:D7:8E:4E:1D:5E:45:54:7A:04:E6:87:3E:64:F9:0C:F9:53:6D:1C:CC:2E:F8:00:F3:55:C4:C5:FD:70:FD
#
Fingerprint (SHA1): E2:B8:29:4B:55:84:AB:6B:58:C2:90:46:6C:AC:3F:B8:39:8F:84:83
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CFCA EV ROOT"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\060\060\056\006\003\125\004\012\014\047\103\150\151\156\141\040
\106\151\156\141\156\143\151\141\154\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\025\060\023\006\003\125\004\003\014\014\103\106\103\101
\040\105\126\040\122\117\117\124
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\060\060\056\006\003\125\004\012\014\047\103\150\151\156\141\040
\106\151\156\141\156\143\151\141\154\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\025\060\023\006\003\125\004\003\014\014\103\106\103\101
\040\105\126\040\122\117\117\124
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\030\112\314\326

```

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\215\060\202\003\165\240\003\002\001\002\002\004\030  
\112\314\326\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\060\126\061\013\060\011\006\003\125\004\006\023\002\103  
\116\061\060\060\056\006\003\125\004\012\014\047\103\150\151\156  
\141\040\106\151\156\141\156\143\151\141\154\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\061\025\060\023\006\003\125\004\003\014\014\103\106  
\103\101\040\105\126\040\122\117\117\124\060\036\027\015\061\062  
\060\070\060\070\060\063\060\067\060\061\132\027\015\062\071\061  
\062\063\061\060\063\060\067\060\061\132\060\126\061\013\060\011  
\006\003\125\004\006\023\002\103\116\061\060\060\056\006\003\125  
\004\012\014\047\103\150\151\156\141\040\106\151\156\141\156\143  
\151\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\061\025\060\023\006  
\003\125\004\003\014\014\103\106\103\101\040\105\126\040\122\117  
\117\124\060\202\002\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202  
\002\001\000\327\135\153\315\020\077\037\005\131\325\005\115\067  
\261\016\354\230\053\216\025\035\372\223\113\027\202\041\161\020  
\122\327\121\144\160\026\302\125\151\115\216\025\155\237\277\014  
\033\302\340\243\147\326\014\254\317\042\256\257\167\124\052\113  
\114\212\123\122\172\303\356\056\336\263\161\045\301\351\135\075  
\356\241\057\243\367\052\074\311\043\035\152\253\035\241\247\361  
\363\354\240\325\104\317\025\317\162\057\035\143\227\350\231\371  
\375\223\244\124\200\114\122\324\122\253\056\111\337\220\315\270  
\137\276\077\336\241\312\115\040\324\045\350\204\051\123\267\261  
\210\037\377\372\332\220\237\012\251\055\101\077\261\361\030\051  
\356\026\131\054\064\111\032\250\006\327\250\210\322\003\162\172  
\062\342\352\150\115\156\054\226\145\173\312\131\372\362\342\335  
\356\060\054\373\314\106\254\304\143\353\157\177\066\053\064\163  
\022\224\177\337\314\046\236\361\162\135\120\145\131\217\151\263  
\207\136\062\157\303\030\212\265\225\217\260\172\067\336\132\105  
\073\307\066\341\357\147\321\071\323\227\133\163\142\031\110\055  
\207\034\006\373\164\230\040\111\163\360\005\322\033\261\240\243  
\267\033\160\323\210\151\271\132\326\070\364\142\334\045\213\170  
\277\370\350\176\270\134\311\225\117\137\247\055\271\040\153\317  
\153\335\365\015\364\202\267\364\262\146\056\020\050\366\227\132  
\173\226\026\217\001\031\055\154\156\177\071\130\006\144\203\001  
\203\203\303\115\222\335\062\306\207\244\067\351\026\316\252\055  
\150\257\012\201\145\072\160\301\233\255\115\155\124\312\052\055  
\113\205\033\263\200\346\160\105\015\153\136\065\360\177\073\270  
\234\344\004\160\211\022\045\223\332\012\231\042\140\152\143\140  
\116\166\006\230\116\275\203\255\035\130\212\045\205\322\307\145  
\036\055\216\306\337\266\306\341\177\212\004\041\025\051\164\360  
\076\234\220\235\014\056\361\212\076\132\252\014\011\036\307\325  
\074\243\355\227\303\036\064\372\070\371\010\016\343\300\135\053

\203\321\126\152\311\266\250\124\123\056\170\062\147\075\202\177  
\164\320\373\341\266\005\140\271\160\333\216\013\371\023\130\157  
\161\140\020\122\020\271\301\101\011\357\162\037\147\061\170\377  
\226\005\215\002\003\001\000\001\243\143\060\141\060\037\006\003  
\125\035\043\004\030\060\026\200\024\343\376\055\375\050\320\013  
\265\272\266\242\304\277\006\252\005\214\223\373\057\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035  
\006\003\125\035\016\004\026\004\024\343\376\055\375\050\320\013  
\265\272\266\242\304\277\006\252\005\214\223\373\057\060\015\006  
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001  
\000\045\306\272\153\353\207\313\336\202\071\226\075\360\104\247  
\153\204\163\003\336\235\053\117\272\040\177\274\170\262\317\227  
\260\033\234\363\327\171\056\365\110\266\322\373\027\210\346\323  
\172\077\355\123\023\320\342\057\152\171\313\000\043\050\346\036  
\067\127\065\211\204\302\166\117\064\066\255\147\303\316\101\006  
\210\305\367\356\330\032\270\326\013\177\120\377\223\252\027\113  
\214\354\355\122\140\262\244\006\352\116\353\364\153\031\375\353  
\365\032\340\045\052\232\334\307\101\066\367\310\164\005\204\071  
\225\071\326\013\073\244\047\372\010\330\134\036\370\004\140\122  
\021\050\050\003\377\357\123\146\000\245\112\064\026\146\174\375  
\011\244\256\236\147\032\157\101\013\153\006\023\233\217\206\161  
\005\264\057\215\211\146\063\051\166\124\232\021\370\047\372\262  
\077\221\340\316\015\033\363\060\032\255\277\042\135\033\323\277  
\045\005\115\341\222\032\177\231\237\074\104\223\312\324\100\111  
\154\200\207\327\004\072\303\062\122\065\016\126\370\245\335\175  
\304\213\015\021\037\123\313\036\262\027\266\150\167\132\340\324  
\313\310\007\256\365\072\056\216\067\267\320\001\113\103\051\167  
\214\071\227\217\202\132\370\121\345\211\240\030\347\150\177\135  
\012\056\373\243\107\016\075\246\043\172\306\001\307\217\310\136  
\277\155\200\126\276\212\044\272\063\352\237\341\062\021\236\361  
\322\117\200\366\033\100\257\070\236\021\120\171\163\022\022\315  
\346\154\235\054\210\162\074\060\201\006\221\042\352\131\255\332  
\031\056\042\302\215\271\214\207\340\146\274\163\043\137\041\144  
\143\200\110\365\240\074\030\075\224\310\110\101\035\100\272\136  
\376\376\126\071\241\310\317\136\236\031\144\106\020\332\027\221  
\267\005\200\254\213\231\222\175\347\242\330\007\013\066\047\347  
\110\171\140\212\303\327\023\134\370\162\100\337\112\313\317\231  
\000\012\000\013\021\225\332\126\105\003\210\012\237\147\320\325  
\171\261\250\215\100\155\015\302\172\100\372\363\137\144\107\222  
\313\123\271\273\131\316\117\375\320\025\123\001\330\337\353\331  
\346\166\357\320\043\273\073\251\171\263\325\002\051\315\211\243  
\226\017\112\065\347\116\102\300\165\315\007\317\346\054\353\173  
\056

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "CFCA EV ROOT"

# Issuer: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN

# Serial Number: 407555286 (0x184accd6)

# Subject: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN

# Not Valid Before: Wed Aug 08 03:07:01 2012

# Not Valid After : Mon Dec 31 03:07:01 2029

# Fingerprint (SHA-256):

5C:C3:D7:8E:4E:1D:5E:45:54:7A:04:E6:87:3E:64:F9:0C:F9:53:6D:1C:CC:2E:F8:00:F3:55:C4:C5:FD:70:FD

# Fingerprint (SHA1): E2:B8:29:4B:55:84:AB:6B:58:C2:90:46:6C:AC:3F:B8:39:8F:84:83

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CFCA EV ROOT"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\342\270\051\113\125\204\253\153\130\302\220\106\154\254\077\270  
\071\217\204\203

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\164\341\266\355\046\172\172\104\060\063\224\253\173\047\201\060

END

CKA\_ISSUER

MULTILINE\_OCTAL

\060\126\061\013\060\011\006\003\125\004\006\023\002\103\116\061  
\060\060\056\006\003\125\004\012\014\047\103\150\151\156\141\040  
\106\151\156\141\156\143\151\141\154\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
\171\061\025\060\023\006\003\125\004\003\014\014\103\106\103\101  
\040\105\126\040\122\117\117\124

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\004\030\112\314\326

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "OISTE WISEKey Global Root GB CA"

#

# Issuer: CN=OISTE WISEKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISEKey,C=CH

# Serial Number:76:b1:20:52:74:f0:85:87:46:b3:f8:23:1a:f6:c2:c0

# Subject: CN=OISTE WISEKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISEKey,C=CH

# Not Valid Before:

Mon Dec 01 15:00:32 2014

# Not Valid After : Thu Dec 01 15:10:31 2039

# Fingerprint (SHA-256):

6B:9C:08:E8:6E:B0:F7:67:CF:AD:65:CD:98:B6:21:49:E5:49:4A:67:F5:84:5E:7B:D1:ED:01:9F:27:B8:6B:D6

# Fingerprint (SHA1): 0F:F9:40:76:18:D3:D7:6A:4B:98:F0:A8:35:9E:0C:FD:27:AC:CC:ED

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "OISTE WISeKey Global Root GB CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061  
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145  
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124  
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144  
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037  
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154  
\157\142\141\154\040\122\157\157\164\040\107\102\040\103\101

END

CKA\_ID UTF8

"0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061  
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145  
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124  
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144  
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037  
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154  
\157\142\141\154\040\122\157\157\164\040\107\102\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\166\261\040\122\164\360\205\207\106\263\370\043\032\366  
\302\300

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\265\060\202\002\235\240\003\002\001\002\002\020\166  
\261\040\122\164\360\205\207\106\263\370\043\032\366\302\300\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\155  
\061\013\060\011\006\003\125\004\006\023\002\103\110\061\020\060  
\016\006\003\125\004\012\023\007\127\111\123\145\113\145\171\061  
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040  
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162  
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111  
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142  
\141\154\040\122\157\157\164\040\107\102\040\103\101\060\036\027  
\015\061\064\061\062\060\061\061\065\060\060\063\062\132\027\015  
\063\071\061\062\060\061\061\065\061\060\063\061\132\060\155\061

\013\060\011\006\003\125\004\006\023\002\103\110\061\020\060\016  
\006\003\125\004\012\023\007\127\111\123\145\113\145\171\061\042  
\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040\106  
\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162\163  
\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111\123  
\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142\141  
\154\040\122\157\157\164\040\107\102\040\103\101\060\202\001\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\001\017\000\060\202\001\012\002\202\001\001\000\330\027\267  
\034\112\044\052\326\227\261\312\342\036\373\175\070\357\230\365  
\262\071\230\116\047\270\021\135\173\322\045\224\210\202\025\046  
\152\033\061\273\250\133\041\041\053\330\017\116\237\132\361\261  
\132\344\171\326\062\043\053\341\123\314\231\105\134\173\117\255  
\274\277\207\112\013\113\227\132\250\366\110\354\175\173\015\315  
\041\006\337\236\025\375\101\212\110\267\040\364\241\172\033\127  
\324\135\120\377\272\147\330\043\231\037\310\077\343\336\377\157  
\133\167\261\153\156\270\311\144\367\341\312\101\106\016\051\161  
\320\271\043\374\311\201\137\116\367\157\337\277\204\255\163\144  
\273\267\102\216\151\366\324\166\035\176\235\247\270\127\212\121  
\147\162\327\324\250\270\225\124\100\163\003\366\352\364\353\376  
\050\102\167\077\235\043\033\262\266\075\200\024\007\114\056\117  
\367\325\012\026\015\275\146\103\067\176\043\103\171\303\100\206  
\365\114\051\332\216\232\255\015\245\004\207\210\036\205\343\351  
\123\325\233\310\213\003\143\170\353\340\031\112\156\273\057\153  
\063\144\130\223\255\151\277\217\033\357\202\110\307\002\003\001  
\000\001\243\121\060\117\060\013\006\003\125\035\017\004\004\003  
\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\065  
\017\310\066\143\136\342\243\354\371\073\146\025\316\121\122\343  
\221\232\075\060\020\006\011\053\006\001\004\001\202\067\025\001  
\004\003\002\001\000\060\015\006\011\052\206\110\206\367\015\001  
\001\013\005\000\003\202\001\001\000\100\114\373\207\262\231\201  
\220\176\235\305\260\260\046\315\210\173\053\062\215\156\270\041  
\161\130\227\175\256\067\024\257\076\347\367\232\342\175\366\161  
\230\231\004\252\103\164\170\243\343\111\141\076\163\214\115\224  
\340\371\161\304\266\026\016\123\170\037\326\242\207\057\002\071  
\201\051\074\257\025\230\041\060\376\050\220\000\214\321\341\313  
\372\136\310\375\370\020\106\073\242\170\102\221\027\164\125\012  
\336\120\147\115\146\321\247\377\375\331\300\265\250\243\212\316  
\146\365\017\103\315\247\053\127\173\143\106\152\252\056\122\330  
\364\355\341\155\255\051\220\170\110\272\341\043\252\243\211\354  
\265\253\226\300\264\113\242\035\227\236\172\362\156\100\161\337  
\150\361\145\115\316\174\005\337\123\145\251\245\360\261\227\004  
\160\025\106\003\230\324\322\277\124\264\240\130\175\122\157\332  
\126\046\142\324\330\333\211\061\157\034\360\042\302\323\142\034  
\065\315\114\151\025\124\032\220\230\336\353\036\137\312\167\307  
\313\216\075\103\151\234\232\130\320\044\073\337\033\100\226\176  
\065\255\201\307\116\161\272\210\023



```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "OISTE WISEKey Global Root GB CA"
Issuer: CN=OISTE WISEKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISEKey,C=CH
Serial Number:76:b1:20:52:74:f0:85:87:46:b3:f8:23:1a:f6:c2:c0
Subject: CN=OISTE WISEKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISEKey,C=CH
Not Valid Before: Mon Dec 01 15:00:32 2014
Not Valid After : Thu Dec
01 15:10:31 2039
Fingerprint (SHA-256):
6B:9C:08:E8:6E:B0:F7:67:CF:AD:65:CD:98:B6:21:49:E5:49:4A:67:F5:84:5E:7B:D1:ED:01:9F:27:B8:6B:D6
Fingerprint (SHA1): 0F:F9:40:76:18:D3:D7:6A:4B:98:F0:A8:35:9E:0C:FD:27:AC:CC:ED
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISEKey Global Root GB CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\017\371\100\166\030\323\327\152\113\230\360\250\065\236\014\375
\047\254\314\355
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\244\353\271\141\050\056\267\057\230\260\065\046\220\231\121\035
END
CKA_ISSUER MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\102\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\166\261\040\122\164\360\205\207\106\263\370\043\032\366
\302\300
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

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```
Certificate "SZAFIR ROOT CA2"
#
Issuer: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
Serial Number:3e:8a:5d:07:ec:55:d2:32:d5:b7:e3:b6:5f:01:eb:2d:dc:e4:d6:e4
Subject: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
Not Valid Before: Mon Oct 19 07:43:30 2015
Not Valid After : Fri Oct 19 07:43:30 2035
Fingerprint (SHA-256):
A1:33:9D:33:28:1A:0B:56:E5:57:D3:D3:2B:1C:E7:F9:36:7E:B0:94:BD:5F:A7:2A:7E:50:04:C8:DE:D7:CA:FE
Fingerprint (SHA1): E2:52:FA:95:3F:ED:DB:24:60:BD:6E:28:F3:9C:CC:CF:5E:B3:3F:DE
CKA_CLASS CK_OBJECT_CLASS
CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SZAFIR ROOT CA2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\050\060\046\006\003\125\004\012\014\037\113\162\141\152\157\167
\141\040\111\172\142\141\040\122\157\172\154\151\143\172\145\156
\151\157\167\141\040\123\056\101\056\061\030\060\026\006\003\125
\004\003\014\017\123\132\101\106\111\122\040\122\117\117\124\040
\103\101\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\050\060\046\006\003\125\004\012\014\037\113\162\141\152\157\167
\141\040\111\172\142\141\040\122\157\172\154\151\143\172\145\156
\151\157\167\141\040\123\056\101\056\061\030\060\026\006\003\125
\004\003\014\017\123\132\101\106\111\122\040\122\117\117\124\040
\103\101\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\076\212\135\007\354\125\322\062\325\267\343\266\137\001
\353\055\334\344\326\344
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\003\162\060\202\002\132\240\003\002\001\002\002\024\076
\212\135\007\354\125\322\062\325\267\343\266\137\001\353\055\334
\344\326\344\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\121\061\013\060\011\006\003\125\004\006\023\002\120
\114\061\050\060\046\006\003\125\004\012\014\037\113\162\141\152
\157\167\141\040\111\172\142\141\040\122\157\172\154\151\143\172
\145\156\151\157\167\141\040\123\056\101\056\061\030\060\026\006
\003\125\004\003\014\017\123\132\101\106\111\122\040\122\117\117
```

\124\040\103\101\062\060\036\027\015\061\065\061\060\061\071\060  
\067\064\063\063\060\132\027\015\063\065\061\060\061\071\060\067  
\064\063\063\060\132\060\121\061\013\060\011\006\003\125\004\006  
\023\002\120\114\061\050\060\046\006\003\125\004\012\014\037\113  
\162\141\152\157\167\141\040\111\172\142\141\040\122\157\172\154  
\151\143\172\145\156\151\157\167\141\040\123\056\101\056\061\030  
\060\026\006\003\125\004\003\014\017\123\132\101\106\111\122\040  
\122\117\117\124\040\103\101\062\060\202\001\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000  
\060\202\001\012\002\202\001\001\000\267\274\076\120\250\113\315  
\100\265\316\141\347\226\312\264\241\332\014\042\260\372\265\173  
\166\000\167\214\013\317\175\250\206\314\046\121\344\040\075\205  
\014\326\130\343\347\364\052\030\235\332\321\256\046\356\353\123  
\334\364\220\326\023\112\014\220\074\303\364\332\322\216\015\222  
\072\334\261\261\377\070\336\303\272\055\137\200\271\002\275\112  
\235\033\017\264\303\302\301\147\003\335\334\033\234\075\263\260  
\336\000\036\250\064\107\273\232\353\376\013\024\275\066\204\332  
\015\040\277\372\133\313\251\026\040\255\071\140\356\057\165\266  
\347\227\234\371\076\375\176\115\157\115\057\357\210\015\152\372  
\335\361\075\156\040\245\240\022\264\115\160\271\316\327\162\073  
\211\223\247\200\204\034\047\111\162\111\265\377\073\225\236\301  
\314\310\001\354\350\016\212\012\226\347\263\246\207\345\326\371  
\005\053\015\227\100\160\074\272\254\165\132\234\325\115\235\002  
\012\322\113\233\146\113\106\007\027\145\255\237\154\210\000\334  
\042\211\340\341\144\324\147\274\061\171\141\074\273\312\101\315  
\134\152\000\310\074\070\216\130\257\002\003\001\000\001\243\102  
\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003  
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\035\006\003\125\035\016\004\026\004\024\056\026  
\251\112\030\265\313\314\365\157\120\363\043\137\370\135\347\254  
\360\310\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\003\202\001\001\000\265\163\370\003\334\131\133\035\166\351  
\243\052\173\220\050\262\115\300\063\117\252\232\261\324\270\344  
\047\377\251\226\231\316\106\340\155\174\114\242\070\244\006\160  
\360\364\101\021\354\077\107\215\077\162\207\371\073\375\244\157  
\053\123\000\340\377\071\271\152\007\016\353\035\034\366\242\162  
\220\313\202\075\021\202\213\322\273\237\052\257\041\346\143\206  
\235\171\031\357\367\273\014\065\220\303\212\355\117\017\365\314  
\022\331\244\076\273\240\374\040\225\137\117\046\057\021\043\203  
\116\165\007\017\277\233\321\264\035\351\020\004\376\312\140\217  
\242\114\270\255\317\341\220\017\315\256\012\307\135\173\267\120  
\322\324\141\372\325\025\333\327\237\207\121\124\353\245\343\353  
\311\205\240\045\040\067\373\216\316\014\064\204\341\074\201\262  
\167\116\103\245\210\137\206\147\241\075\346\264\134\141\266\076  
\333\376\267\050\305\242\007\256\265\312\312\215\052\022\357\227  
\355\302\060\244\311\052\172\373\363\115\043\033\231\063\064\240  
\056\365\251\013\077\324\135\341\317\204\237\342\031\302\137\212  
\326\040\036\343\163\267

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "SZAFIR ROOT CA2"
Issuer: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
Serial Number:3e:8a:5d:07:ec:55:d2:32:d5:b7:e3:b6:5f:01:eb:2d:dc:e4:d6:e4
#
Subject: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
Not Valid Before: Mon Oct 19 07:43:30 2015
Not Valid After : Fri Oct 19 07:43:30 2035
Fingerprint (SHA-256):
A1:33:9D:33:28:1A:0B:56:E5:57:D3:D3:2B:1C:E7:F9:36:7E:B0:94:BD:5F:A7:2A:7E:50:04:C8:DE:D7:CA:FE
Fingerprint (SHA1): E2:52:FA:95:3F:ED:DB:24:60:BD:6E:28:F3:9C:CC:CF:5E:B3:3F:DE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SZAFIR ROOT CA2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\342\122\372\225\077\355\333\044\140\275\156\050\363\234\314\317
\136\263\077\336
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\021\144\301\211\260\044\261\214\261\007\176\211\236\121\236\231
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\050\060\046\006\003\125\004\012\014\037\113\162\141\152\157\167
\141\040\111\172\142\141\040\122\157\172\154\151\143\172\145\156
\151\157\167\141\040\123\056\101\056\061\030\060\026\006\003\125
\004\003\014\017\123\132\101\106\111\122\040\122\117\117\124\040
\103\101\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\076\212\135\007\354\125\322\062\325\267\343\266\137\001
\353\055\334\344\326\344
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Certum Trusted Network CA 2"

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```
#
Issuer: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
Serial Number:21:d6:d0:4a:4f:25:0f:c9:32:37:fc:aa:5e:12:8d:e9
Subject: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
Not Valid Before: Thu Oct 06 08:39:56 2011
Not Valid After : Sat Oct 06 08:39:56 2046
Fingerprint (SHA-256):
B6:76:F2:ED:DA:E8:77:5C:D3:6C:B0:F6:3C:D1:D4:60:39:61:F4:9E:62:65:BA:01:3A:2F:03:07:B6:D0:B8:04
#
Fingerprint (SHA1): D3:DD:48:3E:2B:BF:4C:05:E8:AF:10:F5:FA:76:26:CF:D3:DC:30:92
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\044\060
\042\006\003\125\004\003\023\033\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\044\060
\042\006\003\125\004\003\023\033\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\041\326\320\112\117\045\017\311\062\067\374\252\136\022
\215\351
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\322\060\202\003\272\240\003\002\001\002\002\020\041
```

\326\320\112\117\045\017\311\062\067\374\252\136\022\215\351\060  
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060\201  
\200\061\013\060\011\006\003\125\004\006\023\002\120\114\061\042  
\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164\157  
\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123\056  
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162  
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\061\044\060\042\006  
\003\125\004\003\023\033\103\145\162\164\165\155\040\124\162\165  
\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101\040  
\062\060\042\030\017\062\060\061\061\061\060\060\066\060\070\063  
\071\065\066\132\030\017\062\060\064\066\061\060\060\066\060\070  
\063\071\065\066\132\060\201\200\061\013\060\011\006\003\125\004  
\006\023\002\120\114\061\042\060\040\006\003\125\004\012\023\031  
\125\156\151\172\145\164\157\040\124\145\143\150\156\157\154\157  
\147\151\145\163\040\123\056\101\056\061\047\060\045\006\003\125  
\004\013\023\036\103\145\162\164\165\155\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\061\044\060\042\006\003\125\004\003\023\033\103\145\162  
\164\165\155\040\124\162\165\163\164\145\144\040\116\145\164\167  
\157\162\153\040\103\101\040\062\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\275\371\170\370\346\325\200  
\014\144\235\206\033\226\144\147\077\042\072\036\165\001\175\357  
\373\134\147\214\311\314\134\153\251\221\346\271\102\345\040\113  
\233\332\233\173\271\231\135\331\233\200\113\327\204\100\053\047  
\323\350\272\060\273\076\011\032\247\111\225\357\053\100\044\302  
\227\307\247\356\233\045\357\250\012\000\227\205\132\252\235\334  
\051\311\342\065\007\353\160\115\112\326\301\263\126\270\241\101  
\070\233\321\373\061\177\217\340\137\341\261\077\017\216\026\111  
\140\327\006\215\030\371\252\046\020\253\052\323\320\321\147\215  
\033\106\276\107\060\325\056\162\321\305\143\332\347\143\171\104  
\176\113\143\044\211\206\056\064\077\051\114\122\213\052\247\300  
\342\221\050\211\271\300\133\371\035\331\347\047\255\377\232\002  
\227\301\306\120\222\233\002\054\275\251\271\064\131\012\277\204  
\112\377\337\376\263\237\353\331\236\340\230\043\354\246\153\167  
\026\052\333\314\255\073\034\244\207\334\106\163\136\031\142\150  
\105\127\344\220\202\102\273\102\326\360\141\340\301\243\075\146  
\243\135\364\030\356\210\311\215\027\105\051\231\062\165\002\061  
\356\051\046\310\153\002\346\265\142\105\177\067\025\132\043\150  
\211\324\076\336\116\047\260\360\100\014\274\115\027\313\115\242  
\263\036\320\006\132\335\366\223\317\127\165\231\365\372\206\032  
\147\170\263\277\226\376\064\334\275\347\122\126\345\263\345\165  
\173\327\101\221\005\334\135\151\343\225\015\103\271\374\203\226  
\071\225\173\154\200\132\117\023\162\306\327\175\051\172\104\272  
\122\244\052\325\101\106\011\040\376\042\240\266\133\060\215\274  
\211\014\325\327\160\370\207\122\375\332\357\254\121\056\007\263  
\116\376\320\011\332\160\357\230\372\126\346\155\333\265\127\113

\334\345\054\045\025\310\236\056\170\116\370\332\234\236\206\054  
\312\127\363\032\345\310\222\213\032\202\226\172\303\274\120\022  
\151\330\016\132\106\213\072\353\046\372\043\311\266\260\201\276  
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\027\374\145\204\307\020\111\220\336\333\307\046\223\210\046\157  
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\155\016\201\202\021\033\212\116\306\117\245\335\142\036\104\337  
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\057\336\232\035\132\271\126\316\065\072\260\137\160\115\136\343  
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\166\065\213\050\247\151\240\371\073\365\043\335\205\020\164\311  
\220\003\126\221\347\257\272\107\324\022\227\021\042\343\242\111  
\224\154\347\267\224\113\272\055\244\332\063\213\114\246\104\377  
\132\074\306\035\144\330\265\061\344\246\074\172\250\127\013\333  
\355\141\032\313\361\316\163\167\143\244\207\157\114\121\070\326  
\344\137\307\237\266\201\052\344\205\110\171\130\136\073\370\333  
\002\202\147\301\071\333\303\164\113\075\066\036\371\051\223\210  
\150\133\250\104\031\041\360\247\350\201\015\054\350\223\066\264  
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\157\266\272\154\203\103\167\315\212\222\027\241\236\133\170\026  
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\150\004\106\256\266\331\233\214\276\031\276\261\306\362\031\343  
\134\002\312\054\330\157\112\007\331\311\065\332\100\165\362\304  
\247\031\157\236\102\020\230\165\346\225\213\140\274\355\305\022  
\327\212\316\325\230\134\126\226\003\305\356\167\006\065\377\317  
\344\356\077\023\141\356\333\332\055\205\360\315\256\235\262\030  
\011\105\303\222\241\162\027\374\107\266\240\013\054\361\304\336  
\103\150\010\152\137\073\360\166\143\373\314\006\054\246\306\342  
\016\265\271\276\044\217

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Certum Trusted Network CA 2"
Issuer: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
Serial
 Number:21:d6:d0:4a:4f:25:0f:c9:32:37:fc:aa:5e:12:8d:e9
Subject: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
Not Valid Before: Thu Oct 06 08:39:56 2011
Not Valid After : Sat Oct 06 08:39:56 2046
Fingerprint (SHA-256):
B6:76:F2:ED:DA:E8:77:5C:D3:6C:B0:F6:3C:D1:D4:60:39:61:F4:9E:62:65:BA:01:3A:2F:03:07:B6:D0:B8:04
Fingerprint (SHA1): D3:DD:48:3E:2B:BF:4C:05:E8:AF:10:F5:FA:76:26:CF:D3:DC:30:92
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\323\335\110\076\053\277\114\005\350\257\020\365\372\166\046\317
\323\334\060\222
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\155\106\236\331\045\155\010\043\133\136\164\175\036\047\333\362
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\044\060
\042\006\003\125\004\003\023\033\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\041\326\320\112\117\045\017\311\062\067\374\252\136\022
\215\351
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```



```

#
Certificate "Hellenic Academic and Research Institutions RootCA 2015"
#
Issuer: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research
Institutions Cert. Authority,L=Athens,C=GR
Serial Number: 0 (0x0)
#
Subject: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research
Institutions Cert. Authority,L=Athens,C=GR
Not Valid Before: Tue Jul 07 10:11:21 2015
Not Valid After : Sat Jun 30 10:11:21 2040
Fingerprint (SHA-256):
A0:40:92:9A:02:CE:53:B4:AC:F4:F2:FF:C6:98:1C:E4:49:6F:75:5E:6D:45:FE:0B:2A:69:2B:CD:52:52:3F:36
Fingerprint (SHA1): 01:0C:06:95:A6:98:19:14:FF:BF:5F:C6:B0:B6:95:EA:29:E9:12:A6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2015"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003
\023\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157
\157\164\103\101\040\062\060\061\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003
\023\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157
\157\164\103\101\040\062\060\061\065

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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

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\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122\061  
\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156\163  
\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145  
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144  
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164  
\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164  
\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023  
\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155  
\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040  
\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157  
\164\103\101\040\062\060\061\065\060\036\027\015\061\065\060\067  
\060\067\061\060\061\061\062\061\132\027\015\064\060\060\066\063  
\060\061\060\061\061\062\061\132\060\201\246\061\013\060\011\006  
\003\125\004\006\023\002\107\122\061\017\060\015\006\003\125\004  
\007\023\006\101\164\150\145\156\163\061\104\060\102\006\003\125  
\004\012\023\073\110\145\154\154\145\156\151\143\040\101\143\141  
\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141\162  
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\100\060\076\006\003\125\004\003\023\067\110\145\154\154\145\156  
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\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165  
\164\151\157\156\163\040\122\157\157\164\103\101\040\062\060\061  
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\271\260\137\231\341\362\022\203\200\115\006\076\337\254\257\347  
\241\210\153\061\257\360\213\320\030\063\270\333\105\152\064\364  
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\330\216\243\226\136\072\331\062\333\076\350\360\020\145\355\164  
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\201\370\027\313\222\066\135\321\243\330\165\033\341\213\047\352  
\172\110\101\375\105\031\006\255\047\231\116\301\160\107\335\265  
\237\201\123\022\345\261\214\110\135\061\103\027\343\214\306\172  
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\162\320\070\030\152\235\363\161\044\124\013\060\015\006\011\052  
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\165  
\273\155\124\113\252\020\130\106\064\362\142\327\026\066\135\010  
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\162\307\350\105\216\334\251\362\046\077\306\171\214\261\123\010  
\063\201\260\126\023\276\346\121\134\330\233\012\117\113\234\126  
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\011\154\205\206\223\377\211\226\047\170\201\217\147\343\106\164  
\124\216\331\015\151\342\112\364\115\164\003\377\262\167\355\225  
\147\227\344\261\305\253\277\152\043\350\324\224\342\104\050\142  
\304\113\342\360\330\342\051\153\032\160\176\044\141\223\173\117  
\003\062\045\015\105\044\053\226\264\106\152\277\112\013\367\232  
\217\301\254\032\305\147\363\157\064\322\372\163\143\214\357\026  
\260\250\244\106\052\370\353\022\354\162\264\357\370\053\176\214  
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\253\330\313\222\315\224\070\141\016\007\006\037\113\106\020\361  
\025\276\215\205\134\073\112\053\201\171\017\264\151\237\111\120  
\227\115\367\016\126\135\300\225\152\302\066\303\033\150\311\365  
\052\334\107\232\276\262\316\305\045\350\372\003\271\332\371\026  
\156\221\204\365\034\050\310\374\046\314\327\034\220\126\247\137  
\157\072\004\274\315\170\211\013\216\017\057\243\252\117\242\033  
\022\075\026\010\100\017\361\106\114\327\252\173\010\301\012\365  
\155\047\336\002\217\312\303\265\053\312\351\353\310\041\123\070

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\245\314\073\330\167\067\060\242\117\331\157\321\362\100\255\101
\172\027\305\326\112\065\211\267\101\325\174\206\177\125\115\203
\112\245\163\040\300\072\257\220\361\232\044\216\331\216\161\312
\173\270\206\332\262\217\231\076\035\023\015\022\021\356\324\253
\360\351\025\166\002\344\340\337\252\040\036\133\141\205\144\100
\251\220\227\015\255\123\322\132\035\207\152\000\227\145\142\264
\276\157\152\247\365\054\102\355\062\255\266\041\236\276\274
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Hellenic Academic and Research Institutions RootCA 2015"

# Issuer: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR

# Serial Number: 0 (0x0)

# Subject: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR

# Not Valid Before: Tue Jul 07 10:11:21 2015

# Not Valid After : Sat Jun 30 10:11:21 2040

# Fingerprint (SHA-256):

A0:40:92:9A:02:CE:53:B4:AC:F4:F2:FF:C6:98:1C:E4:49:6F:75:5E:6D:45:FE:0B:2A:69:2B:CD:52:52:3F:36

# Fingerprint (SHA1): 01:0C:06:95:A6:98:19:14:FF:BF:5F:C6:B0:B6:95:EA:29:E9:12:A6

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2015"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\001\014\006\225\246\230\031\024\377\277\137\306\260\266\225\352
\051\351\022\246
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\312\377\342\333\003\331\313\113\351\017\255\204\375\173\030\316
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003
\023\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157
\157\164\103\101\040\062\060\061\065
```

```

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Hellenic Academic and Research Institutions ECC RootCA 2015"
#
Issuer: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research
Institutions Cert. Authority,L=Athens,C=GR
#
Serial Number: 0 (0x0)
Subject: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and
Research Institutions Cert. Authority,L=Athens,C=GR
Not Valid Before: Tue Jul 07 10:37:12 2015
Not Valid After : Sat Jun 30 10:37:12 2040
Fingerprint (SHA-256):
44:B5:45:AA:8A:25:E6:5A:73:CA:15:DC:27:FC:36:D2:4C:1C:B9:95:3A:06:65:39:B1:15:82:DC:48:7B:48:33
Fingerprint (SHA1): 9F:F1:71:8D:92:D5:9A:F3:7D:74:97:B4:BC:6F:84:68:0B:BA:B6:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions ECC RootCA 2015"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\252\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\104\060\102\006\003\125\004\003
\023\073\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\105\103
\103\040\122\157\157\164\103\101\040\062\060\061\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\252\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156

```

\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154  
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156  
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151  
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165  
\164\150\157\162\151\164\171\061\104\060\102\006\003\125\004\003  
\023\073\110\145\154\154\145\156\151\143\040\101\143\141\144\145  
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150  
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\105\103  
\103\040\122\157\157\164\103\101\040\062\060\061\065

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\303\060\202\002\112\240\003\002\001\002\002\001\000  
\060\012\006\010\052\206\110\316\075\004\003\002\060\201\252\061  
\013\060\011\006\003\125\004\006\023\002\107\122\061\017\060\015  
\006\003\125\004\007\023\006\101\164\150\145\156\163\061\104\060  
\102\006\003\125\004\012\023\073\110\145\154\154\145\156\151\143  
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145  
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151  
\157\156\163\040\103\145\162\164\056\040\101\165\164\150\157\162  
\151\164\171\061\104\060\102\006\003\125\004\003\023\073\110\145  
\154\154\145\156\151\143\040\101\143\141\144\145\155\151\143\040  
\141\156\144\040\122\145\163\145\141\162\143\150\040\111\156\163  
\164\151\164\165\164\151\157\156\163\040\105\103\103\040\122\157  
\157\164\103\101\040\062\060\061\065\060\036\027\015\061\065\060  
\067\060\067\061\060\063\067\061\062\132\027\015\064\060\060\066  
\063\060\061\060\063\067\061\062\132\060\201\252\061\013\060\011  
\006\003\125\004\006\023\002\107\122\061\017\060\015\006\003\125  
\004\007\023\006\101\164\150\145\156\163\061\104\060\102\006\003  
\125\004\012\023\073\110\145\154\154\145\156\151\143\040\101\143  
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141  
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163  
\040\103\145\162\164\056\040\101\165\164\150\157\162\151\164\171  
\061\104\060\102\006\003\125\004\003\023\073\110\145\154\154\145  
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144  
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164  
\165\164\151\157\156\163\040\105\103\103\040\122\157\157\164\103  
\101\040\062\060\061\065\060\166\060\020\006\007\052\206\110\316  
\075\002\001\006\005\053\201\004\000\042\003\142\000\004\222\240  
\101\350\113\202\204\134\342\370\061\021\231\206\144\116\011\045  
\057\235\101\057\012\256\065\117\164\225\262\121\144\153\215\153  
\346\077\160\225\360\005\104\107\246\162\070\120\166\225\002\132  
\216\256\050\236\371\055\116\231\357\054\110\157\114\045\051\350  
\321\161\133\337\035\301\165\067\264\327\372\173\172\102\234\152  
\012\126\132\174\151\013\252\200\011\044\154\176\301\106\243\102

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\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\035\006\003\125\035\016\004\026\004\024\264\042
\013\202\231\044\001\016\234\273\344\016\375\277\373\227\040\223
\231\052\060\012\006\010\052\206\110\316\075\004\003\002\003\147
\000\060\144\002\060\147\316\026\142\070\242\254\142\105\247\251
\225\044\300\032\047\234\062\073\300\300\325\272\251\347\370\004
\103\123\205\356\122\041\336\235\365\045\203\076\236\130\113\057
\327\147\023\016\041\002\060\005\341\165\001\336\150\355\052\037
\115\114\011\010\015\354\113\255\144\027\050\347\165\316\105\145
\162\041\027\313\042\101\016\214\023\230\070\232\124\155\233\312
\342\174\352\002\130\042\221
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Hellenic Academic and Research Institutions ECC RootCA 2015"

# Issuer: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR

# Serial Number: 0 (0x0)

# Subject: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR

# Not Valid Before: Tue Jul 07 10:37:12 2015

# Not Valid After : Sat Jun 30 10:37:12 2040

# Fingerprint (SHA-256):

44:B5:45:AA:8A:25:E6:5A:73:CA:15:DC:27:FC:36:D2:4C:1C:B9:95:3A:06:65:39:B1:15:82:DC:48:7B:48:33

# Fingerprint (SHA1): 9F:F1:71:8D:92:D5:9A:F3:7D:74:97:B4:BC:6F:84:68:0B:BA:B6:66

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Hellenic Academic and Research Institutions ECC RootCA 2015"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\237\361\161\215\222\325\232\363\175\164\227\264\274\157\204\150
\013\272\266\146
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\201\345\264\027\353\302\365\341\113\015\101\173\111\222\376\357
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\252\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
```

```
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\104\060\102\006\003\125\004\003
\023\073\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\105\103
\103\040\122\157\157\164\103\101\040\062\060\061\065
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\001\000
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "ISRG Root X1"

#

# Issuer: CN=ISRG Root X1,O=Internet Security Research Group,C=US

# Serial Number:00:82:10:cf:b0:d2:40:e3:59:44:63:e0:bb:63:82:8b:00

# Subject: CN=ISRG Root X1,O=Internet Security Research Group,C=US

# Not Valid Before: Thu Jun 04 11:04:38 2015

# Not Valid After : Mon Jun 04 11:04:38 2035

# Fingerprint (SHA-256):

96:BC:EC:06:26:49:76:F3:74:60:77:9A:CF:28:C5:A7:CF:E8:A3:C0:AA:E1:1A:8F:FC:EE:05:C0:BD:DF:08:C6

# Fingerprint (SHA1): CA:BD:2A:79:A1:07:6A:31:F2:1D:25:36:35:CB:03:9D:43:29:A5:E8

CKA\_CLASS CK\_OBJECT\_CLASS

CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ISRG Root X1"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
```



\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130  
\061  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\021\000\202\020\317\260\322\100\343\131\104\143\340\273\143  
\202\213\000  
END  
CKA\_VALUE  
MULTILINE\_OCTAL  
\060\202\005\153\060\202\003\123\240\003\002\001\002\002\021\000  
\202\020\317\260\322\100\343\131\104\143\340\273\143\202\213\000  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061\051  
\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156\145  
\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145\141  
\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003\125  
\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130\061  
\060\036\027\015\061\065\060\066\060\064\061\061\060\064\063\070  
\132\027\015\063\065\060\066\060\064\061\061\060\064\063\070\132  
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156  
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145  
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003  
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130  
\061\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002  
\001\000\255\350\044\163\364\024\067\363\233\236\053\127\050\034  
\207\276\334\267\337\070\220\214\156\074\346\127\240\170\367\165  
\302\242\376\365\152\156\366\000\117\050\333\336\150\206\154\104  
\223\266\261\143\375\024\022\153\277\037\322\352\061\233\041\176  
\321\063\074\272\110\365\335\171\337\263\270\377\022\361\041\232  
\113\301\212\206\161\151\112\146\146\154\217\176\074\160\277\255  
\051\042\006\363\344\300\346\200\256\342\113\217\267\231\176\224  
\003\237\323\107\227\174\231\110\043\123\350\070\256\117\012\157  
\203\056\321\111\127\214\200\164\266\332\057\320\070\215\173\003  
\160\041\033\165\362\060\074\372\217\256\335\332\143\253\353\026  
\117\302\216\021\113\176\317\013\350\377\265\167\056\364\262\173  
\112\340\114\022\045\014\160\215\003\051\240\341\123\044\354\023  
\331\356\031\277\020\263\112\214\077\211\243\141\121\336\254\207  
\007\224\364\143\161\354\056\342\157\133\230\201\341\211\134\064  
\171\154\166\357\073\220\142\171\346\333\244\232\057\046\305\320  
\020\341\016\336\331\020\216\026\373\267\367\250\367\307\345\002  
\007\230\217\066\010\225\347\342\067\226\015\066\165\236\373\016  
\162\261\035\233\274\003\371\111\005\330\201\335\005\264\052\326  
\101\351\254\001\166\225\012\017\330\337\325\275\022\037\065\057  
\050\027\154\322\230\301\250\011\144\167\156\107\067\272\316\254  
\131\136\150\235\177\162\326\211\305\006\101\051\076\131\076\335  
\046\365\044\311\021\247\132\243\114\100\037\106\241\231\265\247

\072\121\156\206\073\236\175\162\247\022\005\170\131\355\076\121  
\170\025\013\003\217\215\320\057\005\262\076\173\112\034\113\163  
\005\022\374\306\352\340\120\023\174\103\223\164\263\312\164\347  
\216\037\001\010\320\060\324\133\161\066\264\007\272\301\060\060  
\134\110\267\202\073\230\246\175\140\212\242\243\051\202\314\272  
\275\203\004\033\242\203\003\101\241\326\005\361\033\302\266\360  
\250\174\206\073\106\250\110\052\210\334\166\232\166\277\037\152  
\245\075\031\217\353\070\363\144\336\310\053\015\012\050\377\367  
\333\342\025\102\324\042\320\047\135\341\171\376\030\347\160\210  
\255\116\346\331\213\072\306\335\047\121\156\377\274\144\365\063  
\103\117\002\003\001\000\001\243\102\060\100\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003  
\125\035\016\004\026\004\024\171\264\131\346\173\266\345\344\001  
\163\200\010\210\310\032\130\366\351\233\156\060\015\006\011\052  
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\125  
\037\130\251\274\262\250\120\320\014\261\330\032\151\040\047\051  
\010\254\141\165\134\212\156\370\202\345\151\057\325\366\126\113  
\271\270\163\020\131\323\041\227\176\347\114\161\373\262\322\140  
\255\071\250\013\352\027\041\126\205\361\120\016\131\353\316\340  
\131\351\272\311\025\357\206\235\217\204\200\366\344\351\221\220  
\334\027\233\142\033\105\360\146\225\322\174\157\302\352\073\357  
\037\317\313\326\256\047\361\251\260\310\256\375\175\176\232\372  
\042\004\353\377\331\177\352\221\053\042\261\027\016\217\362\212  
\064\133\130\330\374\001\311\124\271\270\046\314\212\210\063\211  
\114\055\204\074\202\337\356\226\127\005\272\054\273\367\304\267  
\307\116\073\202\276\061\310\042\163\163\222\321\302\200\244\071  
\071\020\063\043\202\114\074\237\206\262\125\230\035\276\051\206  
\214\042\233\236\342\153\073\127\072\202\160\115\334\011\307\211  
\313\012\007\115\154\350\135\216\311\357\316\253\307\273\265\053  
\116\105\326\112\320\046\314\345\162\312\010\152\245\225\343\025  
\241\367\244\355\311\054\137\245\373\377\254\050\002\056\276\327  
\173\273\343\161\173\220\026\323\007\136\106\123\174\067\007\102  
\214\323\304\226\234\325\231\265\052\340\225\032\200\110\256\114  
\071\007\316\314\107\244\122\225\053\272\270\373\255\322\063\123  
\175\345\035\115\155\325\241\261\307\102\157\346\100\047\065\134  
\243\050\267\007\215\347\215\063\220\347\043\237\373\120\234\171  
\154\106\325\264\025\263\226\156\176\233\014\226\072\270\122\055  
\077\326\133\341\373\010\302\204\376\044\250\243\211\332\254\152  
\341\030\052\261\250\103\141\133\323\037\334\073\215\166\362\055  
\350\215\165\337\027\063\154\075\123\373\173\313\101\137\377\334  
\242\320\141\070\341\226\270\254\135\213\067\327\165\325\063\300  
\231\021\256\235\101\301\162\165\204\276\002\101\102\137\147\044  
\110\224\321\233\047\276\007\077\271\270\117\201\164\121\341\172  
\267\355\235\043\342\276\340\325\050\004\023\074\061\003\236\335  
\172\154\217\306\007\030\306\177\336\107\216\077\050\236\004\006  
\317\245\124\064\167\275\354\211\233\351\027\103\337\133\333\137  
\376\216\036\127\242\315\100\235\176\142\042\332\336\030\047

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "ISRG Root X1"
Issuer: CN=ISRG Root X1,O=Internet Security Research Group,C=US
Serial Number:00:82:10:cf:b0:d2:40:e3:59:44:63:e0:bb:63:82:8b:00
#
Subject: CN=ISRG Root X1,O=Internet Security Research Group,C=US
Not Valid Before: Thu Jun 04 11:04:38 2015
Not Valid After : Mon Jun 04 11:04:38 2035
Fingerprint (SHA-256):
96:BC:EC:06:26:49:76:F3:74:60:77:9A:CF:28:C5:A7:CF:E8:A3:C0:AA:E1:1A:8F:FC:EE:05:C0:BD:DF:08:C6
Fingerprint (SHA1): CA:BD:2A:79:A1:07:6A:31:F2:1D:25:36:35:CB:03:9D:43:29:A5:E8
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ISRG Root X1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\312\275\052\171\241\007\152\061\362\035\045\066\065\313\003\235
\103\051\245\350
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\014\322\371\340\332\027\163\351\355\206\115\245\343\160\347\116
END
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\202\020\317\260\322\100\343\131\104\143\340\273\143
\202\213\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "AC RAIZ FNMT-RCM"

```

```
#
Issuer: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES
Serial Number:5d:93:8d:30:67:36:c8:06:1d:1a:c7:54:84:69:07
Subject: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES
Not Valid Before: Wed Oct 29 15:59:56 2008
Not Valid After : Tue Jan 01 00:00:00 2030
Fingerprint (SHA-256):
EB:C5:57:0C:29:01:8C:4D:67:B1:AA:12:7B:AF:12:F7:03:B4:61:1E:BC:17:B7:DA:B5:57:38:94:17:9B:93:FA
Fingerprint (SHA1): EC:50:35:07:B2:15:C4:95:62:19:E2:A8:9A:5B:42:99:2C:4C:2C:20
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ FNMT-RCM"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\031\060\027\006\003\125\004\013\014\020\101\103\040
\122\101\111\132\040\106\116\115\124\055\122\103\115
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\031\060\027\006\003\125\004\013\014\020\101\103\040
\122\101\111\132\040\106\116\115\124\055\122\103\115
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\135\223\215\060\147\066\310\006\035\032\307\124\204\151
\007
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\203\060\202\003\153\240\003\002\001\002\002\017\135
\223\215\060\147\066\310\006\035\032\307\124\204\151\007\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\060\073\061
\013\060\011\006\003\125\004\006\023\002\105\123\061\021\060\017
\006\003\125\004\012\014\010\106\116\115\124\055\122\103\115\061
\031\060\027\006\003\125\004\013\014\020\101\103\040\122\101\111
\132\040\106\116\115\124\055\122\103\115\060\036\027\015\060\070
\061\060\062\071\061\065\065\071\065\066\132\027\015\063\060\060
\061\060\061\060\060\060\060\060\132\060\073\061\013\060\011
\006\003\125\004\006\023\002\105\123\061\021\060\017\006\003\125
\004\012\014\010\106\116\115\124\055\122\103\115\061\031\060\027
\006\003\125\004\013\014\020\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
```

\202\002\012\002\202\002\001\000\272\161\200\172\114\206\156\177  
\310\023\155\300\306\175\034\000\227\217\054\014\043\273\020\232  
\100\251\032\267\207\210\370\233\126\152\373\346\173\216\213\222  
\216\247\045\135\131\021\333\066\056\267\121\027\037\251\010\037  
\004\027\044\130\252\067\112\030\337\345\071\324\127\375\327\301  
\054\221\001\221\342\042\324\003\300\130\374\167\107\354\217\076  
\164\103\272\254\064\215\115\070\166\147\216\260\310\157\060\063  
\130\161\134\264\365\153\156\324\001\120\270\023\176\154\112\243  
\111\321\040\031\356\274\300\051\030\145\247\336\376\357\335\012  
\220\041\347\032\147\222\102\020\230\137\117\060\274\076\034\105  
\264\020\327\150\100\024\300\100\372\347\167\027\172\346\013\217  
\145\133\074\331\232\122\333\265\275\236\106\317\075\353\221\005  
\002\300\226\262\166\114\115\020\226\073\222\372\234\177\017\231  
\337\276\043\065\105\036\002\134\376\265\250\233\231\045\332\136  
\363\042\303\071\365\344\052\056\323\306\037\304\154\252\305\034  
\152\001\005\112\057\322\305\301\250\064\046\135\146\245\322\002  
\041\371\030\267\006\365\116\231\157\250\253\114\121\350\317\120  
\030\305\167\310\071\011\054\111\222\062\231\250\273\027\027\171  
\260\132\305\346\243\304\131\145\107\065\203\136\251\350\065\013  
\231\273\344\315\040\306\233\112\006\071\265\150\374\042\272\356  
\125\214\053\116\352\363\261\343\374\266\231\232\325\102\372\161  
\115\010\317\207\036\152\161\175\371\323\264\351\245\161\201\173  
\302\116\107\226\245\366\166\205\243\050\217\351\200\156\201\123  
\245\155\137\270\110\371\302\371\066\246\056\111\377\270\226\302  
\214\007\263\233\210\130\374\353\033\034\336\055\160\342\227\222  
\060\241\211\343\274\125\250\047\326\113\355\220\255\213\372\143  
\045\131\055\250\065\335\312\227\063\274\345\315\307\235\321\354  
\357\136\016\112\220\006\046\143\255\271\331\065\055\007\272\166  
\145\054\254\127\217\175\364\007\224\327\201\002\226\135\243\007  
\111\325\172\320\127\371\033\347\123\106\165\252\260\171\102\313  
\150\161\010\351\140\275\071\151\316\364\257\303\126\100\307\255  
\122\242\011\344\157\206\107\212\037\353\050\047\135\203\040\257  
\004\311\154\126\232\213\106\365\002\003\001\000\001\243\201\203  
\060\201\200\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\367  
\175\305\375\304\350\232\033\167\144\247\365\035\240\314\277\207  
\140\232\155\060\076\006\003\125\035\040\004\067\060\065\060\063  
\006\004\125\035\040\000\060\053\060\051\006\010\053\006\001\005  
\005\007\002\001\026\035\150\164\164\160\072\057\057\167\167\167  
\056\143\145\162\164\056\146\156\155\164\056\145\163\057\144\160  
\143\163\057\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\002\001\000\007\220\112\337\363\043\116\360\303  
\234\121\145\233\234\042\242\212\014\205\363\163\051\153\115\376  
\001\342\251\014\143\001\277\004\147\245\235\230\137\375\001\023  
\372\354\232\142\351\206\376\266\142\322\156\114\224\373\300\165  
\105\174\145\014\370\262\067\317\254\017\317\215\157\371\031\367  
\217\354\036\362\160\236\360\312\270\357\267\377\166\067\166\133

\366\156\210\363\257\142\062\042\223\015\072\152\216\024\146\014  
\055\123\164\127\145\036\325\262\335\043\201\073\245\146\043\047  
\147\011\217\341\167\252\103\315\145\121\010\355\121\130\376\346  
\071\371\313\107\204\244\025\361\166\273\244\356\244\073\304\137  
\357\262\063\226\021\030\267\311\145\276\030\341\243\244\334\372  
\030\371\323\274\023\233\071\172\064\272\323\101\373\372\062\212  
\052\267\053\206\013\151\203\070\276\315\212\056\013\160\255\215  
\046\222\356\036\365\001\053\012\331\326\227\233\156\340\250\031  
\034\072\041\213\014\036\100\255\003\347\335\146\176\365\271\040  
\015\003\350\226\371\202\105\324\071\340\240\000\135\327\230\346  
\175\236\147\163\303\232\052\367\253\213\241\072\024\357\064\274  
\122\016\211\230\232\004\100\204\035\176\105\151\223\127\316\353  
\316\370\120\174\117\034\156\004\103\233\371\326\073\043\030\351  
\352\216\321\115\106\215\361\073\344\152\312\272\373\043\267\233  
\372\231\001\051\132\130\132\055\343\371\324\155\016\046\255\301  
\156\064\274\062\370\014\005\372\145\243\333\073\067\203\042\351  
\326\334\162\063\375\135\362\040\275\166\074\043\332\050\367\371  
\033\353\131\144\325\334\137\162\176\040\374\315\211\265\220\147  
\115\142\172\077\116\255\035\303\071\376\172\364\050\026\337\101  
\366\110\200\005\327\017\121\171\254\020\253\324\354\003\146\346  
\152\260\272\061\222\102\100\152\276\072\323\162\341\152\067\125  
\274\254\035\225\267\151\141\362\103\221\164\346\240\323\012\044  
\106\241\010\257\326\332\105\031\226\324\123\035\133\204\171\360  
\300\367\107\357\213\217\305\006\256\235\114\142\235\377\106\004  
\370\323\311\266\020\045\100\165\376\026\252\311\112\140\206\057  
\272\357\060\167\344\124\342\270\204\231\130\200\252\023\213\121  
\072\117\110\366\213\266\263

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "AC RAIZ FNMT-RCM"

# Issuer: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES

# Serial Number:5d:93:8d:30:67:36:c8:06:1d:1a:c7:54:84:69:07

# Subject: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES

# Not Valid Before: Wed Oct 29 15:59:56 2008

#

Not Valid After : Tue Jan 01 00:00:00 2030

# Fingerprint (SHA-256):

EB:C5:57:0C:29:01:8C:4D:67:B1:AA:12:7B:AF:12:F7:03:B4:61:1E:BC:17:B7:DA:B5:57:38:94:17:9B:93:FA

# Fingerprint (SHA1): EC:50:35:07:B2:15:C4:95:62:19:E2:A8:9A:5B:42:99:2C:4C:2C:20

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "AC RAIZ FNMT-RCM"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\354\120\065\007\262\025\304\225\142\031\342\250\232\133\102\231
\054\114\054\040
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\342\011\004\264\323\275\321\240\024\375\032\322\107\304\127\035
END
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\031\060\027\006\003\125\004\013\014\020\101\103\040
\122\101\111\132\040\106\116\115\124\055\122\103\115
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\135\223\215\060\147\066\310\006\035\032\307\124\204\151
\007
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Amazon Root CA 1"
#
Issuer: CN=Amazon Root CA 1,O=Amazon,C=US
Serial Number:06:6c:9f:cf:99:bf:8c:0a:39:e2:f0:78:8a:43:e6:96:36:5b:ca
Subject: CN=Amazon Root CA 1,O=Amazon,C=US
Not Valid Before: Tue May 26 00:00:00 2015
Not Valid After : Sun Jan 17 00:00:00 2038
Fingerprint (SHA-256):
8E:CD:E6:88:4F:3D:87:B1:12:5B:A3:1A:C3:FC:B1:3D:70:16:DE:7F:57:CC:90:4F:E1:CB:97:C6:AE:98:19:6E
Fingerprint (SHA1): 8D:A7:F9:65:EC:5E:FC:37:91:0F:1C:6E:59:FD:C1:CC:6A:6E:DE:16
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\061
END
CKA_ID

```

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156  
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157  
\156\040\122\157\157\164\040\103\101\040\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\023\006\154\237\317\231\277\214\012\071\342\360\170\212\103  
\346\226\066\133\312

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\101\060\202\002\051\240\003\002\001\002\002\023\006  
\154\237\317\231\277\214\012\071\342\360\170\212\103\346\226\066  
\133\312\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157  
\156\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172  
\157\156\040\122\157\157\164\040\103\101\040\061\060\036\027\015  
\061\065\060\065\062\066\060\060\060\060\060\132\027\015\063  
\070\060\061\061\067\060\060\060\060\060\132\060\071\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\017\060\015\006  
\003\125\004\012\023\006\101\155\141\172\157\156\061\031\060\027  
\006\003\125\004\003\023\020\101\155\141\172\157\156\040\122\157  
\157\164\040\103\101\040\061\060\202\001\042\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060  
\202\001\012\002\202\001\001\000\262\170\200\161\312\170\325\343  
\161\257\107\200\120\164\175\156\330\327\210\166\364\231\150\367  
\130\041\140\371\164\204\001\057\254\002\055\206\323\240\103\172  
\116\262\244\320\066\272\001\276\215\333\110\310\007\027\066\114  
\364\356\210\043\307\076\353\067\365\265\031\370\111\150\260\336  
\327\271\166\070\035\141\236\244\376\202\066\245\345\112\126\344  
\105\341\371\375\264\026\372\164\332\234\233\065\071\057\372\260  
\040\120\006\154\172\320\200\262\246\371\257\354\107\031\217\120  
\070\007\334\242\207\071\130\370\272\325\251\371\110\147\060\226  
\356\224\170\136\157\211\243\121\300\060\206\146\241\105\146\272  
\124\353\243\303\221\371\110\334\377\321\350\060\055\175\055\164  
\160\065\327\210\044\367\236\304\131\156\273\163\207\027\362\062  
\106\050\270\103\372\267\035\252\312\264\362\237\044\016\055\113  
\367\161\134\136\151\377\352\225\002\313\070\212\256\120\070\157  
\333\373\055\142\033\305\307\036\124\341\167\340\147\310\017\234  
\207\043\326\077\100\040\177\040\200\304\200\114\076\073\044\046  
\216\004\256\154\232\310\252\015\002\003\001\000\001\243\102\060  
\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\206\060\035\006\003\125\035\016\004\026\004\024\204\030\314  
\205\064\354\274\014\224\224\056\010\131\234\307\262\020\116\012  
\010\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000



```
\003\202\001\001\000\230\362\067\132\101\220\241\032\305\166\121
\050\040\066\043\016\256\346\050\273\252\370\224\256\110\244\060
\177\033\374\044\215\113\264\310\241\227\366\266\361\172\160\310
\123\223\314\010\050\343\230\045\317\043\244\371\336\041\323\174
\205\011\255\116\232\165\072\302\013\152\211\170\166\104\107\030
\145\154\215\101\216\073\177\232\313\364\265\247\120\327\005\054
\067\350\003\113\255\351\141\240\002\156\365\362\360\305\262\355
\133\267\334\372\224\134\167\236\023\245\177\122\255\225\362\370
\223\073\336\213\134\133\312\132\122\133\140\257\024\367\113\357
\243\373\237\100\225\155\061\124\374\102\323\307\106\037\043\255
\331\017\110\160\232\331\165\170\161\321\162\103\064\165\156\127
\131\302\002\134\046\140\051\317\043\031\026\216\210\103\245\324
\344\313\010\373\043\021\103\350\103\051\162\142\241\251\135\136
\010\324\220\256\270\330\316\024\302\320\125\362\206\366\304\223
\103\167\146\141\300\271\350\101\327\227\170\140\003\156\112\162
\256\245\321\175\272\020\236\206\154\033\212\271\131\063\370\353
\304\220\276\361\271
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Amazon Root CA 1"

# Issuer: CN=Amazon Root CA 1,O=Amazon,C=US

# Serial Number:06:6c:9f:cf:99:bf:8c:0a:39:e2:f0:78:8a:43:e6:96:36:5b:ca

# Subject: CN=Amazon Root CA 1,O=Amazon,C=US

# Not Valid Before: Tue May 26 00:00:00 2015

# Not Valid After : Sun Jan 17 00:00:00 2038

# Fingerprint (SHA-256):

8E:CD:E6:88:4F:3D:87:B1:12:5B:A3:1A:C3:FC:B1:3D:70:16:DE:7F:57:CC:90:4F:E1:CB:97:C6:AE:98:19:6E

# Fingerprint (SHA1): 8D:A7:F9:65:EC:5E:FC:37:91:0F:1C:6E:59:FD:C1:CC:6A:6E:DE:16

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Amazon Root CA 1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\215\247\371\145\354\136\374\067\221\017\034\156\131\375\301\314
\152\156\336\026
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\103\306\277\256\354\376\255\057\030\306\210\150\060\374\310\346
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
```

```

\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\317\231\277\214\012\071\342\360\170\212\103
\346\226\066\133\312
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Amazon Root CA 2"
#
Issuer: CN=Amazon Root CA 2,O=Amazon,C=US
Serial Number:06:6c:9f:d2:96:35:86:9f:0a:0f:e5:86:78:f8:5b:26:bb:8a:37
Subject: CN=Amazon Root CA 2,O=Amazon,C=US
Not Valid Before: Tue May 26 00:00:00 2015
Not Valid After : Sat May 26 00:00:00 2040
Fingerprint
(SHA-256):
1B:A5:B2:AA:8C:65:40:1A:82:96:01:18:F8:0B:EC:4F:62:30:4D:83:CE:C4:71:3A:19:C3:9C:01:1E:A4:6D:B4
Fingerprint (SHA1): 5A:8C:EF:45:D7:A6:98:59:76:7A:8C:8B:44:96:B5:78:CF:47:4B:1A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\322\226\065\206\237\012\017\345\206\170\370
\133\046\273\212\067
END
CKA_VALUE

```

MULTILINE\_OCTAL

\060\202\005\101\060\202\003\051\240\003\002\001\002\002\023\006  
\154\237\322\226\065\206\237\012\017\345\206\170\370\133\046\273  
\212\067\060\015\006\011\052\206\110\206\367\015\001\001\014\005  
\000\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157  
\156\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172  
\157\156\040\122\157\157\164\040\103\101\040\062\060\036\027\015  
\061\065\060\065\062\066\060\060\060\060\060\060\132\027\015\064  
\060\060\065\062\066\060\060\060\060\060\132\060\071\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\017\060\015\006  
\003\125\004\012\023\006\101\155\141\172\157\156\061\031\060\027  
\006\003\125\004\003\023\020\101\155\141\172\157\156\040\122\157  
\157\164\040\103\101\040\062\060\202\002\042\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060  
\202\002\012\002\202\002\001\000\255\226\237\055\234\112\114\112  
\201\171\121\231\354\212\313\153\140\121\023\274\115\155\006\374  
\260\010\215\335\031\020\152\307\046\014\065\330\300\157\040\204  
\351\224\261\233\205\003\303\133\333\112\350\310\370\220\166\331  
\133\117\343\114\350\006\066\115\314\232\254\075\014\220\053\222  
\324\006\031\140\254\067\104\171\205\201\202\255\132\067\340\015  
\314\235\246\114\122\166\352\103\235\267\004\321\120\366\125\340  
\325\322\246\111\205\351\067\351\312\176\256\134\225\115\110\232  
\077\256\040\132\155\210\225\331\064\270\122\032\103\220\260\277  
\154\005\271\266\170\267\352\320\344\072\074\022\123\142\377\112  
\362\173\276\065\005\251\022\064\343\363\144\164\142\054\075\000  
\111\132\050\376\062\104\273\207\335\145\047\002\161\073\332\112  
\367\037\332\315\367\041\125\220\117\017\354\256\202\341\237\153  
\331\105\323\273\360\137\207\355\074\054\071\206\332\077\336\354  
\162\125\353\171\243\255\333\335\174\260\272\034\316\374\336\117  
\065\166\317\017\370\170\037\152\066\121\106\047\141\133\351\236  
\317\360\242\125\175\174\045\212\157\057\264\305\317\204\056\053  
\375\015\121\020\154\373\137\033\274\033\176\305\256\073\230\001  
\061\222\377\013\127\364\232\262\271\127\351\253\357\015\166\321  
\360\356\364\316\206\247\340\156\351\264\151\241\337\151\366\063  
\306\151\056\227\023\236\245\207\260\127\020\201\067\311\123\263  
\273\177\366\222\321\234\320\030\364\222\156\332\203\117\246\143  
\231\114\245\373\136\357\041\144\172\040\137\154\144\205\025\313  
\067\351\142\014\013\052\026\334\001\056\062\332\076\113\365\236  
\072\366\027\100\224\357\236\221\010\206\372\276\143\250\132\063  
\354\313\164\103\225\371\154\151\122\066\307\051\157\374\125\003  
\134\037\373\237\275\107\353\347\111\107\225\013\116\211\042\011  
\111\340\365\141\036\361\277\056\212\162\156\200\131\377\127\072  
\371\165\062\243\116\137\354\355\050\142\331\115\163\362\314\201  
\027\140\355\315\353\334\333\247\312\305\176\002\275\362\124\010  
\124\375\264\055\011\054\027\124\112\230\321\124\341\121\147\010  
\322\355\156\176\157\077\322\055\201\131\051\146\313\220\071\225  
\021\036\164\047\376\335\353\257\002\003\001\000\001\243\102\060

\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\206\060\035\006\003\125\035\016\004\026\004\024\260\014\360  
\114\060\364\005\130\002\110\375\063\345\122\257\113\204\343\146  
\122\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000  
\003\202\002\001\000\252\250\200\217\016\170\243\340\242\324\315  
\346\365\230\172\073\352\000\003\260\227\016\223\274\132\250\366  
\054\214\162\207\251\261\374\177\163\375\143\161\170\245\207\131  
\317\060\341\015\020\262\023\132\155\202\365\152\346\200\237\240  
\005\013\150\344\107\153\307\152\337\266\375\167\062\162\345\030  
\372\011\364\240\223\054\135\322\214\165\205\166\145\220\014\003  
\171\267\061\043\143\255\170\203\011\206\150\204\312\377\371\317  
\046\232\222\171\347\315\113\305\347\141\247\027\313\363\251\022  
\223\223\153\247\350\057\123\222\304\140\130\260\314\002\121\030  
\133\205\215\142\131\143\266\255\264\336\232\373\046\367\000\047  
\300\135\125\067\164\231\311\120\177\343\131\056\104\343\054\045  
\356\354\114\062\167\264\237\032\351\113\135\040\305\332\375\034  
\207\026\306\103\350\324\273\046\232\105\160\136\251\013\067\123  
\342\106\173\047\375\340\106\362\211\267\314\102\266\313\050\046  
\156\331\245\311\072\310\101\023\140\367\120\214\025\256\262\155  
\032\025\032\127\170\346\222\052\331\145\220\202\077\154\002\257  
\256\022\072\047\226\066\004\327\035\242\200\143\251\233\361\345  
\272\264\174\024\260\116\311\261\037\164\137\070\366\121\352\233  
\372\054\242\021\324\251\055\047\032\105\261\257\262\116\161\015  
\300\130\106\326\151\006\313\123\313\263\376\153\101\315\101\176  
\175\114\017\174\162\171\172\131\315\136\112\016\254\233\251\230  
\163\171\174\264\364\314\271\270\007\014\262\164\134\270\307\157  
\210\241\220\247\364\252\371\277\147\072\364\032\025\142\036\267  
\237\276\075\261\051\257\147\241\022\362\130\020\031\123\003\060  
\033\270\032\211\366\234\275\227\003\216\243\011\363\035\213\041  
\361\264\337\344\034\321\237\145\002\006\352\134\326\023\263\204  
\357\242\245\134\214\167\051\247\150\300\153\256\100\322\250\264  
\352\315\360\215\113\070\234\031\232\033\050\124\270\211\220\357  
\312\165\201\076\036\362\144\044\307\030\257\116\377\107\236\007  
\366\065\145\244\323\012\126\377\365\027\144\154\357\250\042\045  
\111\223\266\337\000\027\332\130\176\135\356\305\033\260\321\321  
\137\041\020\307\371\363\272\002\012\047\007\305\361\326\307\323  
\340\373\011\140\154

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Amazon Root CA 2"

# Issuer: CN=Amazon Root CA 2,O=Amazon,C=US

# Serial Number:06:6c:9f:d2:96:35:86:9f:0a:0f:e5:86:78:f8:5b:26:bb:8a:37

# Subject: CN=Amazon Root CA 2,O=Amazon,C=US

```

Not Valid Before: Tue May 26 00:00:00 2015
Not Valid After :
 Sat May 26 00:00:00 2040
Fingerprint (SHA-256):
1B:A5:B2:AA:8C:65:40:1A:82:96:01:18:F8:0B:EC:4F:62:30:4D:83:CE:C4:71:3A:19:C3:9C:01:1E:A4:6D:B4
Fingerprint (SHA1): 5A:8C:EF:45:D7:A6:98:59:76:7A:8C:8B:44:96:B5:78:CF:47:4B:1A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\132\214\357\105\327\246\230\131\166\172\214\213\104\226\265\170
\317\107\113\032
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\310\345\215\316\250\102\342\172\300\052\134\174\236\046\277\146
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\322\226\065\206\237\012\017\345\206\170\370
\133\046\273\212\067
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Amazon Root CA 3"
#
Issuer: CN=Amazon Root CA 3,O=Amazon,C=US
Serial Number:06:6c:9f:d5:74:97:36:66:3f:3b:0b:9a:d9:e8:9e:76:03:f2:4a
Subject: CN=Amazon Root CA 3,O=Amazon,C=US
Not Valid Before: Tue May 26 00:00:00 2015
Not Valid After : Sat May 26 00:00:00 2040
Fingerprint (SHA-256):
18:CE:6C:FE:7B:F1:4E:60:B2:E3:47:B8:DF:E8:68:CB:31:D0:2E:BB:3A:DA:27:15:69:F5:03:43:B4:6D:B3:A4
Fingerprint (SHA1): 0D:44:DD:8C:3C:8C:1A:1A:58:75:64:81:E9:0F:2E:2A:FF:B3:D2:6E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\325\164\227\066\146\077\073\013\232\331\350
\236\166\003\362\112
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\266\060\202\001\133\240\003\002\001\002\002\023\006
\154\237\325\164\227\066\146\077\073\013\232\331\350\236\166\003
\362\112\060\012\006\010\052\206\110\316\075\004\003\002\060\071
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\017\060
\015\006\003\125\004\012\023\006\101\155\141\172\157\156\061\031
\060\027\006\003\125\004\003\023\020\101\155\141\172\157\156\040
\122\157\157\164\040\103\101\040\063\060\036\027\015\061\065\060
\065\062\066\060\060\060\060\060\132\027\015\064\060\060\065
\062\066\060\060\060\060\060\060\132\060\071\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\017\060\015\006\003\125\004
\012\023\006\101\155\141\172\157\156\061\031\060\027\006\003\125
\004\003\023\020\101\155\141\172\157\156\040\122\157\157\164\040
\103\101\040\063\060\131\060\023\006\007\052\206\110\316\075\002
\001\006\010\052\206\110\316\075\003\001\007\003\102\000\004\051
\227\247\306\101\177\300\015\233\350\001\033\126\306\362\122\245
\272\055\262\022\350\322\056\327\372\311\305\330\252\155\037\163
\201\073\073\230\153\071\174\063\245\305\116\206\216\200\027\150
\142\105\127\175\104\130\035\263\067\345\147\010\353\146\336\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\035\006\003\125\035\016\004\026\004\024\253
\266\333\327\006\236\067\254\060\206\007\221\160\307\234\304\031
\261\170\300\060\012\006\010\052\206\110\316\075\004\003\002\003
\111\000\060\106\002\041\000\340\205\222\243\027\267\215\371\053
\006\245\223\254\032\230\150\141\162\372\341\241\320\373\034\170
\140\246\103\231\305\270\304\002\041\000\234\002\357\361\224\234
```

```
\263\226\371\353\306\052\370\266\054\376\072\220\024\026\327\214
\143\044\110\034\337\060\175\325\150\073
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "Amazon Root CA 3"
Issuer: CN=Amazon Root CA 3,O=Amazon,C=US
Serial Number:06:6c:9f:d5:74:97:36:66:3f:3b:0b:9a:d9:e8:9e:76:03:f2:4a
Subject: CN=Amazon Root CA 3,O=Amazon,C=US
Not Valid Before: Tue May 26 00:00:00 2015
Not Valid After : Sat May 26 00:00:00 2040
Fingerprint (SHA-256):
18:CE:6C:FE:7B:F1:4E:60:B2:E3:47:B8:DF:E8:68:CB:31:D0:2E:BB:3A:DA:27:15:69:F5:03:43:B4:6D:B3:A4
Fingerprint
(SHA1): 0D:44:DD:8C:3C:8C:1A:1A:58:75:64:81:E9:0F:2E:2A:FF:B3:D2:6E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\015\104\335\214\074\214\032\032\130\165\144\201\351\017\056\052
\377\263\322\156
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\240\324\357\013\367\265\330\111\225\052\354\365\304\374\201\207
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\325\164\227\066\146\077\073\013\232\331\350
\236\166\003\362\112
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Amazon Root CA 4"
```

```
#
Issuer: CN=Amazon Root CA 4,O=Amazon,C=US
Serial Number:06:6c:9f:d7:c1:bb:10:4c:29:43:e5:71:7b:7b:2c:c8:1a:c1:0e
Subject: CN=Amazon Root CA 4,O=Amazon,C=US
Not Valid Before: Tue May 26 00:00:00 2015
Not Valid After : Sat May 26 00:00:00 2040
Fingerprint (SHA-256):
E3:5D:28:41:9E:D0:20:25:CF:A6:90:38:CD:62:39:62:45:8D:A5:C6:95:FB:DE:A3:C2:2B:0B:FB:25:89:70:92
Fingerprint (SHA1): F6:10:84:07:D6:F8:BB:67:98:0C:C2:E2:44:C2:EB:AE:1C:EF:63:BE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\064
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\327\301\273\020\114\051\103\345\161\173\173
\054\310\032\301\016
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\362\060\202\001\170\240\003\002\001\002\002\023\006
\154\237\327\301\273\020\114\051\103\345\161\173\173\054\310\032
\301\016\060\012\006\010\052\206\110\316\075\004\003\003\060\071
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\017\060
\015\006\003\125\004\012\023\006\101\155\141\172\157\156\061\031
\060\027\006\003\125\004\003\023\020\101\155\141\172\157\156\040
\122\157\157\164\040\103\101\040\064\060\036\027\015\061\065\060
\065\062\066\060\060\060\060\060\132\027\015\064\060\060\065
\062\066\060\060\060\060\060\060\132\060\071\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\017\060\015\006\003\125\004
\012\023\006\101\155\141\172\157\156\061\031\060\027\006\003\125
\004\003\023\020\101\155\141\172\157\156\040\122\157\157\164\040
\103\101\040\064\060\166\060\020\006\007\052\206\110\316\075\002
\001\006\005\053\201\004\000\042\003\142\000\004\322\253\212\067
```



```
\117\243\123\015\376\301\212\173\113\250\173\106\113\143\260\142
\366\055\033\333\010\161\041\322\000\350\143\275\232\047\373\360
\071\156\135\352\075\245\311\201\252\243\133\040\230\105\135\026
\333\375\350\020\155\343\234\340\343\275\137\204\142\363\160\144
\063\240\313\044\057\160\272\210\241\052\240\165\370\201\256\142
\006\304\201\333\071\156\051\260\036\372\056\134\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\206\060\035\006\003\125\035\016\004\026\004\024\323\354\307\072
\145\156\314\341\332\166\232\126\373\234\363\206\155\127\345\201
\060\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060
\145\002\060\072\213\041\361\275\176\021\255\320\357\130\226\057
\326\353\235\176\220\215\053\317\146\125\303\054\343\050\251\160
\012\107\016\360\067\131\022\377\055\231\224\050\116\052\117\065
\115\063\132\002\061\000\352\165\000\116\073\304\072\224\022\221
\311\130\106\235\041\023\162\247\210\234\212\344\114\112\333\226
\324\254\213\153\153\111\022\123\063\255\327\344\276\044\374\265
\012\166\324\245\274\020
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Amazon Root CA 4"

# Issuer: CN=Amazon Root CA 4,O=Amazon,C=US

# Serial Number:06:6c:9f:d7:c1:bb:10:4c:29:43:e5:71:7b:7b:2c:c8:1a:c1:0e

# Subject: CN=Amazon Root CA 4,O=Amazon,C=US

# Not Valid Before: Tue May 26 00:00:00 2015

# Not Valid After : Sat May 26 00:00:00 2040

# Fingerprint (SHA-256):

E3:5D:28:41:9E:D0:20:25:CF:A6:90:38:CD:62:39:62:45:8D:A5:C6:95:FB:DE:A3:C2:2B:0B:FB:25:89:70:92

#

Fingerprint (SHA1): F6:10:84:07:D6:F8:BB:67:98:0C:C2:E2:44:C2:EB:AE:1C:EF:63:BE

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Amazon Root CA 4"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\366\020\204\007\326\370\273\147\230\014\302\342\104\302\353\256
\034\357\143\276
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\211\274\047\325\353\027\215\006\152\151\325\375\211\107\264\315
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
```

```

\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\327\301\273\020\114\051\103\345\161\173\173
\054\310\032\301\016
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "D-TRUST Root CA 3 2013"
#
Issuer: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE
Serial Number: 1039788 (0xfddac)
Subject: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE
Not Valid Before: Fri Sep 20 08:25:51 2013
Not Valid After : Wed Sep 20 08:25:51 2028
Fingerprint (SHA-256):
A1:A8:6D:04:12:1E:B8:7F:02:7C:66:F5:33:03:C2:8E:57:39:F9:43:FC:84:B3:8A:D6:AF:00:90:35:DD:94:57
Fingerprint (SHA1): 6C:7C:CC:E7:D4:AE:51:5F:99:08:CD:3F:F6:E8:C3:78:DF:6F:EF:97
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root CA 3 2013"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003\014
\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103\101
\040\063\040\062\060\061\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003\014
\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103\101
\040\063\040\062\060\061\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL

```

\002\003\017\335\254

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\016\060\202\002\366\240\003\002\001\002\002\003\017  
\335\254\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105  
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165  
\163\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003  
\014\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103  
\101\040\063\040\062\060\061\063\060\036\027\015\061\063\060\071  
\062\060\060\070\062\065\065\061\132\027\015\062\070\060\071\062  
\060\060\070\062\065\065\061\132\060\105\061\013\060\011\006\003  
\125\004\006\023\002\104\105\061\025\060\023\006\003\125\004\012  
\014\014\104\055\124\162\165\163\164\040\107\155\142\110\061\037  
\060\035\006\003\125\004\003\014\026\104\055\124\122\125\123\124  
\040\122\157\157\164\040\103\101\040\063\040\062\060\061\063\060  
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001  
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000  
\304\173\102\222\202\037\354\355\124\230\216\022\300\312\011\337  
\223\156\072\223\134\033\344\020\167\236\116\151\210\154\366\341  
\151\362\366\233\242\141\261\275\007\040\164\230\145\361\214\046  
\010\315\250\065\312\200\066\321\143\155\350\104\172\202\303\154  
\136\336\273\350\066\322\304\150\066\214\237\062\275\204\042\340  
\334\302\356\020\106\071\155\257\223\071\256\207\346\303\274\011  
\311\054\153\147\133\331\233\166\165\114\013\340\273\305\327\274  
\076\171\362\137\276\321\220\127\371\256\366\146\137\061\277\323  
\155\217\247\272\112\363\043\145\273\267\357\243\045\327\012\352  
\130\266\357\210\372\372\171\262\122\130\325\360\254\214\241\121  
\164\051\225\252\121\073\220\062\003\237\034\162\164\220\336\075  
\355\141\322\345\343\375\144\107\345\271\267\112\251\367\037\256  
\226\206\004\254\057\343\244\201\167\267\132\026\377\330\017\077  
\366\267\170\314\244\257\372\133\074\022\133\250\122\211\162\357  
\210\363\325\104\201\206\225\043\237\173\335\274\331\064\357\174  
\224\074\252\300\101\302\343\235\120\032\300\344\031\042\374\263  
\002\003\001\000\001\243\202\001\005\060\202\001\001\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035  
\006\003\125\035\016\004\026\004\024\077\220\310\175\307\025\157  
\363\044\217\251\303\057\113\242\017\041\262\057\347\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\201\276  
\006\003\125\035\037\004\201\266\060\201\263\060\164\240\162\240  
\160\206\156\154\144\141\160\072\057\057\144\151\162\145\143\164  
\157\162\171\056\144\055\164\162\165\163\164\056\156\145\164\057  
\103\116\075\104\055\124\122\125\123\124\045\062\060\122\157\157  
\164\045\062\060\103\101\045\062\060\063\045\062\060\062\060\061  
\063\054\117\075\104\055\124\162\165\163\164\045\062\060\107\155  
\142\110\054\103\075\104\105\077\143\145\162\164\151\146\151\143  
\141\164\145\162\145\166\157\143\141\164\151\157\156\154\151\163  
\164\060\073\240\071\240\067\206\065\150\164\164\160\072\057\057

```
\143\162\154\056\144\055\164\162\165\163\164\056\156\145\164\057
\143\162\154\057\144\055\164\162\165\163\164\137\162\157\157\164
\137\143\141\137\063\137\062\060\061\063\056\143\162\154\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\016\131\016\130\344\164\110\043\104\317\064\041\265\234
\024\032\255\232\113\267\263\210\155\134\251\027\160\360\052\237
\215\173\371\173\205\372\307\071\350\020\010\260\065\053\137\317
\002\322\323\234\310\013\036\356\005\124\256\067\223\004\011\175
\154\217\302\164\274\370\034\224\276\061\001\100\055\363\044\040
\267\204\125\054\134\310\365\164\112\020\031\213\243\307\355\065
\326\011\110\323\016\300\272\071\250\260\106\002\260\333\306\210
\131\302\276\374\173\261\053\317\176\142\207\125\226\314\001\157
\233\147\041\225\065\213\370\020\374\161\033\267\113\067\151\246
\073\326\354\213\356\301\260\363\045\311\217\222\175\241\352\303
\312\104\277\046\245\164\222\234\343\164\353\235\164\331\313\115
\207\330\374\264\151\154\213\240\103\007\140\170\227\351\331\223
\174\302\106\274\233\067\122\243\355\212\074\023\251\173\123\113
\111\232\021\005\054\013\156\126\254\037\056\202\154\340\151\147
\265\016\155\055\331\344\300\025\361\077\372\030\162\341\025\155
\047\133\055\060\050\053\237\110\232\144\053\231\357\362\165\111
\137\134
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

#

Trust for "D-TRUST Root CA 3 2013"

# Issuer: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE

# Serial Number: 1039788 (0xfddac)

# Subject: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE

# Not Valid Before: Fri Sep 20 08:25:51 2013

# Not Valid After : Wed Sep 20 08:25:51 2028

# Fingerprint (SHA-256):

A1:A8:6D:04:12:1E:B8:7F:02:7C:66:F5:33:03:C2:8E:57:39:F9:43:FC:84:B3:8A:D6:AF:00:90:35:DD:94:57

# Fingerprint (SHA1): 6C:7C:CC:E7:D4:AE:51:5F:99:08:CD:3F:F6:E8:C3:78:DF:6F:EF:97

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "D-TRUST Root CA 3 2013"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\154\174\314\347\324\256\121\137\231\010\315\077\366\350\303\170
\337\157\357\227
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\267\042\146\230\176\326\003\340\301\161\346\165\315\126\105\277
```

```
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003\014
\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103\101
\040\063\040\062\060\061\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\017\335\254
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"
#
Issuer: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu
SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
Serial Number: 1 (0x1)
Subject: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu
SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
Not Valid Before: Mon Nov 25 08:25:55 2013
Not Valid After : Sun
Oct 25 08:25:55 2043
Fingerprint (SHA-256):
46:ED:C3:68:90:46:D5:3A:45:3F:B3:10:4A:B8:0D:CA:EC:65:8B:26:60:EA:16:29:DD:7E:86:79:90:64:87:16
Fingerprint (SHA1): 31:43:64:9B:EC:CE:27:EC:ED:3A:3F:0B:8F:0D:E4:E8:91:DD:EE:CA
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145
\040\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003
\125\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154
\151\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157
\152\151\153\040\101\162\141\163\164\151\162\155\141\040\113\165
\162\165\155\165\040\055\040\124\125\102\111\124\101\113\061\055
\060\053\006\003\125\004\013\023\044\113\141\155\165\040\123\145
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153
\145\172\151\040\055\040\113\141\155\165\040\123\115\061\066\060
```

\064\006\003\125\004\003\023\055\124\125\102\111\124\101\113\040  
\113\141\155\165\040\123\115\040\123\123\114\040\113\157\153\040  
\123\145\162\164\151\146\151\153\141\163\151\040\055\040\123\165  
\162\165\155\040\061

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122  
\061\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145  
\040\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003  
\125\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154  
\151\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157  
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CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"

# Issuer: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR

# Serial Number: 1 (0x1)

# Subject: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR

# Not Valid Before: Mon Nov 25 08:25:55 2013

# Not Valid After : Sun Oct 25 08:25:55 2043

# Fingerprint (SHA-256):

46:ED:C3:68:90:46:D5:3A:45:3F:B3:10:4A:B8:0D:CA:EC:65:8B:26:60:EA:16:29:DD:7E:86:79:90:64:87:16

# Fingerprint (SHA1): 31:43:64:9B:EC:CE:27:EC:ED:3A:3F:0B:8F:0D:E4:E8:91:DD:EE:CA

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "TUBITAK Kamu SM SSL Kok Sertifikasi

- Surum 1"

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CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "GDCA TrustAUTH R5 ROOT"

#

# Issuer: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY  
CO.,LTD.",C=CN

# Serial Number:7d:09:97:fe:f0:47:ea:7a

# Subject: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY  
CO.,LTD.",C=CN

# Not Valid Before: Wed Nov 26 05:13:15 2014

# Not Valid After : Mon Dec 31 15:59:59 2040

# Fingerprint (SHA-256):

BF:FF:8F:D0:44:33:48:7D:6A:8A:A6:0C:1A:29:76:7A:9F:C2:BB:B0:5E:42:0F:71:3A:13:B9:92:89:1D:38:93

# Fingerprint (SHA1): 0F:36:38:5B:81:1A:25:C3:9B:31:4E:83:CA:E9:34:66:70:CC:74:B4

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CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GDCA TrustAUTH R5 ROOT"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

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CKA\_ID UTF8 "0"

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CKA\_SERIAL\_NUMBER

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\130\104\231\024\256\252\013\223\151\240\051\045\112\245\313\053  
\335\212\146\007\026\170\025\127\161\033\354\365\107\204\363\236  
\061\067\172\325\177\044\255\344\274\375\375\314\156\203\350\014  
\250\267\101\154\007\335\275\074\206\227\057\322

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "GDCA TrustAUTH R5 ROOT"
Issuer: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
Serial Number:7d:09:97:fe:f0:47:ea:7a
Subject: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
Not Valid Before: Wed Nov 26 05:13:15 2014
Not Valid After : Mon Dec 31 15:59:59 2040
Fingerprint (SHA-256):
BF:FF:8F:D0:44:33:48:7D:6A:8A:A6:0C:1A:29:76:7A:9F:C2:BB:B0:5E:42:0F:71:3A:13:B9:92:89:1D:38:93
Fingerprint (SHA1): 0F:36:38:5B:81:1A:25:C3:9B:31:4E:83:CA:E9:34:66:70:CC:74:B4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GDCA TrustAUTH R5 ROOT"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\017\066\070\133\201\032\045\303\233\061\116\203\312\351\064\146
\160\314\164\264
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\143\314\331\075\064\065\134\157\123\243\342\010\160\110\037\264
END
CKA_ISSUER
MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\062\060\060\006\003\125\004\012\014\051\107\125\101\116\107\040
\104\117\116\107\040\103\105\122\124\111\106\111\103\101\124\105
\040\101\125\124\110\117\122\111\124\131\040\103\117\056\054\114
\124\104\056\061\037\060\035\006\003\125\004\003\014\026\107\104
\103\101\040\124\162\165\163\164\101\125\124\110\040\122\065\040
\122\117\117\124
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\175\011\227\376\360\107\352\172
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

#
Certificate "SSL.com Root Certification Authority RSA"
#
Issuer: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
Serial Number:7b:2c:9b:d3:16:80:32:99
Subject: CN=SSL.com Root Certification
 Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
Not Valid Before: Fri Feb 12 17:39:39 2016
Not Valid After : Tue Feb 12 17:39:39 2041
Fingerprint (SHA-256):
85:66:6A:56:2E:E0:BE:5C:E9:25:C1:D8:89:0A:6F:76:A8:7E:C1:6D:4D:7D:5F:29:EA:74:19:CF:20:12:3B:69
Fingerprint (SHA1): B7:AB:33:08:D1:EA:44:77:BA:14:80:12:5A:6F:BD:A9:36:49:0C:BB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority RSA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\122\123\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\122\123\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\173\054\233\323\026\200\062\231
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\335\060\202\003\305\240\003\002\001\002\002\010\173
\054\233\323\026\200\062\231\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\174\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014\005

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\124\145\170\141\163\061\020\060\016\006\003\125\004\007\014\007  
\110\157\165\163\164\157\156\061\030\060\026\006\003\125\004\012  
\014\017\123\123\114\040\103\157\162\160\157\162\141\164\151\157  
\156\061\061\060\057\006\003\125\004\003\014\050\123\123\114\056  
\143\157\155\040\122\157\157\164\040\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171  
\040\122\123\101\060\036\027\015\061\066\060\062\061\062\061\067  
\063\071\063\071\132\027\015\064\061\060\062\061\062\061\067\063  
\071\063\071\132\060\174\061\013\060\011\006\003\125\004\006\023  
\002\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145  
\170\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157  
\165\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017  
\123\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061  
\061\060\057\006\003\125\004\003\014\050\123\123\114\056\143\157  
\155\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141  
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122  
\123\101\060\202\002\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202  
\002\001\000\371\017\335\243\053\175\313\320\052\376\354\147\205  
\246\347\056\033\272\167\341\343\365\257\244\354\372\112\135\221  
\304\127\107\153\030\167\153\166\362\375\223\344\075\017\302\026  
\236\013\146\303\126\224\236\027\203\205\316\126\357\362\026\375  
\000\142\365\042\011\124\350\145\027\116\101\271\340\117\106\227  
\252\033\310\270\156\142\136\151\261\137\333\052\002\176\374\154  
\312\363\101\330\355\320\350\374\077\141\110\355\260\003\024\035  
\020\016\113\031\340\273\116\354\206\145\377\066\363\136\147\002  
\013\235\206\125\141\375\172\070\355\376\342\031\000\267\157\241  
\120\142\165\164\074\240\372\310\045\222\264\156\172\042\307\370  
\036\241\343\262\335\221\061\253\053\035\004\377\245\112\004\067  
\351\205\244\063\053\375\342\326\125\064\174\031\244\112\150\307  
\262\250\323\267\312\241\223\210\353\301\227\274\214\371\035\331  
\042\204\044\164\307\004\075\152\251\051\223\314\353\270\133\341  
\376\137\045\252\064\130\310\301\043\124\235\033\230\021\303\070  
\234\176\075\206\154\245\017\100\206\174\002\364\134\002\117\050  
\313\256\161\237\017\072\310\063\376\021\045\065\352\374\272\305  
\140\075\331\174\030\325\262\251\323\165\170\003\162\042\312\072  
\303\037\357\054\345\056\251\372\236\054\266\121\106\375\257\003  
\326\352\140\150\352\205\026\066\153\205\351\036\300\263\335\304  
\044\334\200\052\201\101\155\224\076\310\340\311\201\101\000\236  
\136\277\177\305\010\230\242\030\054\102\100\263\371\157\070\047  
\113\116\200\364\075\201\107\340\210\174\352\034\316\265\165\134  
\121\056\034\053\177\032\162\050\347\000\265\321\164\306\327\344  
\237\255\007\223\266\123\065\065\374\067\344\303\366\135\026\276  
\041\163\336\222\012\370\240\143\152\274\226\222\152\076\370\274  
\145\125\233\336\365\015\211\046\004\374\045\032\246\045\151\313  
\302\155\312\174\342\131\137\227\254\353\357\056\310\274\327\033  
\131\074\053\314\362\031\310\223\153\047\143\031\317\374\351\046  
\370\312\161\233\177\223\376\064\147\204\116\231\353\374\263\170

\011\063\160\272\146\246\166\355\033\163\353\032\245\015\304\042  
\023\040\224\126\012\116\054\154\116\261\375\317\234\011\272\242  
\063\355\207\002\003\001\000\001\243\143\060\141\060\035\006\003  
\125\035\016\004\026\004\024\335\004\011\007\242\365\172\175\122  
\123\022\222\225\356\070\200\045\015\246\131\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003  
\125\035\043\004\030\060\026\200\024\335\004\011\007\242\365\172  
\175\122\123\022\222\225\356\070\200\045\015\246\131\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\015\006  
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001  
\000\040\030\021\224\051\373\046\235\034\036\036\160\141\361\225  
\162\223\161\044\255\150\223\130\216\062\257\033\263\160\003\374  
\045\053\164\205\220\075\170\152\364\271\213\245\227\073\265\030  
\221\273\036\247\371\100\133\221\371\125\231\257\036\021\320\134  
\035\247\146\343\261\224\007\014\062\071\246\352\033\260\171\330  
\035\234\160\104\343\212\335\304\371\225\037\212\070\103\077\001  
\205\245\107\247\075\106\262\274\345\042\150\367\173\234\330\054  
\076\012\041\310\055\063\254\277\305\201\231\061\164\301\165\161  
\305\276\261\360\043\105\364\235\153\374\031\143\235\243\274\004  
\306\030\013\045\273\123\211\017\263\200\120\336\105\356\104\177  
\253\224\170\144\230\323\366\050\335\207\330\160\145\164\373\016  
\271\023\353\247\017\141\251\062\226\314\336\273\355\143\114\030  
\273\251\100\367\240\124\156\040\210\161\165\030\352\172\264\064  
\162\340\043\047\167\134\266\220\352\206\045\100\253\357\063\017  
\313\237\202\276\242\040\373\366\265\055\032\346\302\205\261\164  
\017\373\310\145\002\244\122\001\107\335\111\042\301\277\330\353  
\153\254\176\336\354\143\063\025\267\043\010\217\306\017\215\101  
\132\335\216\305\271\217\345\105\077\170\333\272\322\033\100\261  
\376\161\115\077\340\201\242\272\136\264\354\025\340\223\335\010  
\037\176\341\125\231\013\041\336\223\236\012\373\346\243\111\275  
\066\060\376\347\167\262\240\165\227\265\055\201\210\027\145\040  
\367\332\220\000\237\311\122\314\062\312\065\174\365\075\017\330  
\053\327\365\046\154\311\006\064\226\026\352\160\131\032\062\171  
\171\013\266\210\177\017\122\110\075\277\154\330\242\104\056\321  
\116\267\162\130\323\211\023\225\376\104\253\370\327\213\033\156  
\234\274\054\240\133\325\152\000\257\137\067\341\325\372\020\013  
\230\234\206\347\046\217\316\360\354\156\212\127\013\200\343\116  
\262\300\240\143\141\220\272\125\150\067\164\152\266\222\333\237  
\241\206\042\266\145\047\016\354\266\237\102\140\344\147\302\265  
\332\101\013\304\323\213\141\033\274\372\037\221\053\327\104\007  
\136\272\051\254\331\305\351\357\123\110\132\353\200\361\050\130  
\041\315\260\006\125\373\047\077\123\220\160\251\004\036\127\047  
\271

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER

```

CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "SSL.com Root Certification Authority RSA"
Issuer: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
Serial Number:7b:2c:9b:d3:16:80:32:99
Subject: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
Not Valid Before: Fri Feb 12 17:39:39 2016
Not Valid After : Tue Feb 12 17:39:39 2041
Fingerprint (SHA-256):
85:66:6A:56:2E:E0:BE:5C:E9:25:C1:D8:89:0A:6F:76:A8:7E:C1:6D:4D:7D:5F:29:EA:74:19:CF:20:12:3B:69
Fingerprint (SHA1): B7:AB:33:08:D1:EA:44:77:BA:14:80:12:5A:6F:BD:A9:36:49:0C:BB
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority RSA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\267\253\063\010\321\352\104\167\272\024\200\022\132\157\275\251
\066\111\014\273
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\206\151\022\300\160\361\354\254\254\302\325\274\245\133\241\051
END
CKA_ISSUER
MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\122\123\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\173\054\233\323\026\200\062\231
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "SSL.com Root Certification Authority ECC"
#
Issuer: CN=SSL.com Root Certification

```



```
Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
Serial Number:75:e6:df:cb:c1:68:5b:a8
Subject: CN=SSL.com Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
Not Valid Before: Fri Feb 12 18:14:03 2016
Not Valid After : Tue Feb 12 18:14:03 2041
Fingerprint (SHA-256):
34:17:BB:06:CC:60:07:DA:1B:96:1C:92:0B:8A:B4:CE:3F:AD:82:0E:4A:A3:0B:9A:CB:C4:A7:4E:BD:CE:BC:65
Fingerprint (SHA1): C3:19:7C:39:24:E6:54:AF:1B:C4:AB:20:95:7A:E2:C3:0E:13:02:6A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority ECC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\105\103\103
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\105\103\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\165\346\337\313\301\150\133\250
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\215\060\202\002\024\240\003\002\001\002\002\010\165
\346\337\313\301\150\133\250\060\012\006\010\052\206\110\316\075
\004\003\002\060\174\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145\170
\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157\165
\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017\123
\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061\061
\060\057\006\003\125\004\003\014\050\123\123\114\056\143\157\155
```

\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103  
\103\060\036\027\015\061\066\060\062\061\062\061\070\061\064\060  
\063\132\027\015\064\061\060\062\061\062\061\070\061\064\060\063  
\132\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163  
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164  
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114  
\040\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057  
\006\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122  
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\040\105\103\103\060  
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201  
\004\000\042\003\142\000\004\105\156\251\120\304\246\043\066\236  
\137\050\215\027\313\226\042\144\077\334\172\216\035\314\010\263  
\242\161\044\272\216\111\271\004\033\107\226\130\253\055\225\310  
\355\236\010\065\310\047\353\211\214\123\130\353\142\212\376\360  
\133\017\153\061\122\143\101\073\211\315\354\354\266\215\031\323  
\064\007\334\273\306\006\177\302\105\225\354\313\177\250\043\340  
\011\351\201\372\363\107\323\243\143\060\141\060\035\006\003\125  
\035\016\004\026\004\024\202\321\205\163\060\347\065\004\323\216  
\002\222\373\345\244\321\304\041\350\315\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125  
\035\043\004\030\060\026\200\024\202\321\205\163\060\347\065\004  
\323\216\002\222\373\345\244\321\304\041\350\315\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\206\060\012\006\010  
\052\206\110\316\075\004\003\002\003\147\000\060\144\002\060\157  
\347\353\131\021\244\140\317\141\260\226\173\355\005\371\057\023  
\221\334\355\345\374\120\153\021\106\106\263\034\041\000\142\273  
\276\303\347\350\315\007\231\371\015\013\135\162\076\304\252\002  
\060\037\274\272\013\342\060\044\373\174\155\200\125\012\231\076  
\200\015\063\345\146\243\263\243\273\245\325\213\217\011\054\246  
\135\176\342\360\007\010\150\155\322\174\151\156\137\337\345\152  
\145

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "SSL.com Root Certification Authority ECC"

# Issuer: CN=SSL.com Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US

# Serial Number:75:e6:df:cb:c1:68:5b:a8

# Subject: CN=SSL.com Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US

# Not Valid Before: Fri Feb 12 18:14:03 2016

# Not Valid After : Tue Feb 12 18:14:03 2041

# Fingerprint (SHA-256):

```
34:17:BB:06:CC:60:07:DA:1B:96:1C:92:0B:8A:B4:CE:3F:AD:82:0E:4A:A3:0B:9A:CB:C4:A7:4E:BD:CE:BC:65
Fingerprint (SHA1): C3:19:7C:39:24:E6:54:AF:1B:C4:AB:20:95:7A:E2:C3:0E:13:02:6A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority ECC"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\303\031\174\071\044\346\124\257\033\304\253\040\225\172\342\303
\016\023\002\152
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\056\332\344\071\177\234\217\067\321\160\237\046\027\121\072\216
END
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\105\103\103
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\165\346\337\313\301\150\133\250
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "SSL.com EV Root Certification Authority RSA R2"
#
Issuer: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL Corporation,L=Houston,ST=Texas,C=US
Serial Number:56:b6:29:cd:34:bc:78:f6
Subject: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL
Corporation,L=Houston,ST=Texas,C=US
Not Valid Before: Wed May 31 18:14:37 2017
Not Valid After : Fri May 30 18:14:37 2042
Fingerprint
(SHA-256):
2E:7B:F1:6C:C2:24:85:A7:BB:E2:AA:86:96:75:07:61:B0:AE:39:BE:3B:2F:E9:D0:CC:6D:4E:F7:34:91:42:5C
Fingerprint (SHA1): 74:3A:F0:52:9B:D0:32:A0:F4:4A:83:CD:D4:BA:A9:7B:7C:2E:C4:9A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA R2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\067\060\065
\006\003\125\004\003\014\056\123\123\114\056\143\157\155\040\105
\126\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\040\122\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\067\060\065
\006\003\125\004\003\014\056\123\123\114\056\143\157\155\040\105
\126\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\126\266\051\315\064\274\170\366
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\353\060\202\003\323\240\003\002\001\002\002\010\126
\266\051\315\064\274\170\366\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\201\202\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014
\005\124\145\170\141\163\061\020\060\016\006\003\125\004\007\014
\007\110\157\165\163\164\157\156\061\030\060\026\006\003\125\004
\012\014\017\123\123\114\040\103\157\162\160\157\162\141\164\151
\157\156\061\067\060\065\006\003\125\004\003\014\056\123\123\114
\056\143\157\155\040\105\126\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\040\122\123\101\040\122\062\060\036\027\015\061
\067\060\065\063\061\061\070\061\064\063\067\132\027\015\064\062
\060\065\063\060\061\070\061\064\063\067\132\060\201\202\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\016\060\014\006
\003\125\004\010\014\005\124\145\170\141\163\061\020\060\016\006
\003\125\004\007\014\007\110\157\165\163\164\157\156\061\030\060
```

\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160  
\157\162\141\164\151\157\156\061\067\060\065\006\003\125\004\003  
\014\056\123\123\114\056\143\157\155\040\105\126\040\122\157\157  
\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040  
\101\165\164\150\157\162\151\164\171\040\122\123\101\040\122\062  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\217\066\145\100\341\326\115\300\327\264\351\106\332\153\352  
\063\107\315\114\371\175\175\276\275\055\075\360\333\170\341\206  
\245\331\272\011\127\150\355\127\076\240\320\010\101\203\347\050  
\101\044\037\343\162\025\320\001\032\373\136\160\043\262\313\237  
\071\343\317\305\116\306\222\155\046\306\173\273\263\332\047\235  
\012\206\351\201\067\005\376\360\161\161\354\303\034\351\143\242  
\027\024\235\357\033\147\323\205\125\002\002\326\111\311\314\132  
\341\261\367\157\062\237\311\324\073\210\101\250\234\275\313\253  
\333\155\173\011\037\242\114\162\220\332\053\010\374\317\074\124  
\316\147\017\250\317\135\226\031\013\304\343\162\353\255\321\175  
\035\047\357\222\353\020\277\133\353\073\257\317\200\335\301\322  
\226\004\133\172\176\244\251\074\070\166\244\142\216\240\071\136  
\352\167\317\135\000\131\217\146\054\076\007\242\243\005\046\021  
\151\227\352\205\267\017\226\013\113\310\100\341\120\272\056\212  
\313\367\017\232\042\347\177\232\067\023\315\362\115\023\153\041  
\321\300\314\042\362\241\106\366\104\151\234\312\141\065\007\000  
\157\326\141\010\021\352\272\270\366\351\263\140\345\115\271\354  
\237\024\146\311\127\130\333\315\207\151\370\212\206\022\003\107  
\277\146\023\166\254\167\175\064\044\205\203\315\327\252\234\220  
\032\237\041\054\177\170\267\144\270\330\350\246\364\170\263\125  
\313\204\322\062\304\170\256\243\217\141\335\316\010\123\255\354  
\210\374\025\344\232\015\346\237\032\167\316\114\217\270\024\025  
\075\142\234\206\070\006\000\146\022\344\131\166\132\123\300\002  
\230\242\020\053\150\104\173\216\171\316\063\112\166\252\133\201  
\026\033\265\212\330\320\000\173\136\142\264\011\326\206\143\016  
\246\005\225\111\272\050\213\210\223\262\064\034\330\244\125\156  
\267\034\320\336\231\125\073\043\364\042\340\371\051\146\046\354  
\040\120\167\333\112\013\217\276\345\002\140\160\101\136\324\256  
\120\071\042\024\046\313\262\073\163\164\125\107\007\171\201\071  
\250\060\023\104\345\004\212\256\226\023\045\102\017\271\123\304  
\233\374\315\344\034\336\074\372\253\326\006\112\037\147\246\230  
\060\034\335\054\333\334\030\225\127\146\306\377\134\213\126\365  
\167\002\003\001\000\001\243\143\060\141\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125  
\035\043\004\030\060\026\200\024\371\140\273\324\343\325\064\366  
\270\365\006\200\045\247\163\333\106\151\250\236\060\035\006\003  
\125\035\016\004\026\004\024\371\140\273\324\343\325\064\366\270  
\365\006\200\045\247\163\333\106\151\250\236\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052  
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\126  
\263\216\313\012\235\111\216\277\244\304\221\273\146\027\005\121

\230\165\373\345\120\054\172\236\361\024\372\253\323\212\076\377  
\221\051\217\143\213\330\264\251\124\001\015\276\223\206\057\371  
\112\155\307\136\365\127\371\312\125\034\022\276\107\017\066\305  
\337\152\267\333\165\302\107\045\177\271\361\143\370\150\055\125  
\004\321\362\215\260\244\317\274\074\136\037\170\347\245\240\040  
\160\260\004\305\267\367\162\247\336\042\015\275\063\045\106\214  
\144\222\046\343\076\056\143\226\332\233\214\075\370\030\011\327  
\003\314\175\206\202\340\312\004\007\121\120\327\377\222\325\014  
\357\332\206\237\231\327\353\267\257\150\342\071\046\224\272\150  
\267\277\203\323\352\172\147\075\142\147\256\045\345\162\350\342  
\344\354\256\022\366\113\053\074\237\351\260\100\363\070\124\263  
\375\267\150\310\332\306\217\121\074\262\373\221\334\034\347\233  
\235\341\267\015\162\217\342\244\304\251\170\371\353\024\254\306  
\103\005\302\145\071\050\030\002\303\202\262\235\005\276\145\355  
\226\137\145\164\074\373\011\065\056\173\234\023\375\033\017\135  
\307\155\201\072\126\017\314\073\341\257\002\057\042\254\106\312  
\106\074\240\034\114\326\104\264\136\056\134\025\146\011\341\046  
\051\376\306\122\141\272\261\163\377\303\014\234\345\154\152\224  
\077\024\312\100\026\225\204\363\131\251\254\137\114\141\223\155  
\321\073\314\242\225\014\042\246\147\147\104\056\271\331\322\212  
\101\263\146\013\132\373\175\043\245\362\032\260\377\336\233\203  
\224\056\321\077\337\222\267\221\257\005\073\145\307\240\154\261  
\315\142\022\303\220\033\343\045\316\064\274\157\167\166\261\020  
\303\367\005\032\300\326\257\164\142\110\027\167\222\151\220\141  
\034\336\225\200\164\124\217\030\034\303\363\003\320\277\244\103  
\165\206\123\030\172\012\056\011\034\066\237\221\375\202\212\042  
\113\321\016\120\045\335\313\003\014\027\311\203\000\010\116\065  
\115\212\213\355\360\002\224\146\054\104\177\313\225\047\226\027  
\255\011\060\254\266\161\027\156\213\027\366\034\011\324\055\073  
\230\245\161\323\124\023\331\140\363\365\113\146\117\372\361\356  
\040\022\215\264\254\127\261\105\143\241\254\166\251\302\373

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Trust for "SSL.com EV Root Certification Authority RSA R2"

# Issuer: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL Corporation,L=Houston,ST=Texas,C=US

# Serial Number:56:b6:29:cd:34:bc:78:f6

# Subject: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL Corporation,L=Houston,ST=Texas,C=US

# Not Valid Before: Wed May 31 18:14:37 2017

# Not Valid After : Fri May 30 18:14:37 2042

# Fingerprint (SHA-256):

2E:7B:F1:6C:C2:24:85:A7:BB:E2:AA:86:96:75:07:61:B0:AE:39:BE:3B:2F:E9:D0:CC:6D:4E:F7:34:91:42:5C

# Fingerprint (SHA1): 74:3A:F0:52:9B:D0:32:A0:F4:4A:83:CD:D4:BA:A9:7B:7C:2E:C4:9A

```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA R2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\164\072\360\122\233\320\062\240\364\112\203\315\324\272\251\173
\174\056\304\232
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\341\036\061\130\032\256\124\123\002\366\027\152\021\173\115\225
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\067\060\065
\006\003\125\004\003\014\056\123\123\114\056\143\157\155\040\105
\126\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\126\266\051\315\064\274\170\366
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "SSL.com EV Root Certification Authority ECC"
#
Issuer: CN=SSL.com
EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
Serial Number:2c:29:9c:5b:16:ed:05:95
Subject: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
Not Valid Before: Fri Feb 12 18:15:23 2016
Not Valid After : Tue Feb 12 18:15:23 2041
Fingerprint (SHA-256):
22:A2:C1:F7:BD:ED:70:4C:C1:E7:01:B5:F4:08:C3:10:88:0F:E9:56:B5:DE:2A:4A:44:F9:9C:87:3A:25:A7:C8
Fingerprint (SHA1): 4C:DD:51:A3:D1:F5:20:32:14:B0:C6:C5:32:23:03:91:C7:46:42:6D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

```
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority ECC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\054\051\234\133\026\355\005\225
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\224\060\202\002\032\240\003\002\001\002\002\010\054
\051\234\133\026\355\005\225\060\012\006\010\052\206\110\316\075
\004\003\002\060\177\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145\170
\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157\165
\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017\123
\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061\064
\060\062\006\003\125\004\003\014\053\123\123\114\056\143\157\155
\040\105\126\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\105\103\103\060\036\027\015\061\066\060\062\061\062\061\070
\061\065\062\063\132\027\015\064\061\060\062\061\062\061\070\061
\065\062\063\132\060\177\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145
\170\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157
\165\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017
\123\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061
\064\060\062\006\003\125\004\003\014\053\123\123\114\056\143\157
```



\155\040\105\126\040\122\157\157\164\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
\171\040\105\103\103\060\166\060\020\006\007\052\206\110\316\075  
\002\001\006\005\053\201\004\000\042\003\142\000\004\252\022\107  
\220\230\033\373\357\303\100\007\203\040\116\361\060\202\242\006  
\321\362\222\206\141\362\366\041\150\312\000\304\307\352\103\000  
\124\206\334\375\037\337\000\270\101\142\134\334\160\026\062\336  
\037\231\324\314\305\007\310\010\037\141\026\007\121\075\175\134  
\007\123\343\065\070\214\337\315\237\331\056\015\112\266\031\056  
\132\160\132\006\355\276\360\241\260\312\320\011\051\243\143\060  
\141\060\035\006\003\125\035\016\004\026\004\024\133\312\136\345  
\336\322\201\252\315\250\055\144\121\266\331\162\233\227\346\117  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\037\006\003\125\035\043\004\030\060\026\200\024\133\312  
\136\345\336\322\201\252\315\250\055\144\121\266\331\162\233\227  
\346\117\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\206\060\012\006\010\052\206\110\316\075\004\003\002\003\150  
\000\060\145\002\061\000\212\346\100\211\067\353\351\325\023\331  
\312\324\153\044\363\260\075\207\106\130\032\354\261\337\157\373  
\126\272\160\153\307\070\314\350\261\214\117\017\367\361\147\166  
\016\203\320\036\121\217\002\060\075\366\043\050\046\114\306\140  
\207\223\046\233\262\065\036\272\326\367\074\321\034\316\372\045  
\074\246\032\201\025\133\363\022\017\154\356\145\212\311\207\250  
\371\007\340\142\232\214\134\112

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "SSL.com EV Root Certification Authority ECC"

# Issuer: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US

# Serial Number:2c:29:9c:5b:16:ed:05:95

#

Subject: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US

# Not Valid Before: Fri Feb 12 18:15:23 2016

# Not Valid After : Tue Feb 12 18:15:23 2041

# Fingerprint (SHA-256):

22:A2:C1:F7:BD:ED:70:4C:C1:E7:01:B5:F4:08:C3:10:88:0F:E9:56:B5:DE:2A:4A:44:F9:9C:87:3A:25:A7:C8

# Fingerprint (SHA1): 4C:DD:51:A3:D1:F5:20:32:14:B0:C6:C5:32:23:03:91:C7:46:42:6D

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSL.com EV Root Certification Authority ECC"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\114\335\121\243\321\365\040\062\024\260\306\305\062\043\003\221

\307\106\102\155

```

END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\131\123\042\145\203\102\001\124\300\316\102\271\132\174\362\220
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\054\051\234\133\026\355\005\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "GlobalSign Root CA - R6"
#
Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6
Serial Number:45:e6:bb:03:83:33:c3:85:65:48:e6:ff:45:51
Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6
Not Valid Before: Wed Dec 10 00:00:00 2014
Not Valid After : Sun Dec 10
00:00:00 2034
Fingerprint (SHA-256):
2C:AB:EA:FE:37:D0:6C:A2:2A:BA:73:91:C0:03:3D:25:98:29:52:C4:53:64:73:49:76:3A:3A:B5:AD:6C:CF:69
Fingerprint (SHA1): 80:94:64:0E:B5:A7:A1:CA:11:9C:1F:DD:D5:9F:81:02:63:A7:FB:D1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA - R6"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\066\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156

```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157  
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040  
\055\040\122\066\061\023\060\021\006\003\125\004\012\023\012\107  
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125  
\004\003\023\012\107\154\157\142\141\154\123\151\147\156

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\016\105\346\273\003\203\063\303\205\145\110\346\377\105\121

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\203\060\202\003\153\240\003\002\001\002\002\016\105  
\346\273\003\203\063\303\205\145\110\346\377\105\121\060\015\006  
\011\052\206\110\206\367\015\001\001\014\005\000\060\114\061\040  
\060\036\006\003\125\004\013\023\027\107\154\157\142\141\154\123  
\151\147\156\040\122\157\157\164\040\103\101\040\055\040\122\066  
\061\023\060\021\006\003\125\004\012\023\012\107\154\157\142\141  
\154\123\151\147\156\061\023\060\021\006\003\125\004\003\023\012  
\107\154\157\142\141\154\123\151\147\156\060\036\027\015\061\064  
\061\062\061\060\060\060\060\060\060\060\132\027\015\063\064\061  
\062\061\060\060\060\060\060\060\060\132\060\114\061\040\060\036  
\006\003\125\004\013\023\027\107\154\157\142\141\154\123\151\147  
\156\040\122\157\157\164\040\103\101\040\055\040\122\066\061\023  
\060\021\006\003\125\004\012\023\012\107\154\157\142\141\154\123  
\151\147\156\061\023\060\021\006\003\125\004\003\023\012\107\154  
\157\142\141\154\123\151\147\156\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\225\007\350\163\312\146\371  
\354\024\312\173\074\367\015\010\361\264\105\013\054\202\264\110  
\306\353\133\074\256\203\270\101\222\063\024\244\157\177\351\052  
\314\306\260\210\153\305\266\211\321\306\262\377\024\316\121\024  
\041\354\112\335\033\132\306\326\207\356\115\072\025\006\355\144  
\146\013\222\200\312\104\336\163\224\116\363\247\211\177\117\170  
\143\010\310\022\120\155\102\146\057\115\271\171\050\115\122\032  
\212\032\200\267\031\201\016\176\304\212\274\144\114\041\034\103  
\150\327\075\074\212\305\262\146\325\220\232\267\061\006\305\276  
\342\155\062\006\246\036\371\271\353\252\243\270\277\276\202\143  
\120\320\360\030\211\337\344\017\171\365\352\242\037\052\322\160  
\056\173\347\274\223\273\155\123\342\110\174\214\020\007\070\377  
\146\262\167\141\176\340\352\214\074\252\264\244\366\363\225\112  
\022\007\155\375\214\262\211\317\320\240\141\167\310\130\164\260  
\324\043\072\367\135\072\312\242\333\235\011\336\135\104\055\220  
\361\201\315\127\222\372\176\274\120\004\143\064\337\153\223\030  
\276\153\066\262\071\344\254\044\066\267\360\357\266\034\023\127  
\223\266\336\262\370\342\205\267\163\242\270\065\252\105\362\340

\235\066\241\157\124\212\361\162\126\156\056\210\305\121\102\104  
\025\224\356\243\305\070\226\233\116\116\132\013\107\363\006\066  
\111\167\060\274\161\067\345\246\354\041\010\165\374\346\141\026  
\077\167\325\331\221\227\204\012\154\324\002\115\164\300\024\355  
\375\071\373\203\362\136\024\241\004\260\013\351\376\356\217\341  
\156\013\262\010\263\141\146\011\152\261\006\072\145\226\131\300  
\360\065\375\311\332\050\215\032\021\207\160\201\012\250\232\165  
\035\236\072\206\005\000\236\333\200\326\045\371\334\005\236\047  
\131\114\166\071\133\352\371\245\241\330\203\017\321\377\337\060  
\021\371\205\317\063\110\365\312\155\144\024\054\172\130\117\323  
\113\010\111\305\225\144\032\143\016\171\075\365\263\214\312\130  
\255\234\102\105\171\156\016\207\031\134\124\261\145\266\277\214  
\233\334\023\351\015\157\270\056\334\147\156\311\213\021\265\204  
\024\212\000\031\160\203\171\221\227\221\324\032\047\277\067\036  
\062\007\330\024\143\074\050\114\257\002\003\001\000\001\243\143  
\060\141\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003  
\001\001\377\060\035\006\003\125\035\016\004\026\004\024\256\154  
\005\243\223\023\342\242\347\342\327\034\326\307\360\177\310\147  
\123\240\060\037\006\003\125\035\043\004\030\060\026\200\024\256  
\154\005\243\223\023\342\242\347\342\327\034\326\307\360\177\310  
\147\123\240\060\015\006\011\052\206\110\206\367\015\001\001\014  
\005\000\003\202\002\001\000\203\045\355\350\321\375\225\122\315  
\236\300\004\240\221\151\346\134\320\204\336\334\255\242\117\350  
\107\170\326\145\230\251\133\250\074\207\174\002\212\321\156\267  
\026\163\346\137\300\124\230\325\164\276\301\315\342\021\221\255  
\043\030\075\335\341\162\104\226\264\225\136\300\173\216\231\170  
\026\103\023\126\127\263\242\263\073\265\167\334\100\162\254\243  
\353\233\065\076\261\010\041\241\347\304\103\067\171\062\276\265  
\347\234\054\114\274\103\051\231\216\060\323\254\041\340\343\035  
\372\330\007\063\166\124\000\042\052\271\115\040\056\160\150\332  
\345\123\374\203\134\323\235\362\377\104\014\104\146\362\322\343  
\275\106\000\032\155\002\272\045\135\215\241\061\121\335\124\106  
\034\115\333\231\226\357\032\034\004\134\246\025\357\170\340\171  
\376\135\333\076\252\114\125\375\232\025\251\157\341\246\373\337  
\160\060\351\303\356\102\106\355\302\223\005\211\372\175\143\173  
\077\320\161\201\174\000\350\230\256\016\170\064\303\045\373\257  
\012\237\040\153\335\073\023\217\022\214\342\101\032\110\172\163  
\240\167\151\307\266\134\177\202\310\036\376\130\033\050\053\250  
\154\255\136\155\300\005\322\173\267\353\200\376\045\067\376\002  
\233\150\254\102\135\303\356\365\314\334\360\120\165\322\066\151  
\234\346\173\004\337\156\006\151\266\336\012\011\110\131\207\353  
\173\024\140\172\144\252\151\103\357\221\307\114\354\030\335\154  
\357\123\055\214\231\341\136\362\162\076\317\124\310\275\147\354  
\244\017\114\105\377\323\271\060\043\007\114\217\020\277\206\226  
\331\231\132\264\231\127\034\244\314\273\025\211\123\272\054\005  
\017\344\304\236\031\261\030\064\325\114\235\272\355\367\037\257  
\044\225\004\170\250\003\273\356\201\345\332\137\174\213\112\241

```
\220\164\045\247\263\076\113\310\054\126\275\307\310\357\070\342
\134\222\360\171\367\234\204\272\164\055\141\001\040\176\176\321
\362\117\007\131\137\213\055\103\122\353\106\014\224\341\365\146
\107\171\167\325\124\133\037\255\044\067\313\105\132\116\240\104
\110\310\330\260\231\305\025\204\011\366\326\111\111\300\145\270
\346\032\161\156\240\250\361\202\350\105\076\154\326\002\327\012
\147\203\005\132\311\244\020
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GlobalSign Root CA - R6"

# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6

# Serial Number:45:e6:bb:03:83:33:c3:85:65:48:e6:ff:45:51

# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6

# Not Valid Before: Wed Dec 10 00:00:00 2014

# Not Valid After : Sun Dec 10 00:00:00 2034

# Fingerprint (SHA-256):

2C:AB:EA:FE:37:D0:6C:A2:2A:BA:73:91:C0:03:3D:25:98:29:52:C4:53:64:73:49:76:3A:3A:B5:AD:6C:CF:69

# Fingerprint (SHA1): 80:94:64:0E:B5:A7:A1:CA:11:9C:1F:DD:D5:9F:81:02:63:A7:FB:D1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GlobalSign Root CA - R6"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\200\224\144\016\265\247\241\312\021\234\037\335\325\237\201\002
\143\247\373\321
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\117\335\007\344\324\042\144\071\036\014\067\102\352\321\306\256
```

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\066\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\016\105\346\273\003\203\063\303\205\145\110\346\377\105\121
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "OISTE WISeKey Global Root GC CA"

#

# Issuer: CN=OISTE WISeKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH

# Serial Number:21:2a:56:0c:ae:da:0c:ab:40:45:bf:2b:a2:2d:3a:ea

# Subject: CN=OISTE WISeKey Global

Root GC CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH

# Not Valid Before: Tue May 09 09:48:34 2017

# Not Valid After : Fri May 09 09:58:33 2042

# Fingerprint (SHA-256):

85:60:F9:1C:36:24:DA:BA:95:70:B5:FE:A0:DB:E3:6F:F1:1A:83:23:BE:94:86:85:4F:B3:F3:4A:55:71:19:8D

# Fingerprint (SHA1): E0:11:84:5E:34:DE:BE:88:81:B9:9C:F6:16:26:D1:96:1F:C3:B9:31

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "OISTE WISeKey Global Root GC CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061  
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145  
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124  
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144  
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037  
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154  
\157\142\141\154\040\122\157\157\164\040\107\103\040\103\101

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061  
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145  
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124  
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144  
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037  
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154  
\157\142\141\154\040\122\157\157\164\040\107\103\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\041\052\126\014\256\332\014\253\100\105\277\053\242\055  
\072\352

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\151\060\202\001\357\240\003\002\001\002\002\020\041  
\052\126\014\256\332\014\253\100\105\277\053\242\055\072\352\060  
\012\006\010\052\206\110\316\075\004\003\003\060\155\061\013\060

\011\006\003\125\004\006\023\002\103\110\061\020\060\016\006\003  
\125\004\012\023\007\127\111\123\145\113\145\171\061\042\060\040  
\006\003\125\004\013\023\031\117\111\123\124\105\040\106\157\165  
\156\144\141\164\151\157\156\040\105\156\144\157\162\163\145\144  
\061\050\060\046\006\003\125\004\003\023\037\117\111\123\124\105  
\040\127\111\123\145\113\145\171\040\107\154\157\142\141\154\040  
\122\157\157\164\040\107\103\040\103\101\060\036\027\015\061\067  
\060\065\060\071\060\071\064\070\063\064\132\027\015\064\062\060  
\065\060\071\060\071\065\070\063\063\132\060\155\061\013\060\011  
\006\003\125\004\006\023\002\103\110\061\020\060\016\006\003\125  
\004\012\023\007\127\111\123\145\113\145\171\061\042\060\040\006  
\003\125\004\013\023\031\117\111\123\124\105\040\106\157\165\156  
\144\141\164\151\157\156\040\105\156\144\157\162\163\145\144\061  
\050\060\046\006\003\125\004\003\023\037\117\111\123\124\105\040  
\127\111\123\145\113\145\171\040\107\154\157\142\141\154\040\122  
\157\157\164\040\107\103\040\103\101\060\166\060\020\006\007\052  
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000  
\004\114\351\120\300\306\017\162\030\274\330\361\272\263\211\342  
\171\112\243\026\247\153\124\044\333\121\377\352\364\011\044\303  
\013\042\237\313\152\047\202\201\015\322\300\257\061\344\164\202  
\156\312\045\331\214\165\235\361\333\320\232\242\113\041\176\026  
\247\143\220\322\071\324\261\207\170\137\030\226\017\120\033\065  
\067\017\152\306\334\331\023\115\244\216\220\067\346\275\133\061  
\221\243\124\060\122\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004  
\024\110\207\024\254\343\303\236\220\140\072\327\312\211\356\323  
\255\214\264\120\146\060\020\006\011\053\006\001\004\001\202\067  
\025\001\004\003\002\001\000\060\012\006\010\052\206\110\316\075  
\004\003\003\003\150\000\060\145\002\060\046\307\151\133\334\325  
\347\262\347\310\014\214\214\303\335\171\214\033\143\325\311\122  
\224\116\115\202\112\163\036\262\200\204\251\045\300\114\132\155  
\111\051\140\170\023\342\176\110\353\144\002\061\000\333\064\040  
\062\010\377\232\111\002\266\210\336\024\257\135\154\231\161\215  
\032\077\213\327\340\242\066\206\034\007\202\072\166\123\375\302  
\242\355\357\173\260\200\117\130\017\113\123\071\275

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "OISTE WISEKey Global Root GC CA"

# Issuer: CN=OISTE WISEKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WISEKey,C=CH

# Serial Number:21:2a:56:0c:ae:da:0c:ab:40:45:bf:2b:a2:2d:3a:ea

# Subject: CN=OISTE WISEKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WISEKey,C=CH

# Not Valid Before: Tue May 09 09:48:34 2017

# Not Valid After : Fri May 09 09:58:33 2042

```

Fingerprint (SHA-256):
85:60:F9:1C:36:24:DA:BA:95:70:B5:FE:A0:DB:E3:6F:F1:1A:83:23:BE:94:86:85:4F:B3:F3:4A:55:71:19:8D
Fingerprint (SHA1): E0:11:84:5E:34:DE:BE:88:81:B9:9C:F6:16:26:D1:96:1F:C3:B9:31
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GC CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\340\021\204\136\064\336\276\210\201\271\234\366\026\046\321\226
\037\303\271\061
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\251\326\271\055\057\223\144\370\245\151\312\221\351\150\007\043
END
CKA_ISSUER MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\103\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\041\052\126\014\256\332\014\253\100\105\277\053\242\055
\072\352
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "UCA Global G2 Root"
#
Issuer: CN=UCA Global G2 Root,O=UniTrust,C=CN
Serial Number:5d:df:b1:da:5a:a3:ed:5d:be:5a:65:20:65:03:90:ef
Subject: CN=UCA Global G2 Root,O=UniTrust,C=CN
Not Valid Before: Fri Mar 11 00:00:00 2016
Not Valid After : Mon Dec 31 00:00:00 2040
Fingerprint (SHA-256):
9B:EA:11:C9:76:FE:01:47:64:C1:BE:56:A6:F9:14:B5:A5:60:31:7A:BD:99:88:39:33:82:E5:16:1A:A0:49:3C
Fingerprint (SHA1): 28:F9:78:16:19:7A:FF:18:25:18:AA:44:FE:C1:A0:CE:5C:B6:4C:8A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

```



```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Global G2 Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\033\060\031\006\003\125\004\003\014\022\125\103\101
\040\107\154\157\142\141\154\040\107\062\040\122\157\157\164
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\033\060\031\006\003\125\004\003\014\022\125\103\101
\040\107\154\157\142\141\154\040\107\062\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\135\337\261\332\132\243\355\135\276\132\145\040\145\003
\220\357
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\106\060\202\003\056\240\003\002\001\002\002\020\135
\337\261\332\132\243\355\135\276\132\145\040\145\003\220\357\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\075
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\021\060
\017\006\003\125\004\012\014\010\125\156\151\124\162\165\163\164
\061\033\060\031\006\003\125\004\003\014\022\125\103\101\040\107
\154\157\142\141\154\040\107\062\040\122\157\157\164\060\036\027
\015\061\066\060\063\061\061\060\060\060\060\060\060\132\027\015
\064\060\061\062\063\061\060\060\060\060\060\060\132\060\075\061
\013\060\011\006\003\125\004\006\023\002\103\116\061\021\060\017
\006\003\125\004\012\014\010\125\156\151\124\162\165\163\164\061
\033\060\031\006\003\125\004\003\014\022\125\103\101\040\107\154
\157\142\141\154\040\107\062\040\122\157\157\164\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\305\346\053
\157\174\357\046\005\047\243\201\044\332\157\313\001\371\231\232
\251\062\302\042\207\141\101\221\073\313\303\150\033\006\305\114
\251\053\301\147\027\042\035\053\355\371\051\211\223\242\170\275
\222\153\240\243\015\242\176\312\223\263\246\321\214\065\325\165
\371\027\366\317\105\305\345\172\354\167\223\240\217\043\256\016
\032\003\177\276\324\320\355\056\173\253\106\043\133\377\054\346
\124\172\224\300\052\025\360\311\215\260\172\073\044\341\327\150
\342\061\074\006\063\106\266\124\021\246\245\057\042\124\052\130
\015\001\002\361\372\025\121\147\154\300\372\327\266\033\177\321
\126\210\057\032\072\215\073\273\202\021\340\107\000\320\122\207
```

\253\373\206\176\017\044\153\100\235\064\147\274\215\307\055\206  
\157\171\076\216\251\074\027\113\177\260\231\343\260\161\140\334  
\013\365\144\303\316\103\274\155\161\271\322\336\047\133\212\350  
\330\306\256\341\131\175\317\050\055\065\270\225\126\032\361\262  
\130\113\267\022\067\310\174\263\355\113\200\341\215\372\062\043  
\266\157\267\110\225\010\261\104\116\205\214\072\002\124\040\057  
\337\277\127\117\073\072\220\041\327\301\046\065\124\040\354\307  
\077\107\354\357\132\277\113\172\301\255\073\027\120\134\142\330  
\017\113\112\334\053\372\156\274\163\222\315\354\307\120\350\101  
\226\327\251\176\155\330\351\035\217\212\265\271\130\222\272\112  
\222\053\014\126\375\200\353\010\360\136\051\156\033\034\014\257  
\217\223\211\255\333\275\243\236\041\312\211\031\354\337\265\303  
\032\353\026\376\170\066\114\326\156\320\076\027\034\220\027\153  
\046\272\373\172\057\277\021\034\030\016\055\163\003\217\240\345  
\065\240\132\342\114\165\035\161\341\071\070\123\170\100\314\203  
\223\327\012\236\235\133\217\212\344\345\340\110\344\110\262\107  
\315\116\052\165\052\173\362\042\366\311\276\011\221\226\127\172  
\210\210\254\356\160\254\371\334\051\343\014\034\073\022\116\104  
\326\247\116\260\046\310\363\331\032\227\221\150\352\357\215\106  
\006\322\126\105\130\232\074\014\017\203\270\005\045\303\071\317  
\073\244\064\211\267\171\022\057\107\305\347\251\227\151\374\246  
\167\147\265\337\173\361\172\145\025\344\141\126\145\002\003\001  
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\201\304\214\314\365\344\060\377\245\014\010\137\214\025  
\147\041\164\001\337\337\060\015\006\011\052\206\110\206\367\015  
\001\001\013\005\000\003\202\002\001\000\023\145\042\365\216\053  
\255\104\344\313\377\271\150\346\303\200\110\075\004\173\372\043  
\057\172\355\066\332\262\316\155\366\346\236\345\137\130\217\313  
\067\062\241\310\145\266\256\070\075\065\033\076\274\073\266\004  
\320\274\371\111\365\233\367\205\305\066\266\313\274\370\310\071  
\325\344\137\007\275\025\124\227\164\312\312\355\117\272\272\144  
\166\237\201\270\204\105\111\114\215\157\242\353\261\314\321\303  
\224\332\104\302\346\342\352\030\350\242\037\047\005\272\327\345  
\326\251\315\335\357\166\230\215\000\016\315\033\372\003\267\216  
\200\130\016\047\077\122\373\224\242\312\136\145\311\326\204\332  
\271\065\161\363\046\300\117\167\346\201\047\322\167\073\232\024  
\157\171\364\366\320\341\323\224\272\320\127\121\275\047\005\015  
\301\375\310\022\060\356\157\215\021\053\010\235\324\324\277\200  
\105\024\232\210\104\332\060\352\264\247\343\356\357\133\202\325  
\076\326\255\170\222\333\134\074\363\330\255\372\270\153\177\304  
\066\050\266\002\025\212\124\054\234\260\027\163\216\320\067\243  
\024\074\230\225\000\014\051\005\133\236\111\111\261\137\307\343  
\313\317\047\145\216\065\027\267\127\310\060\331\101\133\271\024  
\266\350\302\017\224\061\247\224\230\314\152\353\265\341\047\365  
\020\250\001\350\216\022\142\350\210\314\265\177\106\227\300\233  
\020\146\070\032\066\106\137\042\150\075\337\311\306\023\047\253

```
\123\006\254\242\074\206\006\145\157\261\176\261\051\104\232\243
\272\111\151\050\151\217\327\345\137\255\004\206\144\157\032\240
\014\305\010\142\316\200\243\320\363\354\150\336\276\063\307\027
\133\177\200\304\114\114\261\246\204\212\303\073\270\011\315\024
\201\272\030\343\124\127\066\376\333\057\174\107\241\072\063\310
\371\130\073\104\117\261\312\002\211\004\226\050\150\305\113\270
\046\211\273\326\063\057\120\325\376\232\211\272\030\062\222\124
\306\133\340\235\371\136\345\015\042\233\366\332\342\310\041\262
\142\041\252\206\100\262\056\144\323\137\310\343\176\021\147\105
\037\005\376\343\242\357\263\250\263\363\175\217\370\014\037\042
\037\055\160\264\270\001\064\166\060\000\345\043\170\247\126\327
\120\037\212\373\006\365\302\031\360\320
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "UCA Global G2 Root"

# Issuer: CN=UCA Global G2 Root,O=UniTrust,C=CN

# Serial Number:5d:df:b1:da:5a:a3:ed:5d:be:5a:65:20:65:03:90:ef

# Subject: CN=UCA Global G2 Root,O=UniTrust,C=CN

# Not Valid Before: Fri Mar 11 00:00:00 2016

# Not Valid After : Mon Dec 31 00:00:00 2040

# Fingerprint (SHA-256):

9B:EA:11:C9:76:FE:01:47:64:C1:BE:56:A6:F9:14:B5:A5:60:31:7A:BD:99:88:39:33:82:E5:16:1A:A0:49:3C

# Fingerprint (SHA1): 28:F9:78:16:19:7A:FF:18:25:18:AA:44:FE:C1:A0:CE:5C:B6:4C:8A

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "UCA Global G2 Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\050\371\170\026\031\172\377\030\045\030\252\104\376\301\240\316
\134\266\114\212
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\200\376\360\304\112\360\134\142\062\237\034\272\170\251\120\370
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\075\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\033\060\031\006\003\125\004\003\014\022\125\103\101
\040\107\154\157\142\141\154\040\107\062\040\122\157\157\164
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\020\135\337\261\332\132\243\355\135\276\132\145\040\145\003
```

```

\220\357
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "UCA Extended Validation Root"
#
Issuer: CN=UCA Extended Validation Root,O=UniTrust,C=CN
Serial Number:4f:d2:2b:8f:f5:64:c8:33:9e:4f:34:58:66:23:70:60
Subject: CN=UCA Extended Validation Root,O=UniTrust,C=CN
Not Valid Before:
 Fri Mar 13 00:00:00 2015
Not Valid After : Fri Dec 31 00:00:00 2038
Fingerprint (SHA-256):
D4:3A:F9:B3:54:73:75:5C:96:84:FC:06:D7:D8:CB:70:EE:5C:28:E7:73:FB:29:4E:B4:1E:E7:17:22:92:4D:24
Fingerprint (SHA1): A3:A1:B0:6F:24:61:23:4A:E3:36:A5:C2:37:FC:A6:FF:DD:F0:D7:3A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Extended Validation Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\045\060\043\006\003\125\004\003\014\034\125\103\101
\040\105\170\164\145\156\144\145\144\040\126\141\154\151\144\141
\164\151\157\156\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\045\060\043\006\003\125\004\003\014\034\125\103\101
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\176\062\232\210\225\010\066\122\273\336\166\137\166\111\111\255  
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Trust for "UCA Extended Validation Root"

# Issuer: CN=UCA Extended Validation Root,O=UniTrust,C=CN

# Serial Number:4f:d2:2b:8f:f5:64:c8:33:9e:4f:34:58:66:23:70:60

# Subject: CN=UCA Extended Validation Root,O=UniTrust,C=CN

# Not Valid Before: Fri Mar 13 00:00:00 2015

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Not Valid After : Fri Dec 31 00:00:00 2038
Fingerprint (SHA-256):
D4:3A:F9:B3:54:73:75:5C:96:84:FC:06:D7:D8:CB:70:EE:5C:28:E7:73:FB:29:4E:B4:1E:E7:17:22:92:4D:24
Fingerprint (SHA1): A3:A1:B0:6F:24:61:23:4A:E3:36:A5:C2:37:FC:A6:FF:DD:F0:D7:3A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Extended Validation Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\243\241\260\157\044\141\043\112\343\066\245\302\067\374\246\377
\335\360\327\072
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
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END
CKA_ISSUER MULTILINE_OCTAL
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\163\164\061\045\060\043\006\003\125\004\003\014\034\125\103\101
\040\105\170\164\145\156\144\145\144\040\126\141\154\151\144\141
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END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
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\160\140
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Certigna Root CA"
#
Issuer: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR
Serial Number:00:ca:e9:1b:89:f1:55:03:0d:a3:e6:41:6d:c4:e3:a6:e1
Subject: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR
Not Valid Before: Tue Oct 01 08:32:27 2013
Not Valid After : Sat Oct 01 08:32:27 2033
Fingerprint (SHA-256):
D4:8D:3D:23:EE:DB:50:A4:59:E5:51:97:60:1C:27:77:4B:9D:7B:18:C9:4D:5A:05:95:11:A1:02:50:B9:31:68
#
Fingerprint (SHA1): 2D:0D:52:14:FF:9E:AD:99:24:01:74:20:47:6E:6C:85:27:27:F5:43
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060
\060\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063
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\151\147\156\141\040\122\157\157\164\040\103\101
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\151\147\156\141\040\122\157\157\164\040\103\101
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MULTILINE_OCTAL
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\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157\164
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\200\374\144\103\224\346\343\034\157\276\255\016\052\143\231\053  
\311\176\205\366\161\350\006\003\225\376\336\217\110\034\132\324  
\222\350\053\356\347\061\333\272\004\152\207\230\347\305\137\357  
\175\247\042\367\001\330\115\371\211\320\016\232\005\131\244\236  
\230\331\157\053\312\160\276\144\302\125\243\364\351\257\303\222  
\051\334\210\026\044\231\074\215\046\230\266\133\267\314\316\267  
\067\007\375\046\331\230\205\044\377\131\043\003\232\355\235\235  
\250\344\136\070\316\327\122\015\157\322\077\155\261\005\153\111  
\316\212\221\106\163\364\366\057\360\250\163\167\016\145\254\241  
\215\146\122\151\176\113\150\014\307\036\067\047\203\245\214\307  
\002\344\024\315\111\001\260\163\263\375\306\220\072\157\322\154  
\355\073\356\354\221\276\242\103\135\213\000\112\146\045\104\160  
\336\100\017\370\174\025\367\242\316\074\327\136\023\214\201\027  
\030\027\321\275\361\167\020\072\324\145\071\301\047\254\127\054  
\045\124\377\242\332\117\212\141\071\136\256\075\112\214\275

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Certigna Root CA"

# Issuer: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR

# Serial Number:00:ca:e9:1b:89:f1:55:03:0d:a3:e6:41:6d:c4:e3:a6:e1

# Subject: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR

# Not Valid Before: Tue Oct 01 08:32:27 2013

# Not Valid After : Sat Oct 01 08:32:27 2033

# Fingerprint (SHA-256):

D4:8D:3D:23:EE:DB:50:A4:59:E5:51:97:60:1C:27:77:4B:9D:7B:18:C9:4D:5A:05:95:11:A1:02:50:B9:31:68

# Fingerprint (SHA1): 2D:0D:52:14:FF:9E:AD:99:24:01:74:20:47:6E:6C:85:27:27:F5:43

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\055\015\122\024\377\236\255\231\044\001\164\040\107\156\154\205
\047\047\365\103
END
```

```
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\016\134\060\142\047\353\133\274\327\256\142\272\351\325\337\167
END
```

```
CKA_ISSUER
MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060
\060\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063
\066\061\031\060\027\006\003\125\004\003\014\020\103\145\162\164
\151\147\156\141\040\122\157\157\164\040\103\101
END
```

```
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\312\351\033\211\361\125\003\015\243\346\101\155\304
\343\246\341
END
```

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
Certificate "emSign Root CA - G1"
#
Issuer: CN=emSign Root CA - G1,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
Serial Number:31:f5:e4:62:0c:6c:58:ed:d6:d8
Subject: CN=emSign Root CA - G1,O=eMudhra Technologies
Limited,OU=emSign PKI,C=IN
Not Valid Before: Sun Feb 18 18:30:00 2018
Not Valid After : Wed Feb 18 18:30:00 2043
Fingerprint (SHA-256):
40:F6:AF:03:46:A9:9A:A1:CD:1D:55:5A:4E:9C:CE:62:C7:F9:63:46:03:EE:40:66:15:83:3D:C8:C8:D0:03:67
Fingerprint (SHA1): 8A:C7:AD:8F:73:AC:4E:C1:B5:75:4D:A5:40:F4:FC:CF:7C:B5:8E:8C
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061  
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156  
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145  
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147  
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006  
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157  
\164\040\103\101\040\055\040\107\061

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061  
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156  
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145  
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147  
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006  
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157  
\164\040\103\101\040\055\040\107\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\012\061\365\344\142\014\154\130\355\326\330

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\224\060\202\002\174\240\003\002\001\002\002\012\061  
\365\344\142\014\154\130\355\326\330\060\015\006\011\052\206\110  
\206\367\015\001\001\013\005\000\060\147\061\013\060\011\006\003  
\125\004\006\023\002\111\116\061\023\060\021\006\003\125\004\013  
\023\012\145\155\123\151\147\156\040\120\113\111\061\045\060\043  
\006\003\125\004\012\023\034\145\115\165\144\150\162\141\040\124  
\145\143\150\156\157\154\157\147\151\145\163\040\114\151\155\151  
\164\145\144\061\034\060\032\006\003\125\004\003\023\023\145\155  
\123\151\147\156\040\122\157\157\164\040\103\101\040\055\040\107  
\061\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060  
\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060  
\132\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116  
\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147  
\156\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034  
\145\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157  
\147\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032  
\006\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157  
\157\164\040\103\101\040\055\040\107\061\060\202\001\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001  
\017\000\060\202\001\012\002\202\001\001\000\223\113\273\351\146  
\212\356\235\133\325\064\223\320\033\036\303\347\236\270\144\063  
\177\143\170\150\264\315\056\161\165\327\233\040\306\115\051\274  
\266\150\140\212\367\041\232\126\065\132\363\166\275\330\315\232  
\377\223\126\113\245\131\006\241\223\064\051\335\026\064\165\116  
\362\201\264\307\226\116\255\031\025\122\112\376\074\160\165\160

\315\257\053\253\025\232\063\074\252\263\213\252\315\103\375\365  
\352\160\377\355\317\021\073\224\316\116\062\026\323\043\100\052  
\167\263\257\074\001\054\154\355\231\054\213\331\116\151\230\262  
\367\217\101\260\062\170\141\326\015\137\303\372\242\100\222\035  
\134\027\346\160\076\065\347\242\267\302\142\342\253\244\070\114  
\265\071\065\157\352\003\151\372\072\124\150\205\155\326\362\057  
\103\125\036\221\015\016\330\325\152\244\226\321\023\074\054\170  
\120\350\072\222\322\027\126\345\065\032\100\034\076\215\054\355  
\071\337\102\340\203\101\164\337\243\315\302\206\140\110\150\343  
\151\013\124\000\213\344\166\151\041\015\171\116\064\010\136\024  
\302\314\261\267\255\327\174\160\212\307\205\002\003\001\000\001  
\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024\373  
\357\015\206\236\260\343\335\251\271\361\041\027\177\076\374\360  
\167\053\032\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001  
\013\005\000\003\202\001\001\000\131\377\362\214\365\207\175\161  
\075\243\237\033\133\321\332\370\323\234\153\066\275\233\251\141  
\353\336\026\054\164\075\236\346\165\332\327\272\247\274\102\027  
\347\075\221\353\345\175\335\076\234\361\317\222\254\154\110\314  
\302\042\077\151\073\305\266\025\057\243\065\306\150\052\034\127  
\257\071\357\215\320\065\303\030\014\173\000\126\034\315\213\031  
\164\336\276\017\022\340\320\252\241\077\002\064\261\160\316\235  
\030\326\010\003\011\106\356\140\340\176\266\304\111\004\121\175  
\160\140\274\252\262\377\171\162\172\246\035\075\137\052\370\312  
\342\375\071\267\107\271\353\176\337\004\043\257\372\234\006\007  
\351\373\143\223\200\100\265\306\154\012\061\050\316\014\237\317  
\263\043\065\200\101\215\154\304\067\173\201\057\200\241\100\102  
\205\351\331\070\215\350\241\123\315\001\277\151\350\132\006\362  
\105\013\220\372\256\341\277\235\362\256\127\074\245\256\262\126  
\364\213\145\100\351\375\061\201\054\364\071\011\330\356\153\247  
\264\246\035\025\245\230\367\001\201\330\205\175\363\121\134\161  
\210\336\272\314\037\200\176\112

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "emSign Root CA - G1"

# Issuer: CN=emSign Root CA - G1,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN

# Serial Number:31:f5:e4:62:0c:6c:58:ed:d6:d8

# Subject: CN=emSign Root CA - G1,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN

# Not Valid Before: Sun Feb 18 18:30:00 2018

# Not Valid After : Wed Feb 18 18:30:00 2043

# Fingerprint (SHA-256):

40:F6:AF:03:46:A9:9A:A1:CD:1D:55:5A:4E:9C:CE:62:C7:F9:63:46:03:EE:40:66:15:83:3D:C8:C8:D0:03:67

# Fingerprint (SHA1): 8A:C7:AD:8F:73:AC:4E:C1:B5:75:4D:A5:40:F4:FC:CF:7C:B5:8E:8C

```

CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - G1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\212\307\255\217\163\254\116\301\265\165\115\245\100\364\374\317
\174\265\216\214
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\234\102\204\127\335\313\013\247\056\225\255\266\363\332\274\254
END
CKA_ISSUER MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\012\061\365\344\142\014\154\130\355\326\330
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "emSign ECC Root CA - G3"
#
Issuer: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
Serial Number:3c:f6:07:a9:68:70:0e:da:8b:84
Subject: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
Not Valid Before: Sun Feb 18 18:30:00 2018
Not Valid After : Wed Feb 18 18:30:00 2043
Fingerprint (SHA-256):
86:A1:EC:BA:08:9C:4A:8D:3B:BE:27:34:C6:12:BA:34:1D:81:3E:04:3C:F9:E8:A8:62:CD:5C:57:A3:6B:BE:6B
Fingerprint (SHA1): 30:43:FA:4F:F2:57:DC:A0:C3:80:EE:2E:58:EA:78:B2:3F:E6:BB:C1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign ECC Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

```

CKA\_SUBJECT MULTILINE\_OCTAL

\060\153\061\013\060\011\006\003\125\004\006\023\002\111\116\061  
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156  
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145  
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147  
\151\145\163\040\114\151\155\151\164\145\144\061\040\060\036\006  
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103  
\040\122\157\157\164\040\103\101\040\055\040\107\063

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\153\061\013\060\011\006\003\125\004\006\023\002\111\116\061  
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156  
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145  
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147  
\151\145\163\040\114\151\155\151\164\145\144\061\040\060\036\006  
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103  
\040\122\157\157\164\040\103\101\040\055\040\107\063

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\012\074\366\007\251\150\160\016\332\213\204

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\002\116\060\202\001\323\240\003\002\001\002\002\012\074  
\366\007\251\150\160\016\332\213\204\060\012\006\010\052\206\110  
\316\075\004\003\003\060\153\061\013\060\011\006\003\125\004\006  
\023\002\111\116\061\023\060\021\006\003\125\004\013\023\012\145  
\155\123\151\147\156\040\120\113\111\061\045\060\043\006\003\125  
\004\012\023\034\145\115\165\144\150\162\141\040\124\145\143\150  
\156\157\154\157\147\151\145\163\040\114\151\155\151\164\145\144  
\061\040\060\036\006\003\125\004\003\023\027\145\155\123\151\147  
\156\040\105\103\103\040\122\157\157\164\040\103\101\040\055\040  
\107\063\060\036\027\015\061\070\060\062\061\070\061\070\063\060  
\060\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060  
\060\132\060\153\061\013\060\011\006\003\125\004\006\023\002\111  
\116\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151  
\147\156\040\120\113\111\061\045\060\043\006\003\125\004\012\023  
\034\145\115\165\144\150\162\141\040\124\145\143\150\156\157\154  
\157\147\151\145\163\040\114\151\155\151\164\145\144\061\040\060  
\036\006\003\125\004\003\023\027\145\155\123\151\147\156\040\105  
\103\103\040\122\157\157\164\040\103\101\040\055\040\107\063\060  
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201  
\004\000\042\003\142\000\004\043\245\014\270\055\022\365\050\363  
\261\262\335\342\002\022\200\236\071\137\111\115\237\311\045\064  
\131\164\354\273\006\034\347\300\162\257\350\256\057\341\101\124  
\207\024\250\112\262\350\174\202\346\133\152\265\334\263\165\316

```
\213\006\320\206\043\277\106\325\216\017\077\004\364\327\034\222
\176\366\245\143\302\365\137\216\056\117\241\030\031\002\053\062
\012\202\144\175\026\223\321\243\102\060\100\060\035\006\003\125
\035\016\004\026\004\024\174\135\002\204\023\324\314\212\233\201
\316\027\034\056\051\036\234\110\143\102\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\012\006\010\052
\206\110\316\075\004\003\003\003\151\000\060\146\002\061\000\276
\363\141\317\002\020\035\144\225\007\270\030\156\210\205\005\057
\203\010\027\220\312\037\212\114\350\015\033\172\261\255\325\201
\011\107\357\073\254\010\004\174\134\231\261\355\107\007\322\002
\061\000\235\272\125\374\251\112\350\355\355\346\166\001\102\173
\310\370\140\331\215\121\213\125\073\373\214\173\353\145\011\303
\370\226\315\107\250\202\362\026\125\167\044\176\022\020\225\004
\054\243
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "emSign ECC Root CA - G3"

# Issuer: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN

# Serial Number:3c:f6:07:a9:68:70:0e:da:8b:84

# Subject: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN

# Not Valid Before: Sun Feb 18 18:30:00 2018

# Not Valid After : Wed Feb 18 18:30:00 2043

# Fingerprint (SHA-256):

86:A1:EC:BA:08:9C:4A:8D:3B:BE:27:34:C6:12:BA:34:1D:81:3E:04:3C:F9:E8:A8:62:CD:5C:57:A3:6B:BE:6B

#

Fingerprint (SHA1): 30:43:FA:4F:F2:57:DC:A0:C3:80:EE:2E:58:EA:78:B2:3F:E6:BB:C1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "emSign ECC Root CA - G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\060\103\372\117\362\127\334\240\303\200\356\056\130\352\170\262
\077\346\273\301
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\316\013\162\321\237\210\216\320\120\003\350\343\270\213\147\100
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
```



```
\151\145\163\040\114\151\155\151\164\145\144\061\040\060\036\006
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103
\040\122\157\157\164\040\103\101\040\055\040\107\063
END
```

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\012\074\366\007\251\150\160\016\332\213\204
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "emSign Root CA - C1"

#

# Issuer: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US

# Serial Number:00:ae:cf:00:ba:c4:cf:32:f8:43:b2

# Subject: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US

# Not Valid Before: Sun Feb 18 18:30:00 2018

# Not Valid After : Wed Feb 18 18:30:00 2043

# Fingerprint (SHA-256):

```
12:56:09:AA:30:1D:A0:A2:49:B9:7A:82:39:CB:6A:34:21:6F:44:DC:AC:9F:39:54:B1:42:92:F2:E8:C8:60:8F
```

# Fingerprint (SHA1): E7:2E:F1:DF:FC:B2:09:28:CF:5D:D4:D5:67:37:B1:51:CB:86:4F:01

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "emSign Root CA -  
C1"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\061
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
|002|013|000|256|317|000|272|304|317|062|370|103|262

END

CKA\_VALUE MULTILINE\_OCTAL  
|060|202|003|163|060|202|002|133|240|003|002|001|002|002|013|000  
|256|317|000|272|304|317|062|370|103|262|060|015|006|011|052|206  
|110|206|367|015|001|001|013|005|000|060|126|061|013|060|011|006  
|003|125|004|006|023|002|125|123|061|023|060|021|006|003|125|004  
|013|023|012|145|155|123|151|147|156|040|120|113|111|061|024|060  
|022|006|003|125|004|012|023|013|145|115|165|144|150|162|141|040  
|111|156|143|061|034|060|032|006|003|125|004|003|023|023|145|155  
|123|151|147|156|040|122|157|157|164|040|103|101|040|055|040|103  
|061|060|036|027|015|061|070|060|062|061|070|061|070|063|060|060  
|060|132|027|015|064|063|060|062|061|070|061|070|063|060|060|060  
|132|060|126|061|013|060|011|006|003|125|004|006|023|002|125|123  
|061|023|060|021|006|003|125|004|013|023|012|145|155|123|151|147  
|156|040|120|113|111|061|024|060|022|006|003|125|004|012|023|013  
|145|115|165|144|150|162|141|040|111|156|143|061|034|060|032|006  
|003|125|004|003|023|023|145|155|123|151|147|156|040|122|157|157  
|164|040|103|101|040|055|040|103|061|060|202|001|042|060|015|006  
|011|052|206|110|206|367|015|001|001|001|005|000|003|202|001|017  
|000|060|202|001|012|002|202|001|001|000|317|353|251|271|361|231  
|005|314|330|050|041|112|363|163|064|121|204|126|020|365|240|117  
|054|022|343|372|023|232|047|320|317|371|171|032|164|137|035|171  
|071|374|133|370|160|216|340|222|122|367|344|045|371|124|203|331  
|035|323|310|132|205|077|136|307|266|007|356|076|300|316|232|257  
|254|126|102|052|071|045|160|326|277|265|173|066|255|254|366|163  
|334|315|327|035|212|203|245|373|053|220|025|067|153|034|046|107  
|334|073|051|126|223|152|263|301|152|072|235|075|365|301|227|070  
|130|005|213|034|021|343|344|264|270|135|205|035|203|376|170|137  
|013|105|150|030|110|245|106|163|064|073|376|017|310|166|273|307  
|030|363|005|321|206|363|205|355|347|271|331|062|255|125|210|316  
|246|266|221|260|117|254|176|025|043|226|366|077|360|040|064|026  
|336|012|306|304|004|105|171|177|247|375|276|322|251|245|257|234  
|305|043|052|367|074|041|154|275|257|217|116|305|072|262|363|064  
|022|374|337|200|032|111|244|324|251|225|367|236|211|136|242|211  
|254|224|313|250|150|233|257|212|145|047|315|211|356|335|214|265  
|153|051|160|103|240|151|013|344|271|017|002|003|001|000|001|243  
|102|060|100|060|035|006|003|125|035|016|004|026|004|024|376|241  
|340|160|036|052|003|071|122|132|102|276|134|221|205|172|030|252  
|115|265|060|016|006|003|125|035|017|001|001|377|004|004|003|002  
|001|006|060|017|006|003|125|035|023|001|001|377|004|005|060|003  
|001|001|377|060|015|006|011|052|206|110|206|367|015|001|001|013  
|005|000|003|202|001|001|000|302|112|126|372|025|041|173|050|242  
|351|345|035|373|370|055|304|071|226|101|114|073|047|054|304|154  
|030|025|200|306|254|257|107|131|057|046|013|343|066|260|357|073  
|376|103|227|111|062|231|022|025|133|337|021|051|377|253|123|370  
|273|301|170|017|254|234|123|257|127|275|150|214|075|151|063|360

```
\243\240\043\143\073\144\147\042\104\255\325\161\313\126\052\170
\222\243\117\022\061\066\066\342\336\376\000\304\243\140\017\047
\255\240\260\212\265\066\172\122\241\275\047\364\040\047\142\350
\115\224\044\023\344\012\004\351\074\253\056\310\103\011\112\306
\141\004\345\111\064\176\323\304\310\365\017\300\252\351\272\124
\136\363\143\053\117\117\120\324\376\271\173\231\214\075\300\056
\274\002\053\323\304\100\344\212\007\061\036\233\316\046\231\023
\373\021\352\232\042\014\021\031\307\136\033\201\120\060\310\226
\022\156\347\313\101\177\221\073\242\107\267\124\200\033\334\000
\314\232\220\352\303\303\120\006\142\014\060\300\025\110\247\250
\131\174\341\256\042\242\342\012\172\017\372\142\253\122\114\341
\361\337\312\276\203\015\102
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "emSign Root CA - C1"

# Issuer: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US

# Serial Number:00:ae:cf:00:ba:c4:cf:32:f8:43:b2

# Subject: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US

# Not Valid Before: Sun Feb 18 18:30:00 2018

# Not Valid After : Wed Feb

18 18:30:00 2043

# Fingerprint (SHA-256):

12:56:09:AA:30:1D:A0:A2:49:B9:7A:82:39:CB:6A:34:21:6F:44:DC:AC:9F:39:54:B1:42:92:F2:E8:C8:60:8F

# Fingerprint (SHA1): E7:2E:F1:DF:FC:B2:09:28:CF:5D:D4:D5:67:37:B1:51:CB:86:4F:01

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "emSign Root CA - C1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\347\056\361\337\374\262\011\050\317\135\324\325\147\067\261\121
\313\206\117\001
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\330\343\135\001\041\372\170\132\260\337\272\322\356\052\137\150
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\061
```

END

```

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\000\256\317\000\272\304\317\062\370\103\262
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "emSign ECC Root CA - C3"
#
Issuer: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US
Serial Number:7b:71:b6:82:56:b8:12:7c:9c:a8
Subject: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US
Not Valid Before: Sun Feb 18 18:30:00 2018
Not Valid After : Wed Feb 18 18:30:00 2043
Fingerprint (SHA-256):
BC:4D:80:9B:15:18:9D:78:DB:3E:1D:8C:F4:F9:72:6A:79:5D:A1:64:3C:A5:F1:35:8E:1D:DB:0E:DC:0D:7E:B3
Fingerprint (SHA1): B6:AF:43:C2:9B:81:53:7D:F6:EF:6B:C3:1F:1F:60:15:0C:EE:48:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign ECC
Root CA - C3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006\003
\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103\040
\122\157\157\164\040\103\101\040\055\040\103\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006\003
\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103\040
\122\157\157\164\040\103\101\040\055\040\103\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\012\173\161\266\202\126\270\022\174\234\250
END
CKA_VALUE MULTILINE_OCTAL

```

\060\202\002\053\060\202\001\261\240\003\002\001\002\002\012\173  
\161\266\202\126\270\022\174\234\250\060\012\006\010\052\206\110  
\316\075\004\003\003\060\132\061\013\060\011\006\003\125\004\006  
\023\002\125\123\061\023\060\021\006\003\125\004\013\023\012\145  
\155\123\151\147\156\040\120\113\111\061\024\060\022\006\003\125  
\004\012\023\013\145\115\165\144\150\162\141\040\111\156\143\061  
\040\060\036\006\003\125\004\003\023\027\145\155\123\151\147\156  
\040\105\103\103\040\122\157\157\164\040\103\101\040\055\040\103  
\063\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060  
\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060  
\132\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147  
\156\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013  
\145\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006  
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103  
\040\122\157\157\164\040\103\101\040\055\040\103\063\060\166\060  
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000  
\042\003\142\000\004\375\245\141\256\173\046\020\035\351\267\042  
\060\256\006\364\201\263\261\102\161\225\071\274\323\122\343\257  
\257\371\362\227\065\222\066\106\016\207\225\215\271\071\132\351  
\273\337\320\376\310\007\101\074\273\125\157\203\243\152\373\142  
\260\201\211\002\160\175\110\305\112\343\351\042\124\042\115\223  
\273\102\014\257\167\234\043\246\175\327\141\021\316\145\307\370  
\177\376\365\362\251\243\102\060\100\060\035\006\003\125\035\016  
\004\026\004\024\373\132\110\320\200\040\100\362\250\351\000\007  
\151\031\167\247\346\303\364\317\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\012\006\010\052\206\110  
\316\075\004\003\003\003\150\000\060\145\002\061\000\264\330\057  
\002\211\375\266\114\142\272\103\116\023\204\162\265\256\335\034  
\336\326\265\334\126\217\130\100\132\055\336\040\114\042\203\312  
\223\250\176\356\022\100\307\326\207\117\370\337\205\002\060\034  
\024\144\344\174\226\203\021\234\260\321\132\141\113\246\017\111  
\323\000\374\241\374\344\245\377\177\255\327\060\320\307\167\177  
\276\201\007\125\060\120\040\024\365\127\070\012\250\061\121

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "emSign ECC Root CA - C3"

# Issuer: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US

# Serial Number:7b:71:b6:82:56:b8:12:7c:9c:a8

# Subject: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US

# Not Valid Before: Sun Feb 18 18:30:00 2018

# Not Valid After : Wed Feb 18 18:30:00 2043

# Fingerprint (SHA-256):

```
BC:4D:80:9B:15:18:9D:78:DB:3E:1D:8C:F4:F9:72:6A:79:5D:A1:64:3C:A5:F1:35:8E:1D:DB:0E:DC:0D:7E:B3
Fingerprint (SHA1): B6:AF:43:C2:9B:81:53:7D:F6:EF:6B:C3:1F:60:15:0C:EE:48:66
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign ECC Root CA - C3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\266\257\103\302\233\201\123\175\366\357\153\303\037\037\140\025
\014\356\110\146
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\076\123\263\243\201\356\327\020\370\323\260\035\027\222\365\325
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006\003
\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103\040
\122\157\157\164\040\103\101\040\055\040\103\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\012\173\161\266\202\126\270\022\174\234\250
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
Certificate "Hongkong Post Root CA 3"
#
Issuer: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK
Serial Number:08:16:5f:8a:4c:a5:ec:00:c9:93:40:df:c4:c6:ae:23:b8:1c:5a:a4
Subject: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK
Not Valid Before: Sat Jun 03 02:29:46 2017
Not Valid After : Tue Jun 03 02:29:46 2042
Fingerprint (SHA-256):
5A:2F:C0:3F:0C:83:B0:90:BB:FA:40:60:4B:09:88:44:6C:76:36:18:3D:F9:84:6E:17:10:1A:44:7F:B8:EF:D6
Fingerprint (SHA1): 58:A2:D0:EC:20:52:81:5B:C1:F3:F8:64:02:24:4E:C2:8E:02:4B:02
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hongkong Post Root CA 3"
```

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\157\061\013\060\011\006\003\125\004\006\023\002\110\113\061  
\022\060\020\006\003\125\004\010\023\011\110\157\156\147\040\113  
\157\156\147\061\022\060\020\006\003\125\004\007\023\011\110\157  
\156\147\040\113\157\156\147\061\026\060\024\006\003\125\004\012  
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CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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\157\156\147\061\022\060\020\006\003\125\004\007\023\011\110\157  
\156\147\040\113\157\156\147\061\026\060\024\006\003\125\004\012  
\023\015\110\157\156\147\153\157\156\147\040\120\157\163\164\061  
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\156\147\040\120\157\163\164\040\122\157\157\164\040\103\101\040  
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CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\024\010\026\137\212\114\245\354\000\311\223\100\337\304\306  
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END

CKA\_VALUE MULTILINE\_OCTAL

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\164\061\040\060\036\006\003\125\004\003\023\027\110\157\156\147  
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\110\113\061\022\060\020\006\003\125\004\010\023\011\110\157\156  
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\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060  
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\232\233\364

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Hongkong Post Root CA 3"

# Issuer: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK

# Serial Number:08:16:5f:8a:4c:a5:ec:00:c9:93:40:df:c4:c6:ae:23:b8:1c:5a:a4

# Subject: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK

# Not Valid Before: Sat Jun 03 02:29:46 2017

# Not Valid After : Tue Jun 03 02:29:46 2042

# Fingerprint (SHA-256):

5A:2F:C0:3F:0C:83:B0:90:BB:FA:40:60:4B:09:88:44:6C:76:36:18:3D:F9:84:6E:17:10:1A:44:7F:B8:EF:D6

# Fingerprint (SHA1): 58:A2:D0:EC:20:52:81:5B:C1:F3:F8:64:02:24:4E:C2:8E:02:4B:02

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Hongkong Post Root CA 3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\130\242\320\354\040\122\201\133\301\363\370\144\002\044\116\302

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\216\002\113\002
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END
CKA_ISSUER MULTILINE_OCTAL
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CKA_SERIAL_NUMBER MULTILINE_OCTAL
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\256\043\270\034\132\244
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
CK_FALSE

#
Certificate "Entrust Root Certification Authority - G4"
#
Issuer: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
Serial Number:00:d9:b5:43:7f:af:a9:39:0f:00:00:00:00:55:65:ad:58
Subject: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
Not Valid Before: Wed May 27 11:11:16 2015
Not Valid After : Sun Dec 27 11:41:16 2037
Fingerprint (SHA-256):
DB:35:17:D1:F6:73:2A:2D:5A:B9:7C:53:3E:C7:07:79:EE:32:70:A6:2F:B4:AC:42:38:37:24:60:E6:F0:1E:88
Fingerprint (SHA1): 14:88:4E:86:26:37:B0:26:AF:59:62:5C:40:77:EC:35:29:BA:96:01
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123

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END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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END

CKA\_VALUE MULTILINE\_OCTAL

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\041\041\143\145\122\221\033\261\231\216\171\176\346\353\215\000  
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\243\353\057\113\060\260\213\043\165\162\174\041\074\310\366\361  
\164\324\034\173\243\005\125\356\273\115\073\062\276\232\167\146  
\236\254\151\220\042\007\037\141\072\226\276\345\232\117\314\005  
\074\050\131\323\301\014\124\250\131\141\275\310\162\114\350\334  
\237\207\177\275\234\110\066\136\225\243\016\271\070\044\125\374  
\165\146\353\002\343\010\064\051\112\306\343\053\057\063\240\332  
\243\206\245\022\227\375\200\053\332\024\102\343\222\275\076\362  
\135\136\147\164\056\034\210\107\051\064\137\342\062\250\234\045  
\067\214\272\230\000\227\213\111\226\036\375\045\212\254\334\332

\330\135\164\156\146\260\377\104\337\241\030\306\276\110\057\067  
\224\170\370\225\112\077\177\023\136\135\131\375\164\206\103\143  
\163\111\002\003\001\000\001\243\102\060\100\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003  
\125\035\016\004\026\004\024\237\070\304\126\043\303\071\350\240  
\161\154\350\124\114\344\350\072\261\277\147\060\015\006\011\052  
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\022  
\345\102\246\173\213\017\014\344\106\245\266\140\100\207\214\045  
\176\255\270\150\056\133\306\100\166\074\003\370\311\131\364\363  
\253\142\316\020\215\264\132\144\214\150\300\260\162\103\064\322  
\033\013\366\054\123\322\312\220\113\206\146\374\252\203\042\364  
\213\032\157\046\110\254\166\167\010\277\305\230\134\364\046\211  
\236\173\303\271\144\062\001\177\323\303\335\130\155\354\261\253  
\204\125\164\167\204\004\047\122\153\206\114\316\335\271\145\377  
\326\306\136\237\232\020\231\113\165\152\376\152\351\227\040\344  
\344\166\172\306\320\044\252\220\315\040\220\272\107\144\373\177  
\007\263\123\170\265\012\142\362\163\103\316\101\053\201\152\056  
\205\026\224\123\324\153\137\162\042\253\121\055\102\325\000\234  
\231\277\336\273\224\073\127\375\232\365\206\313\126\073\133\210  
\001\345\174\050\113\003\371\111\203\174\262\177\174\343\355\216  
\241\177\140\123\216\125\235\120\064\022\017\267\227\173\154\207  
\112\104\347\365\155\354\200\067\360\130\031\156\112\150\166\360  
\037\222\344\352\265\222\323\141\121\020\013\255\247\331\137\307  
\137\334\037\243\134\214\241\176\233\267\236\323\126\157\146\136  
\007\226\040\355\013\164\373\146\116\213\021\025\351\201\111\176  
\157\260\324\120\177\042\327\137\145\002\015\246\364\205\036\330  
\256\006\113\112\247\322\061\146\302\370\316\345\010\246\244\002  
\226\104\150\127\304\325\063\317\031\057\024\304\224\034\173\244  
\331\360\237\016\261\200\342\321\236\021\144\251\210\021\072\166  
\202\345\142\302\200\330\244\203\355\223\357\174\057\220\260\062  
\114\226\025\150\110\122\324\231\010\300\044\350\034\343\263\245  
\041\016\222\300\220\037\317\040\137\312\073\070\307\267\155\072  
\363\346\104\270\016\061\153\210\216\160\353\234\027\122\250\101  
\224\056\207\266\347\246\022\305\165\337\133\300\012\156\173\244  
\344\136\206\371\066\224\337\167\303\351\015\300\071\361\171\273  
\106\216\253\103\131\047\267\040\273\043\351\126\100\041\354\061  
\075\145\252\103\362\075\337\160\104\341\272\115\046\020\073\230  
\237\363\310\216\033\070\126\041\152\121\223\323\221\312\106\332  
\211\267\075\123\203\054\010\037\213\217\123\335\377\254\037

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

# Trust for "Entrust Root Certification Authority - G4"

# Issuer: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US

# Serial Number:00:d9:b5:43:7f:af:a9:39:0f:00:00:00:00:55:65:ad:58

```
Subject: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
Not Valid Before: Wed May 27 11:11:16 2015
Not Valid After : Sun Dec 27 11:41:16 2037
Fingerprint (SHA-256):
DB:35:17:D1:F6:73:2A:2D:5A:B9:7C:53:3E:C7:07:79:EE:32:70:A6:2F:B4:AC:42:38:37:24:60:E6:F0:1E:88
#
Fingerprint (SHA1): 14:88:4E:86:26:37:B0:26:AF:59:62:5C:40:77:EC:35:29:BA:96:01
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\024\210\116\206\046\067\260\046\257\131\142\134\100\167\354\065
\051\272\226\001
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\211\123\361\203\043\267\174\216\005\361\214\161\070\116\037\210
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\064
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\331\265\103\177\257\251\071\017\000\000\000\000\125
\145\255\130
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Microsoft ECC Root Certificate Authority 2017"
#
```

```
Issuer: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US
Serial Number:66:f2:3d:af:87:de:8b:b1:4a:ea:0c:57:31:01:c2:ec
Subject: CN=Microsoft ECC Root Certificate Authority
2017,O=Microsoft Corporation,C=US
Not Valid Before: Wed Dec 18 23:06:45 2019
Not Valid After : Fri Jul 18 23:16:04 2042
Fingerprint (SHA-256):
35:8D:F3:9D:76:4A:F9:E1:B7:66:E9:C9:72:DF:35:2E:E1:5C:FA:C2:27:AF:6A:D1:D7:0E:8E:4A:6E:DC:BA:02
Fingerprint (SHA1): 99:9A:64:C3:7F:F4:7D:9F:AB:95:F1:47:69:89:14:60:EE:C4:C3:C5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC Root Certificate Authority 2017"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\105\103\103\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\105\103\103\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\146\362\075\257\207\336\213\261\112\352\014\127\061\001
\302\354
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\131\060\202\001\337\240\003\002\001\002\002\020\146
\362\075\257\207\336\213\261\112\352\014\127\061\001\302\354\060
\012\006\010\052\206\110\316\075\004\003\003\060\145\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\036\060\034\006\003
\125\004\012\023\025\115\151\143\162\157\163\157\146\164\040\103
\157\162\160\157\162\141\164\151\157\156\061\066\060\064\006\003
\125\004\003\023\055\115\151\143\162\157\163\157\146\164\040\105
\103\103\040\122\157\157\164\040\103\145\162\164\151\146\151\143
```

\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060  
\061\067\060\036\027\015\061\071\061\062\061\070\062\063\060\066  
\064\065\132\027\015\064\062\060\067\061\070\062\063\061\066\060  
\064\132\060\145\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\036\060\034\006\003\125\004\012\023\025\115\151\143\162  
\157\163\157\146\164\040\103\157\162\160\157\162\141\164\151\157  
\156\061\066\060\064\006\003\125\004\003\023\055\115\151\143\162  
\157\163\157\146\164\040\105\103\103\040\122\157\157\164\040\103  
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157  
\162\151\164\171\040\062\060\061\067\060\166\060\020\006\007\052  
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000  
\004\324\274\075\002\102\165\101\023\043\315\200\004\206\002\121  
\057\152\250\201\142\013\145\314\366\312\235\036\157\112\146\121  
\242\003\331\235\221\372\266\026\261\214\156\336\174\315\333\171  
\246\057\316\273\316\161\057\345\245\253\050\354\143\004\146\231  
\370\372\362\223\020\005\341\201\050\102\343\306\150\364\346\033  
\204\140\112\211\257\355\171\017\073\316\361\366\104\365\001\170  
\300\243\124\060\122\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004  
\024\310\313\231\162\160\122\014\370\346\276\262\004\127\051\052  
\317\102\020\355\065\060\020\006\011\053\006\001\004\001\202\067  
\025\001\004\003\002\001\000\060\012\006\010\052\206\110\316\075  
\004\003\003\003\150\000\060\145\002\060\130\362\115\352\014\371  
\137\136\356\140\051\313\072\362\333\326\062\204\031\077\174\325  
\057\302\261\314\223\256\120\273\011\062\306\306\355\176\311\066  
\224\022\344\150\205\006\242\033\320\057\002\061\000\231\351\026  
\264\016\372\126\110\324\244\060\026\221\170\333\124\214\145\001  
\212\347\120\146\302\061\267\071\272\270\032\042\007\116\374\153  
\124\026\040\377\053\265\347\114\014\115\246\117\163

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Microsoft ECC Root Certificate Authority 2017"

# Issuer: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US

# Serial Number:66:f2:3d:af:87:de:8b:b1:4a:ea:0c:57:31:01:c2:ec

# Subject: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US

# Not Valid Before: Wed Dec 18 23:06:45 2019

# Not Valid After : Fri Jul 18 23:16:04 2042

# Fingerprint (SHA-256):

35:8D:F3:9D:76:4A:F9:E1:B7:66:E9:C9:72:DF:35:2E:E1:5C:FA:C2:27:AF:6A:D1:D7:0E:8E:4A:6E:DC:BA:02

# Fingerprint (SHA1): 99:9A:64:C3:7F:F4:7D:9F:AB:95:F1:47:69:89:14:60:EE:C4:C3:C5

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE



```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC Root Certificate
 Authority 2017"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\231\232\144\303\177\364\175\237\253\225\361\107\151\211\024\140
\356\304\303\305
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\335\241\003\346\112\223\020\321\277\360\031\102\313\376\355\147
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\105\103\103\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\146\362\075\257\207\336\213\261\112\352\014\127\061\001
\302\354
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
Certificate "Microsoft RSA Root Certificate Authority 2017"
#
Issuer: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
Serial Number: 1e:d3:97:09:5f:d8:b4:b3:47:70:1e:aa:be:7f:45:b3
Subject: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
Not Valid Before: Wed Dec 18 22:51:22 2019
Not Valid After : Fri Jul 18 23:00:23 2042
Fingerprint (SHA-256):
C7:41:F7:0F:4B:2A:8D:88:BF:2E:71:C1:41:22:EF:53:EF:10:EB:A0:CF:A5:E6:4C:FA:20:F4:18:85:30:73:E0
Fingerprint (SHA1): 73:A5:E6:4A:3B:FF:83:16:FF:0E:DC:CC:61:8A:90:6E:4E:AE:4D:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft RSA Root Certificate Authority 2017"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061

```

\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163  
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061  
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163  
\157\146\164\040\122\123\101\040\122\157\157\164\040\103\145\162  
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151  
\164\171\040\062\060\061\067

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163  
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061  
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163  
\157\146\164\040\122\123\101\040\122\157\157\164\040\103\145\162  
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151  
\164\171\040\062\060\061\067

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\036\323\227\011\137\330\264\263\107\160\036\252\276\177  
\105\263

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\250\060\202\003\220\240\003\002\001\002\002\020\036  
\323\227\011\137\330\264\263\107\160\036\252\276\177\105\263\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\145  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\036\060  
\034\006\003\125\004\012\023\025\115\151\143\162\157\163\157\146  
\164\040\103\157\162\160\157\162\141\164\151\157\156\061\066\060  
\064\006\003\125\004\003\023\055\115\151\143\162\157\163\157\146  
\164\040\122\123\101\040\122\157\157\164\040\103\145\162\164\151  
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171  
\040\062\060\061\067\060\036\027\015\061\071\061\062\061\070\062  
\062\065\061\062\062\132\027\015\064\062\060\067\061\070\062\063  
\060\060\062\063\132\060\145\061\013\060\011\006\003\125\004\006  
\023\002\125\123\061\036\060\034\006\003\125\004\012\023\025\115  
\151\143\162\157\163\157\146\164\040\103\157\162\160\157\162\141  
\164\151\157\156\061\066\060\064\006\003\125\004\003\023\055\115  
\151\143\162\157\163\157\146\164\040\122\123\101\040\122\157\157  
\164\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165  
\164\150\157\162\151\164\171\040\062\060\061\067\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\312\133\276  
\224\063\214\051\225\221\026\012\225\275\107\142\301\211\363\231  
\066\337\106\220\311\245\355\170\152\157\107\221\150\370\047\147  
\120\063\035\241\246\373\340\345\103\243\204\002\127\001\135\234  
\110\100\202\123\020\274\277\307\073\150\220\266\202\055\345\364  
\145\320\314\155\031\314\225\371\173\254\112\224\255\016\336\113

\103\035\207\007\222\023\220\200\203\144\065\071\004\374\345\351  
\154\263\266\037\120\224\070\145\120\134\027\106\271\266\205\265  
\034\265\027\350\326\105\235\330\262\046\260\312\304\160\112\256  
\140\244\335\263\331\354\374\073\325\127\162\274\077\310\311\262  
\336\113\153\370\043\154\003\300\005\275\225\307\315\163\073\146  
\200\144\343\032\254\056\371\107\005\362\006\266\233\163\365\170  
\063\133\307\241\373\047\052\241\264\232\221\214\221\323\072\202  
\076\166\100\264\315\122\141\121\160\050\077\305\305\132\362\311  
\214\111\273\024\133\115\310\377\147\115\114\022\226\255\365\376  
\170\250\227\207\327\375\136\040\200\334\241\113\042\373\324\211  
\255\272\316\107\227\107\125\173\217\105\310\147\050\204\225\034  
\150\060\357\357\111\340\065\173\144\347\230\260\224\332\115\205  
\073\076\125\304\050\257\127\363\236\023\333\106\047\237\036\242  
\136\104\203\244\245\312\325\023\263\113\077\304\343\302\346\206  
\141\244\122\060\271\172\040\117\157\017\070\123\313\063\014\023  
\053\217\326\232\275\052\310\055\261\034\175\113\121\312\107\321  
\110\047\162\135\207\353\325\105\346\110\145\235\257\122\220\272  
\133\242\030\145\127\022\237\150\271\324\025\153\224\304\151\042  
\230\364\063\340\355\371\121\216\101\120\311\064\117\166\220\254  
\374\070\301\330\341\173\271\343\343\224\341\106\151\313\016\012  
\120\153\023\272\254\017\067\132\267\022\265\220\201\036\126\256  
\127\042\206\331\311\322\321\327\121\343\253\073\306\125\375\036  
\016\323\164\012\321\332\252\352\151\270\227\050\217\110\304\007  
\370\122\103\072\364\312\125\065\054\260\246\152\300\234\371\362  
\201\341\022\152\300\105\331\147\263\316\377\043\242\211\012\124  
\324\024\271\052\250\327\354\371\253\315\045\130\062\171\217\220  
\133\230\071\304\010\006\301\254\177\016\075\000\245\002\003\001  
\000\001\243\124\060\122\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\011\313\131\177\206\262\160\217\032\303\071\343\300\331  
\351\277\273\115\262\043\060\020\006\011\053\006\001\004\001\202  
\067\025\001\004\003\002\001\000\060\015\006\011\052\206\110\206  
\367\015\001\001\014\005\000\003\202\002\001\000\254\257\076\135  
\302\021\226\211\216\243\347\222\326\227\025\270\023\242\246\102  
\056\002\315\026\005\131\047\312\040\350\272\270\350\032\354\115  
\250\227\126\256\145\103\261\217\000\233\122\315\125\315\123\071  
\155\142\114\213\015\133\174\056\104\277\203\020\217\363\123\202  
\200\303\117\072\307\156\021\077\346\343\026\221\204\373\155\204  
\177\064\164\255\211\247\316\271\327\327\237\204\144\222\276\225  
\241\255\011\123\063\335\356\012\352\112\121\216\157\125\253\272  
\265\224\106\256\214\177\330\242\120\045\145\140\200\106\333\063  
\004\256\154\265\230\164\124\045\334\223\344\370\343\125\025\075  
\270\155\303\012\244\022\301\151\205\156\337\144\361\123\231\341  
\112\165\040\235\225\017\344\326\334\003\361\131\030\350\107\211  
\262\127\132\224\266\251\330\027\053\027\111\345\166\313\301\126  
\231\072\067\261\377\151\054\221\221\223\341\337\114\243\067\166  
\115\241\237\370\155\036\035\323\372\354\373\364\105\035\023\155

```
\317\367\131\345\042\047\162\053\206\363\127\273\060\355\044\115
\334\175\126\273\243\263\370\064\171\211\301\340\362\002\141\367
\246\374\017\273\034\027\013\256\101\331\174\275\047\243\375\056
\072\321\223\224\261\163\035\044\213\257\133\040\211\255\267\147
\146\171\365\072\306\246\226\063\376\123\222\310\106\261\021\221
\306\231\177\217\311\326\146\061\040\101\020\207\055\014\326\301
\257\064\230\312\144\203\373\023\127\321\301\360\074\172\214\245
\301\375\225\041\240\161\301\223\147\161\022\352\217\210\012\151
\031\144\231\043\126\373\254\052\056\160\276\146\304\014\204\357
\345\213\363\223\001\370\152\220\223\147\113\262\150\243\265\142
\217\351\077\214\172\073\136\017\347\214\270\306\174\357\067\375
\164\342\310\117\063\162\341\224\071\155\275\022\257\276\014\116
\160\174\033\157\215\263\062\223\163\104\026\155\350\364\367\340
\225\200\217\226\135\070\244\364\253\336\012\060\207\223\330\115
\000\161\142\105\047\113\072\102\204\133\177\145\267\147\064\122
\055\234\026\153\252\250\330\173\243\102\114\161\307\014\312\076
\203\344\246\357\267\001\060\136\121\243\171\365\160\151\246\101
\104\017\206\260\054\221\306\075\352\256\017\204
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Microsoft RSA

Root Certificate Authority 2017"

# Issuer: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US

# Serial Number: 1e:d3:97:09:5f:d8:b4:b3:47:70:1e:aa:be:7f:45:b3

# Subject: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US

# Not Valid Before: Wed Dec 18 22:51:22 2019

# Not Valid After : Fri Jul 18 23:00:23 2042

# Fingerprint (SHA-256):

C7:41:F7:0F:4B:2A:8D:88:BF:2E:71:C1:41:22:EF:53:EF:10:EB:A0:CF:A5:E6:4C:FA:20:F4:18:85:30:73:E0

# Fingerprint (SHA1): 73:A5:E6:4A:3B:FF:83:16:FF:0E:DC:CC:61:8A:90:6E:4E:AE:4D:74

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Microsoft RSA Root Certificate Authority 2017"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\163\245\346\112\073\377\203\026\377\016\334\314\141\212\220\156
\116\256\115\164
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\020\377\000\377\317\311\370\307\172\300\356\065\216\311\017\107
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
```

```
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\122\123\101\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\036\323\227\011\137\330\264\263\107\160\036\252\276\177
\105\263
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "e-Szigno Root CA 2017"

#

# Issuer: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU

# Serial Number:01:54:48:ef:21:fd:97:59:0d:f5:04:0a

# Subject: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec  
Ltd.,L=Budapest,C=HU

# Not Valid Before: Tue Aug 22 12:07:06 2017

# Not Valid After : Fri Aug 22 12:07:06 2042

# Fingerprint (SHA-256):

BE:B0:0B:30:83:9B:9B:C3:2C:32:E4:44:79:05:95:06:41:F2:64:21:B1:5E:D0:89:19:8B:51:8A:E2:EA:1B:99

# Fingerprint (SHA1): 89:D4:83:03:4F:9E:9A:48:80:5F:72:37:D4:A9:A6:EF:CB:7C:1F:D1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "e-Szigno Root CA 2017"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\161\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\027\060\025\006\003
\125\004\141\014\016\126\101\124\110\125\055\062\063\065\070\064
\064\071\067\061\036\060\034\006\003\125\004\003\014\025\145\055
\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040\062
\060\061\067
```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\161\061\013\060\011\006\003\125\004\006\023\002\110\125\061  
\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145  
\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151\143  
\162\157\163\145\143\040\114\164\144\056\061\027\060\025\006\003  
\125\004\141\014\016\126\101\124\110\125\055\062\063\065\070\064  
\064\071\067\061\036\060\034\006\003\125\004\003\014\025\145\055  
\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040\062  
\060\061\067

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\014\001\124\110\357\041\375\227\131\015\365\004\012

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\100\060\202\001\345\240\003\002\001\002\002\014\001  
\124\110\357\041\375\227\131\015\365\004\012\060\012\006\010\052  
\206\110\316\075\004\003\002\060\161\061\013\060\011\006\003\125  
\004\006\023\002\110\125\061\021\060\017\006\003\125\004\007\014  
\010\102\165\144\141\160\145\163\164\061\026\060\024\006\003\125  
\004\012\014\015\115\151\143\162\157\163\145\143\040\114\164\144  
\056\061\027\060\025\006\003\125\004\141\014\016\126\101\124\110  
\125\055\062\063\065\070\064\064\071\067\061\036\060\034\006\003  
\125\004\003\014\025\145\055\123\172\151\147\156\157\040\122\157  
\157\164\040\103\101\040\062\060\061\067\060\036\027\015\061\067  
\060\070\062\062\061\062\060\067\060\066\132\027\015\064\062\060  
\070\062\062\061\062\060\067\060\066\132\060\161\061\013\060\011  
\006\003\125\004\006\023\002\110\125\061\021\060\017\006\003\125  
\004\007\014\010\102\165\144\141\160\145\163\164\061\026\060\024  
\006\003\125\004\012\014\015\115\151\143\162\157\163\145\143\040  
\114\164\144\056\061\027\060\025\006\003\125\004\141\014\016\126  
\101\124\110\125\055\062\063\065\070\064\064\071\067\061\036\060  
\034\006\003\125\004\003\014\025\145\055\123\172\151\147\156\157  
\040\122\157\157\164\040\103\101\040\062\060\061\067\060\131\060  
\023\006\007\052\206\110\316\075\002\001\006\010\052\206\110\316  
\075\003\001\007\003\102\000\004\226\334\075\212\330\260\173\157  
\306\047\276\104\220\261\263\126\025\173\216\103\044\175\032\204  
\131\356\143\150\262\306\136\207\320\025\110\036\250\220\255\275  
\123\242\332\336\072\220\246\140\137\150\062\265\206\101\337\207  
\133\054\173\305\376\174\172\332\243\143\060\141\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006  
\003\125\035\016\004\026\004\024\207\021\025\010\321\252\301\170  
\014\261\257\316\306\311\220\357\277\060\004\300\060\037\006\003  
\125\035\043\004\030\060\026\200\024\207\021\025\010\321\252\301  
\170\014\261\257\316\306\311\220\357\277\060\004\300\060\012\006  
\010\052\206\110\316\075\004\003\002\003\111\000\060\106\002\041  
\000\265\127\335\327\212\125\013\066\341\206\104\372\324\331\150  
\215\270\334\043\212\212\015\324\057\175\352\163\354\277\115\154  
\250\002\041\000\313\245\264\022\372\347\265\350\317\176\223\374

\363\065\217\157\116\132\174\264\274\116\262\374\162\252\133\131  
\371\347\334\061

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "e-Szigno Root CA 2017"

# Issuer: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU

# Serial Number:01:54:48:ef:21:fd:97:59:0d:f5:04:0a

# Subject: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU

# Not Valid Before: Tue Aug 22 12:07:06 2017

# Not Valid After : Fri Aug 22 12:07:06 2042

# Fingerprint (SHA-256):

BE:B0:0B:30:83:9B:9B:C3:2C:32:E4:44:79:05:95:06:41:F2:64:21:B1:5E:D0:89:19:8B:51:8A:E2:EA:1B:99

# Fingerprint (SHA1): 89:D4:83:03:4F:9E:9A:48:80:5F:72:37:D4:A9:A6:EF:CB:7C:1F:D1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "e-Szigno Root CA 2017"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\211\324\203\003\117\236\232\110\200\137\162\067\324\251\246\357

\313\174\037\321

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

\336\037\366\236\204\256\247\264\041\316\036\130\175\321\204\230

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\161\061\013\060\011\006\003\125\004\006\023\002\110\125\061

\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145

\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151\143

\162\157\163\145\143\040\114\164\144\056\061\027\060\025\006\003

\125\004\141\014\016\126\101\124\110\125\055\062\063\065\070\064

\064\071\067\061\036\060\034\006\003\125\004\003\014\025\145\055

\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040\062

\060\061\067

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\014\001\124\110\357\041\375\227\131\015\365\004\012

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

```

#
Certificate
"certSIGN Root CA G2"
#
Issuer: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO
Serial Number:11:00:34:b6:4e:c6:36:2d:36
Subject: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO
Not Valid Before: Mon Feb 06 09:27:35 2017
Not Valid After : Thu Feb 06 09:27:35 2042
Fingerprint (SHA-256):
65:7C:FE:2F:A7:3F:AA:38:46:25:71:F3:32:A2:36:3A:46:FC:E7:02:09:51:71:07:02:CD:FB:B6:EE:DA:33:05
Fingerprint (SHA1): 26:F9:93:B4:ED:3D:28:27:B0:B9:4B:A7:E9:15:1D:A3:8D:92:E5:32
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "certSIGN Root CA G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\024\060\022\006\003\125\004\012\023\013\103\105\122\124\123\111
\107\116\040\123\101\061\034\060\032\006\003\125\004\013\023\023
\143\145\162\164\123\111\107\116\040\122\117\117\124\040\103\101
\040\107\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\024\060\022\006\003\125\004\012\023\013\103\105\122\124\123\111
\107\116\040\123\101\061\034\060\032\006\003\125\004\013\023\023
\143\145\162\164\123\111\107\116\040\122\117\117\124\040\103\101
\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\021\000\064\266\116\306\066\055\066
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\107\060\202\003\057\240\003\002\001\002\002\011\021
\000\064\266\116\306\066\055\066\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\101\061\013\060\011\006\003\125
\004\006\023\002\122\117\061\024\060\022\006\003\125\004\012\023
\013\103\105\122\124\123\111\107\116\040\123\101\061\034\060\032
\006\003\125\004\013\023\023\143\145\162\164\123\111\107\116\040
\122\117\117\124\040\103\101\040\107\062\060\036\027\015\061\067
\060\062\060\066\060\071\062\067\063\065\132\027\015\064\062\060
\062\060\066\060\071\062\067\063\065\132\060\101\061\013\060\011
\006\003\125\004\006\023\002\122\117\061\024\060\022\006\003\125

```



\004\012\023\013\103\105\122\124\123\111\107\116\040\123\101\061  
\034\060\032\006\003\125\004\013\023\023\143\145\162\164\123\111  
\107\116\040\122\117\117\124\040\103\101\040\107\062\060\202\002  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\300\305  
\165\031\221\175\104\164\164\207\376\016\073\226\334\330\001\026  
\314\356\143\221\347\013\157\316\073\012\151\032\174\302\343\257  
\202\216\206\327\136\217\127\353\323\041\131\375\071\067\102\060  
\276\120\352\266\017\251\210\330\056\055\151\041\347\321\067\030  
\116\175\221\325\026\137\153\133\000\302\071\103\015\066\205\122  
\271\123\145\017\035\102\345\217\317\005\323\356\334\014\032\331  
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\162\227\077\043\131\233\311\042\204\301\007\117\314\177\342\127  
\312\022\160\273\246\145\363\151\165\143\275\225\373\033\227\315  
\344\250\257\366\321\116\250\331\212\161\044\315\066\075\274\226  
\304\361\154\251\256\345\317\015\156\050\015\260\016\265\312\121  
\173\170\024\303\040\057\177\373\024\125\341\021\231\375\325\012  
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\134\215\113\006\377\022\106\254\170\313\024\007\065\340\251\337  
\213\351\257\025\117\026\211\133\275\366\215\306\131\256\210\205  
\016\301\211\353\037\147\305\105\216\377\155\067\066\053\170\146  
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\077\176\217\222\317\331\022\024\144\332\020\002\025\101\377\117  
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\170\365\361\155\036\313\237\245\246\237\042\334\321\121\236\202  
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\044\125\054\104\113\212\210\104\234\312\204\323\052\073\002\003  
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\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\035\006\003\125\035\016\004  
\026\004\024\202\041\055\146\306\327\240\340\025\353\316\114\011  
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\111\233\021\127\231\222\103\021\336\266\063\244\314\327\215\144  
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\252\040\200\330\051\125\367\340\101\374\006\046\377\271\066\365  
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\245\036\000\050\141\170\157\250\001\001\217\235\064\232\377\364  
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\246\171\362\023\013\234\367\135\016\173\044\223\264\110\333\206  
\137\336\120\206\170\347\100\346\061\250\220\166\160\141\257\234  
\067\054\021\265\202\267\252\256\044\064\133\162\014\151\015\315  
\131\237\366\161\257\234\013\321\012\070\371\006\042\203\123\045  
\014\374\121\304\346\276\342\071\225\013\044\255\257\321\225\344  
\226\327\164\144\153\161\116\002\074\252\205\363\040\243\103\071  
\166\133\154\120\376\232\234\024\036\145\024\212\025\275\243\202  
\105\132\111\126\152\322\234\261\143\062\345\141\340\123\042\016  
\247\012\111\352\313\176\037\250\342\142\200\366\020\105\122\230  
\006\030\336\245\315\057\177\252\324\351\076\010\162\354\043\003  
\002\074\246\252\330\274\147\164\075\024\027\373\124\113\027\343  
\323\171\075\155\153\111\311\050\016\056\164\120\277\014\331\106  
\072\020\206\311\247\077\351\240\354\177\353\245\167\130\151\161  
\346\203\012\067\362\206\111\152\276\171\010\220\366\002\026\144  
\076\345\332\114\176\014\064\311\371\137\266\263\050\121\247\247  
\053\252\111\372\215\145\051\116\343\153\023\247\224\243\055\121  
\155\170\014\104\313\337\336\010\157\316\243\144\253\323\225\204  
\324\271\122\124\162\173\226\045\314\274\151\343\110\156\015\320  
\307\235\047\232\252\370\023\222\335\036\337\143\237\065\251\026  
\066\354\214\270\203\364\075\211\217\315\264\027\136\327\263\027  
\101\020\135\047\163\140\205\127\111\042\007

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "certSIGN Root CA G2"

# Issuer: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO

# Serial Number:11:00:34:b6:4e:c6:36:2d:36

# Subject: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO

# Not Valid Before: Mon Feb 06 09:27:35 2017

# Not Valid After : Thu Feb 06 09:27:35 2042

# Fingerprint (SHA-256):

65:7C:FE:2F:A7:3F:AA:38:46:25:71:F3:32:A2:36:3A:46:FC:E7:02:09:51:71:07:02:CD:FB:B6:EE:DA:33:05

# Fingerprint (SHA1): 26:F9:93:B4:ED:3D:28:27:B0:B9:4B:A7:E9:15:1D:A3:8D:92:E5:32

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "certSIGN Root CA G2"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\046\371\223\264\355\075\050\047\260\271\113\247\351\025\035\243
\215\222\345\062
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\214\361\165\212\306\031\317\224\267\367\145\040\207\303\227\307
END
CKA_ISSUER MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\024\060\022\006\003\125\004\012\023\013\103\105\122\124\123\111
\107\116\040\123\101\061\034\060\032\006\003\125\004\013\023\023
\143\145\162\164\123\111\107\116\040\122\117\117\124\040\103\101
\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\021\000\064\266\116\306\066\055\066
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Trustwave Global Certification Authority"
#
Issuer: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
Serial Number:05:f7:0e:86:da:49:f3:46:35:2e:ba:b2
Subject: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
Not Valid Before: Wed Aug 23 19:34:12 2017
Not Valid After : Sat Aug 23 19:34:12 2042
Fingerprint (SHA-256):
97:55:20:15:F5:DD:FC:3C:87:88:C0:06:94:45:55:40:88:94:45:00:84:F1:00:86:70:86:BC:1A:2B:B5:8D:C8
#
Fingerprint (SHA1): 2F:8F:36:4F:E1:58:97:44:21:59:87:A5:2A:9A:D0:69:95:26:7F:B5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\014\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\014\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\014\030

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\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156  
\147\163\054\040\111\156\143\056\061\061\060\057\006\003\125\004  
\003\014\050\124\162\165\163\164\167\141\166\145\040\107\154\157  
\142\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\021\060\017\006\003\125\004\010\014\010\111\154\154\151\156  
\157\151\163\061\020\060\016\006\003\125\004\007\014\007\103\150  
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\014\030  
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156  
\147\163\054\040\111\156\143\056\061\061\060\057\006\003\125\004  
\003\014\050\124\162\165\163\164\167\141\166\145\040\107\154\157  
\142\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157  
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END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\014\005\367\016\206\332\111\363\106\065\056\272\262

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\332\060\202\003\302\240\003\002\001\002\002\014\005  
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\206\110\206\367\015\001\001\013\005\000\060\201\210\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\021\060\017\006\003  
\125\004\010\014\010\111\154\154\151\156\157\151\163\061\020\060  
\016\006\003\125\004\007\014\007\103\150\151\143\141\147\157\061  
\041\060\037\006\003\125\004\012\014\030\124\162\165\163\164\167  
\141\166\145\040\110\157\154\144\151\156\147\163\054\040\111\156  
\143\056\061\061\060\057\006\003\125\004\003\014\050\124\162\165  
\163\164\167\141\166\145\040\107\154\157\142\141\154\040\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150  
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\063\064\061\062\132\060\201\210\061\013\060\011\006\003\125\004  
\006\023\002\125\123\061\021\060\017\006\003\125\004\010\014\010  
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\007\014\007\103\150\151\143\141\147\157\061\041\060\037\006\003  
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\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171  
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\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\271\135\121\050\113\074\067\222\321\202\316\275\035\275\315

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\152\262\324\347\240\012\123\001\272\216\227\221\166\156\274\374  
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\347\262\276\222\104\114\322\227\244\376\322\162\201\103\007\234  
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\060\107\263\311\076\270\152\342\347\350\201\160\136\102\213\117  
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\115\261\375\032\157\272\145\007\073\130\354\102\105\046\373\330  
\332\045\162\304\366\000\261\042\171\275\343\174\131\142\112\234  
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\034\334\350\070\145\206\305\165\247\132\333\065\005\275\167\336  
\273\051\067\100\005\007\303\224\122\237\312\144\335\361\033\053  
\334\106\012\020\002\061\375\112\150\015\007\144\220\346\036\365  
\052\241\250\273\074\135\371\243\010\013\021\014\361\077\055\020  
\224\157\376\342\064\207\203\326\317\345\033\065\155\322\003\341  
\260\015\250\240\252\106\047\202\066\247\025\266\010\246\102\124  
\127\266\231\132\342\013\171\220\327\127\022\121\065\031\210\101  
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\223\052\375\026\006\226\247\043\232\043\110\376\121\275\266\304
\260\261\124\316\336\154\101\255\026\147\176\333\375\070\315\271
\070\116\262\301\140\313\235\027\337\130\236\172\142\262\046\217
\164\225\233\344\133\035\322\017\335\230\034\233\131\271\043\323
\061\240\246\377\070\335\317\040\117\351\130\126\072\147\303\321
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\200\344\067\034\246\272\352\227\230\021\320\204\142\107\144\036
\252\356\100\277\064\261\234\217\116\341\362\222\117\037\216\363
\236\227\336\363\246\171\152\211\161\117\113\047\027\110\376\354
\364\120\017\117\111\175\314\105\343\275\172\100\305\101\334\141
\126\047\006\151\345\162\101\201\323\266\001\211\240\057\072\162
\171\376\072\060\277\101\354\307\142\076\221\113\307\331\061\166
\102\371\367\074\143\354\046\214\163\014\175\032\035\352\250\174
\207\250\302\047\174\341\063\101\017\317\317\374\000\240\042\200
\236\112\247\157\000\260\101\105\267\042\312\150\110\305\102\242
\256\335\035\362\340\156\116\005\130\261\300\220\026\052\244\075
\020\100\276\217\142\143\203\251\234\202\175\055\002\351\203\060
\174\313\047\311\375\036\146\000\260\056\323\041\057\216\063\026
\154\230\355\020\250\007\326\314\223\317\333\321\151\034\344\312
\311\340\266\234\351\316\161\161\336\154\077\026\244\171
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for

"Trustwave Global Certification Authority"

# Issuer: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,  
Inc.",L=Chicago,ST=Illinois,C=US

# Serial Number:05:f7:0e:86:da:49:f3:46:35:2e:ba:b2

# Subject: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,  
Inc.",L=Chicago,ST=Illinois,C=US

# Not Valid Before: Wed Aug 23 19:34:12 2017

# Not Valid After : Sat Aug 23 19:34:12 2042

# Fingerprint (SHA-256):

97:55:20:15:F5:DD:FC:3C:87:88:C0:06:94:45:55:40:88:94:45:00:84:F1:00:86:70:86:BC:1A:2B:B5:8D:C8

# Fingerprint (SHA1): 2F:8F:36:4F:E1:58:97:44:21:59:87:A5:2A:9A:D0:69:95:26:7F:B5

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Trustwave Global Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\057\217\066\117\341\130\227\104\041\131\207\245\052\232\320\151
\225\046\177\265
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END

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CKA_CERT_MD5_HASH MULTILINE_OCTAL
\370\034\030\055\057\272\137\155\241\154\274\307\253\221\307\016
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\014\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\014\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\014\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\061\060\057\006\003\125\004
\003\014\050\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\005\367\016\206\332\111\363\106\065\056\272\262
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Trustwave Global ECC P256 Certification Authority"
#
#
Issuer: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
Serial Number:0d:6a:5f:08:3f:28:5c:3e:51:95:df:5d
Subject: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
Not Valid Before: Wed Aug 23 19:35:10 2017
Not Valid After : Sat Aug 23 19:35:10 2042
Fingerprint (SHA-256):
94:5B:BC:82:5E:A5:54:F4:89:D1:FD:51:A7:3D:DF:2E:A6:24:AC:70:19:A0:52:05:22:5C:22:A7:8C:CF:A8:B4
Fingerprint (SHA1): B4:90:82:DD:45:0C:BE:8B:5B:B1:66:D3:E2:A4:08:26:CD:ED:42:CF
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global ECC P256 Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030

```

\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156  
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004  
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157  
\142\141\154\040\105\103\103\040\120\062\065\066\040\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156  
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150  
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030  
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156  
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004  
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157  
\142\141\154\040\105\103\103\040\120\062\065\066\040\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\014\015\152\137\010\077\050\134\076\121\225\337\135

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\140\060\202\002\007\240\003\002\001\002\002\014\015  
\152\137\010\077\050\134\076\121\225\337\135\060\012\006\010\052  
\206\110\316\075\004\003\002\060\201\221\061\013\060\011\006\003  
\125\004\006\023\002\125\123\061\021\060\017\006\003\125\004\010  
\023\010\111\154\154\151\156\157\151\163\061\020\060\016\006\003  
\125\004\007\023\007\103\150\151\143\141\147\157\061\041\060\037  
\006\003\125\004\012\023\030\124\162\165\163\164\167\141\166\145  
\040\110\157\154\144\151\156\147\163\054\040\111\156\143\056\061  
\072\060\070\006\003\125\004\003\023\061\124\162\165\163\164\167  
\141\166\145\040\107\154\157\142\141\154\040\105\103\103\040\120  
\062\065\066\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061  
\067\060\070\062\063\061\071\063\065\061\060\132\027\015\064\062  
\060\070\062\063\061\071\063\065\061\060\132\060\201\221\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\021\060\017\006  
\003\125\004\010\023\010\111\154\154\151\156\157\151\163\061\020  
\060\016\006\003\125\004\007\023\007\103\150\151\143\141\147\157  
\061\041\060\037\006\003\125\004\012\023\030\124\162\165\163\164  
\167\141\166\145\040\110\157\154\144\151\156\147\163\054\040\111  
\156\143\056\061\072\060\070\006\003\125\004\003\023\061\124\162  
\165\163\164\167\141\166\145\040\107\154\157\142\141\154\040\105  
\103\103\040\120\062\065\066\040\103\145\162\164\151\146\151\143



```
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060
\131\060\023\006\007\052\206\110\316\075\002\001\006\010\052\206
\110\316\075\003\001\007\003\102\000\004\176\373\154\346\043\343
\163\062\010\312\140\346\123\234\272\164\215\030\260\170\220\122
\200\335\070\300\112\035\321\250\314\223\244\227\006\070\312\015
\025\142\306\216\001\052\145\235\252\337\064\221\056\201\301\344
\063\222\061\304\375\011\072\246\077\255\243\103\060\101\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\017\006\003\125\035\017\001\001\377\004\005\003\003\007\006\000
\060\035\006\003\125\035\016\004\026\004\024\243\101\006\254\220
\155\321\112\353\165\245\112\020\231\263\261\241\213\112\367\060
\012\006\010\052\206\110\316\075\004\003\002\003\107\000\060\104
\002\040\007\346\124\332\016\240\132\262\256\021\237\207\305\266
\377\151\336\045\276\370\240\267\010\363\104\316\052\337\010\041
\014\067\002\040\055\046\003\240\005\275\153\321\366\134\370\145
\314\206\155\263\234\064\110\143\204\011\305\215\167\032\342\314
\234\341\164\173
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Trustwave Global ECC P256 Certification Authority"

# Issuer: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings, Inc.",L=Chicago,ST=Illinois,C=US

# Serial Number:0d:6a:5f:08:3f:28:5c:3e:51:95:df:5d

# Subject: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings, Inc.",L=Chicago,ST=Illinois,C=US

# Not Valid Before: Wed Aug 23 19:35:10 2017

# Not Valid After : Sat Aug 23 19:35:10 2042

# Fingerprint (SHA-256):

94:5B:BC:82:5E:A5:54:F4:89:D1:FD:51:A7:3D:DF:2E:A6:24:AC:70:19:A0:52:05:22:5C:22:A7:8C:CF:A8:B4

# Fingerprint (SHA1): B4:90:82:DD:45:0C:BE:8B:5B:B1:66:D3:E2:A4:08:26:CD:ED:42:CF

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Trustwave Global ECC P256 Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\264\220\202\335\105\014\276\213\133\261\146\323\342\244\010\046
\315\355\102\317
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\133\104\343\215\135\066\206\046\350\015\005\322\131\247\203\124
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
```

```
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\062\065\066\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\014\015\152\137\010\077\050\134\076\121\225\337\135
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Trustwave Global ECC P384 Certification Authority"

#

# Issuer: CN=Trustwave Global ECC

P384 Certification Authority,O="Trustwave Holdings, Inc.",L=Chicago,ST=Illinois,C=US

# Serial Number:08:bd:85:97:6c:99:27:a4:80:68:47:3b

# Subject: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings, Inc.",L=Chicago,ST=Illinois,C=US

# Not Valid Before: Wed Aug 23 19:36:43 2017

# Not Valid After : Sat Aug 23 19:36:43 2042

# Fingerprint (SHA-256):

55:90:38:59:C8:C0:C3:EB:B8:75:9E:CE:4E:25:57:22:5F:F5:75:8B:BD:38:EB:D4:82:76:60:1E:1B:D5:80:97

# Fingerprint (SHA1): E7:F3:A3:C8:CF:6F:C3:04:2E:6D:0E:67:32:C5:9E:68:95:0D:5E:D2

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Trustwave Global ECC P384 Certification Authority"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\063\070\064\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
```

```
\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\063\070\064\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\014\010\275\205\227\154\231\047\244\200\150\107\073
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\235\060\202\002\044\240\003\002\001\002\002\014\010
\275\205\227\154\231\047\244\200\150\107\073\060\012\006\010\052
\206\110\316\075\004\003\003\060\201\221\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\021\060\017\006\003\125\004\010
\023\010\111\154\154\151\156\157\151\163\061\020\060\016\006\003
\125\004\007\023\007\103\150\151\143\141\147\157\061\041\060\037
\006\003\125\004\012\023\030\124\162\165\163\164\167\141\166\145
\040\110\157\154\144\151\156\147\163\054\040\111\156\143\056\061
\072\060\070\006\003\125\004\003\023\061\124\162\165\163\164\167
\141\166\145\040\107\154\157\142\141\154\040\105\103\103\040\120
\063\070\064\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\067\060\070\062\063\061\071\063\066\064\063\132\027\015\064\062
\060\070\062\063\061\071\063\066\064\063\132\060\201\221\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\021\060\017\006
\003\125\004\010\023\010\111\154\154\151\156\157\151\163\061\020
\060\016\006\003\125\004\007\023\007\103\150\151\143\141\147\157
\061\041\060\037\006\003\125\004\012\023\030\124\162\165\163\164
\167\141\166\145\040\110\157\154\144\151\156\147\163\054\040\111
\156\143\056\061\072\060\070\006\003\125\004\003\023\061\124\162
\165\163\164\167\141\166\145\040\107\154\157\142\141\154\040\105
\103\103\040\120\063\070\064\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\153\332\015\165\065\010\061\107\005
\256\105\231\125\361\021\023\056\112\370\020\061\043\243\176\203
\323\177\050\010\072\046\032\072\317\227\202\037\200\267\047\011
```

```
\217\321\216\060\304\012\233\016\254\130\004\253\367\066\175\224
\043\244\233\012\212\213\253\353\375\071\045\146\361\136\376\214
\256\215\101\171\235\011\140\316\050\251\323\212\155\363\326\105
\324\362\230\204\070\145\240\243\103\060\101\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\017\006\003
\125\035\017\001\001\377\004\005\003\003\007\006\000\060\035\006
\003\125\035\016\004\026\004\024\125\251\204\211\322\301\062\275
\030\313\154\246\007\116\310\347\235\276\202\220\060\012\006\010
\052\206\110\316\075\004\003\003\003\147\000\060\144\002\060\067
\001\222\227\105\022\176\240\363\076\255\031\072\162\335\364\120
\223\003\022\276\104\322\117\101\244\214\234\235\037\243\366\302
\222\347\110\024\376\116\233\245\221\127\256\306\067\162\273\002
\060\147\045\012\261\014\136\356\251\143\222\157\345\220\013\376
\146\042\312\107\375\212\061\367\203\376\172\277\020\276\030\053
\036\217\366\051\036\224\131\357\216\041\067\313\121\230\245\156
\113
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Trustwave Global ECC P384 Certification Authority"

# Issuer: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings, Inc.",L=Chicago,ST=Illinois,C=US

# Serial Number:08:bd:85:97:6c:99:27:a4:80:68:47:3b

# Subject: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings, Inc.",L=Chicago,ST=Illinois,C=US

# Not Valid Before: Wed Aug 23 19:36:43 2017

# Not Valid After : Sat Aug 23 19:36:43 2042

# Fingerprint (SHA-256):

55:90:38:59:C8:C0:C3:EB:B8:75:9E:CE:4E:25:57:22:5F:F5:75:8B:BD:38:EB:D4:82:76:60:1E:1B:D5:80:97

# Fingerprint (SHA1): E7:F3:A3:C8:CF:6F:C3:04:2E:6D:0E:67:32:C5:9E:68:95:0D:5E:D2

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Trustwave Global ECC P384 Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\347\363\243\310\317\157\303\004\056\155\016\147\062\305\236\150
\225\015\136\322
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\352\317\140\304\073\271\025\051\100\241\227\355\170\047\223\326
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\063\070\064\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\014\010\275\205\227\154\231\047\244\200\150\107\073
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING

CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "NAVER Global Root Certification Authority"

#

# Issuer: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR

# Serial Number:01:94:30:1e:a2:0b:dd:f5:c5:33:2a:b1:43:44:71:f8:d6:50:4d:0d

# Subject: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR

# Not Valid Before: Fri Aug 18 08:58:42 2017

# Not Valid After : Tue Aug 18 23:59:59 2037

# Fingerprint (SHA-256):

88:F4:38:DC:F8:FF:D1:FA:8F:42:91:15:FF:E5:F8:2A:E1:E0:6E:0C:70:C3:75:FA:AD:71:7B:34:A4:9E:72:65

# Fingerprint (SHA1): 8F:6B:F2:A9:27:4A:DA:14:A0:C4:F4:8E:61:27:F9:C0:1E:78:5D:D1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "NAVER Global Root Certification Authority"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\151\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\046\060\044\006\003\125\004\012\014\035\116\101\126\105\122\040
\102\125\123\111\116\105\123\123\040\120\114\101\124\106\117\122
\115\040\103\157\162\160\056\061\062\060\060\006\003\125\004\003
\014\051\116\101\126\105\122\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\151\061\013\060\011\006\003\125\004\006\023\002\113\122\061  
\046\060\044\006\003\125\004\012\014\035\116\101\126\105\122\040  
\102\125\123\111\116\105\123\123\040\120\114\101\124\106\117\122  
\115\040\103\157\162\160\056\061\062\060\060\006\003\125\004\003  
\014\051\116\101\126\105\122\040\107\154\157\142\141\154\040\122  
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\024\001\224\060\036\242\013\335\365\305\063\052\261\103\104  
\161\370\326\120\115\015

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\005\242\060\202\003\212\240\003\002\001\002\002\024\001  
\224\060\036\242\013\335\365\305\063\052\261\103\104\161\370\326  
\120\115\015\060\015\006\011\052\206\110\206\367\015\001\001\014  
\005\000\060\151\061\013\060\011\006\003\125\004\006\023\002\113  
\122\061\046\060\044\006\003\125\004\012\014\035\116\101\126\105  
\122\040\102\125\123\111\116\105\123\123\040\120\114\101\124\106  
\117\122\115\040\103\157\162\160\056\061\062\060\060\006\003\125  
\004\003\014\051\116\101\126\105\122\040\107\154\157\142\141\154  
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036\027  
\015\061\067\060\070\061\070\060\070\065\070\064\062\132\027\015  
\063\067\060\070\061\070\062\063\065\071\065\071\132\060\151\061  
\013\060\011\006\003\125\004\006\023\002\113\122\061\046\060\044  
\006\003\125\004\012\014\035\116\101\126\105\122\040\102\125\123  
\111\116\105\123\123\040\120\114\101\124\106\117\122\115\040\103  
\157\162\160\056\061\062\060\060\006\003\125\004\003\014\051\116  
\101\126\105\122\040\107\154\157\142\141\154\040\122\157\157\164  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\266\324\361\223\134\265\100  
\211\012\253\015\220\133\120\143\256\220\224\164\027\105\162\326  
\173\145\132\051\113\247\126\240\113\270\057\102\165\351\331\173  
\044\132\061\145\253\027\027\321\063\072\331\021\334\100\066\207  
\337\307\152\351\046\136\131\212\167\343\350\110\234\061\026\372  
\076\221\261\312\311\243\342\237\316\041\123\243\002\066\060\313  
\122\002\345\332\062\135\303\305\346\371\356\021\307\213\311\104  
\036\204\223\030\112\264\237\345\022\144\151\320\046\205\142\001  
\266\311\002\035\276\203\121\273\134\332\370\255\025\152\231\367  
\222\124\367\064\133\351\277\352\051\201\022\324\123\221\226\263  
\221\132\335\376\220\163\050\373\060\106\265\312\010\007\307\161  
\162\311\146\323\064\227\366\214\364\030\112\341\320\075\132\105

\266\151\247\051\373\043\316\210\330\022\234\000\110\250\246\017  
\263\073\222\215\161\016\164\305\213\310\114\371\364\233\216\270  
\074\151\355\157\073\120\057\130\355\304\260\320\034\033\152\014  
\342\274\104\252\330\315\024\135\224\170\141\277\016\156\332\052  
\274\057\014\013\161\246\263\026\077\234\346\371\314\237\123\065  
\342\003\240\240\030\277\273\361\276\364\326\214\207\015\102\367  
\006\271\361\155\355\004\224\250\376\266\323\006\306\100\141\337  
\235\235\363\124\166\316\123\072\001\246\222\101\354\004\243\217  
\015\242\325\011\312\326\313\232\361\357\103\135\300\253\245\101  
\317\134\123\160\160\311\210\246\055\324\153\141\163\120\046\206  
\141\016\137\033\302\053\342\214\325\273\235\301\003\102\272\224  
\332\137\251\260\312\314\115\012\357\107\151\003\057\042\373\361  
\050\316\277\135\120\145\250\220\155\263\164\260\010\307\254\250  
\321\353\076\234\374\135\032\203\056\053\313\265\363\104\235\072  
\247\027\141\226\242\161\323\160\226\025\115\267\114\163\356\031  
\134\305\133\076\101\376\254\165\140\073\033\143\316\000\335\332  
\010\220\142\264\345\055\356\110\247\153\027\231\124\276\207\112  
\343\251\136\004\114\353\020\155\124\326\357\361\350\362\142\026  
\313\200\153\355\075\355\365\037\060\245\256\113\311\023\355\212  
\001\001\311\270\121\130\300\146\072\261\146\113\304\325\061\002  
\142\351\164\204\014\333\115\106\055\002\003\001\000\001\243\102  
\060\100\060\035\006\003\125\035\016\004\026\004\024\322\237\210  
\337\241\315\054\275\354\365\073\001\001\223\063\047\262\353\140  
\113\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\015\006\011\052\206\110\206\367\015\001\001\014\005  
\000\003\202\002\001\000\062\312\200\263\235\075\124\006\335\322  
\322\056\360\244\001\041\013\147\110\312\155\216\340\310\252\015  
\252\215\041\127\217\306\076\172\312\333\121\324\122\263\324\226  
\204\245\130\140\177\345\013\216\037\365\334\012\025\201\345\073  
\266\267\042\057\011\234\023\026\261\154\014\065\010\155\253\143  
\162\355\334\276\354\307\127\346\060\040\161\326\327\020\301\023  
\125\001\214\052\103\344\101\361\317\072\172\123\222\316\242\003  
\005\015\070\337\002\273\020\056\331\073\322\233\172\300\241\246  
\370\265\061\346\364\165\311\271\123\231\165\107\042\132\024\025  
\307\170\033\266\235\351\014\370\033\166\361\205\204\336\241\332  
\022\357\244\342\020\227\172\170\336\014\121\227\250\041\100\213  
\206\275\015\360\136\116\113\066\273\073\040\037\212\102\126\341  
\013\032\277\173\320\042\103\054\104\214\373\345\052\264\154\034  
\034\272\224\340\023\176\041\346\232\302\313\305\102\144\264\036  
\224\173\010\045\310\161\314\207\105\127\205\323\237\051\142\042  
\203\121\227\000\030\227\167\152\230\222\311\174\140\154\337\154  
\175\112\344\160\114\302\236\270\035\367\320\064\307\017\314\373  
\247\377\003\276\255\160\220\332\013\335\310\155\227\137\232\177  
\011\062\101\375\315\242\314\132\155\114\362\252\111\376\146\370  
\351\330\065\353\016\050\036\356\110\057\072\320\171\011\070\174  
\246\042\202\223\225\320\003\276\276\002\240\005\335\040\042\343  
\157\035\210\064\140\306\346\012\271\011\165\013\360\007\350\151

```
\226\065\307\373\043\201\216\070\071\270\105\053\103\170\242\321
\054\024\377\015\050\162\162\225\233\136\011\333\211\104\230\252
\241\111\273\161\122\362\277\366\377\047\241\066\257\270\266\167
\210\335\072\244\155\233\064\220\334\024\135\060\277\267\353\027
\344\207\267\161\320\241\327\167\025\324\102\327\362\363\061\231
\135\233\335\026\155\077\352\006\043\370\106\242\042\355\223\366
\335\232\346\052\207\261\230\124\361\042\367\153\105\343\342\216
\166\035\232\215\304\006\215\066\267\024\363\235\124\151\267\216
\074\325\244\155\223\201\267\255\366\275\144\173\302\311\150\071
\240\222\234\315\064\206\221\220\372\144\121\235\376\376\353\245
\365\165\336\211\367\162
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "NAVER Global Root Certification Authority"

# Issuer: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR

# Serial Number:01:94:30:1e:a2:0b:dd:f5:c5:33:2a:b1:43:44:71:f8:d6:50:4d:0d

# Subject: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR

# Not Valid Before: Fri Aug 18 08:58:42 2017

# Not Valid After : Tue Aug 18 23:59:59 2037

# Fingerprint (SHA-256):

88:F4:38:DC:F8:FF:D1:FA:8F:42:91:15:FF:E5:F8:2A:E1:E0:6E:0C:70:C3:75:FA:AD:71:7B:34:A4:9E:72:65

# Fingerprint (SHA1): 8F:6B:F2:A9:27:4A:DA:14:A0:C4:F4:8E:61:27:F9:C0:1E:78:5D:D1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "NAVER Global Root Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\217\153\362\251\047\112\332\024\240\304\364\216\141\047\371\300
\036\170\135\321
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\310\176\101\366\045\073\365\011\263\027\350\106\075\277\320\233
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\151\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\046\060\044\006\003\125\004\012\014\035\116\101\126\105\122\040
\102\125\123\111\116\105\123\123\040\120\114\101\124\106\117\122
\115\040\103\157\162\160\056\061\062\060\060\006\003\125\004\003
\014\051\116\101\126\105\122\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
```



```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\001\224\060\036\242\013\335\365\305\063\052\261\103\104
\161\370\326\120\115\015
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
#
Issuer: CN=AC RAIZ FNMT-RCM
SERVIDORES SEGUROS,OID.2.5.4.97=VATES-Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
Serial Number:62:f6:32:6c:e5:c4:e3:68:5c:1b:62:dd:9c:2e:9d:95
Subject: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-
Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
Not Valid Before: Thu Dec 20 09:37:33 2018
Not Valid After : Sun Dec 20 09:37:33 2043
Fingerprint (SHA-256):
55:41:53:B1:3D:2C:F9:DD:B7:53:BF:BE:1A:4E:0A:E0:8D:0A:A4:18:70:58:FE:60:A2:B8:62:B2:E4:B8:7B:CB
Fingerprint (SHA1): 62:FF:D9:9E:C0:65:0D:03:CE:75:93:D2:ED:3F:2D:32:C9:E3:E5:4A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\016\060\014\006\003\125\004\013\014\005\103\145\162
\145\163\061\030\060\026\006\003\125\004\141\014\017\126\101\124
\105\123\055\121\062\070\062\066\060\060\064\112\061\054\060\052
\006\003\125\004\003\014\043\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\040\123\105\122\126\111\104\117\122
\105\123\040\123\105\107\125\122\117\123
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\016\060\014\006\003\125\004\013\014\005\103\145\162
\145\163\061\030\060\026\006\003\125\004\141\014\017\126\101\124
\105\123\055\121\062\070\062\066\060\060\064\112\061\054\060\052
\006\003\125\004\003\014\043\101\103\040\122\101\111\132\040\106

```

\116\115\124\055\122\103\115\040\123\105\122\126\111\104\117\122  
\105\123\040\123\105\107\125\122\117\123

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\142\366\062\154\345\304\343\150\134\033\142\335\234\056  
\235\225

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\156\060\202\001\363\240\003\002\001\002\002\020\142  
\366\062\154\345\304\343\150\134\033\142\335\234\056\235\225\060  
\012\006\010\052\206\110\316\075\004\003\003\060\170\061\013\060  
\011\006\003\125\004\006\023\002\105\123\061\021\060\017\006\003  
\125\004\012\014\010\106\116\115\124\055\122\103\115\061\016\060  
\014\006\003\125\004\013\014\005\103\145\162\145\163\061\030\060  
\026\006\003\125\004\141\014\017\126\101\124\105\123\055\121\062  
\070\062\066\060\060\064\112\061\054\060\052\006\003\125\004\003  
\014\043\101\103\040\122\101\111\132\040\106\116\115\124\055\122  
\103\115\040\123\105\122\126\111\104\117\122\105\123\040\123\105  
\107\125\122\117\123\060\036\027\015\061\070\061\062\062\060\060  
\071\063\067\063\063\132\027\015\064\063\061\062\062\060\060\071  
\063\067\063\063\132\060\170\061\013\060\011\006\003\125\004\006  
\023\002\105\123\061\021\060\017\006\003\125\004\012\014\010\106  
\116\115\124\055\122\103\115\061\016\060\014\006\003\125\004\013  
\014\005\103\145\162\145\163\061\030\060\026\006\003\125\004\141  
\014\017\126\101\124\105\123\055\121\062\070\062\066\060\060\064  
\112\061\054\060\052\006\003\125\004\003\014\043\101\103\040\122  
\101\111\132\040\106\116\115\124\055\122\103\115\040\123\105\122  
\126\111\104\117\122\105\123\040\123\105\107\125\122\117\123\060  
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201  
\004\000\042\003\142\000\004\366\272\127\123\310\312\253\337\066  
\112\122\041\344\227\322\203\147\236\360\145\121\320\136\207\307  
\107\261\131\362\127\107\233\000\002\223\104\027\151\333\102\307  
\261\262\072\030\016\264\135\214\263\146\135\241\064\371\066\054  
\111\333\363\106\374\263\104\151\104\023\146\375\327\305\375\257  
\066\115\316\003\115\007\161\317\257\152\005\322\242\103\132\012  
\122\157\001\003\116\216\213\243\102\060\100\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003  
\125\035\016\004\026\004\024\001\271\057\357\277\021\206\140\362  
\117\320\101\156\253\163\037\347\322\156\111\060\012\006\010\052  
\206\110\316\075\004\003\003\003\151\000\060\146\002\061\000\256  
\112\343\053\100\303\164\021\362\225\255\026\043\336\116\014\032  
\346\135\245\044\136\153\104\173\374\070\342\117\313\234\105\027  
\021\114\024\047\046\125\071\165\112\003\314\023\220\237\222\002  
\061\000\372\112\154\140\210\163\363\356\270\230\142\251\316\053  
\302\331\212\246\160\061\035\257\260\224\114\353\117\306\343\321  
\363\142\247\074\377\223\056\007\134\111\001\147\151\022\002\162  
\277\347

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
Issuer: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-
Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
Serial Number:62:f6:32:6c:e5:c4:e3:68:5c:1b:62:dd:9c:2e:9d:95
Subject: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-
Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
Not
Valid Before: Thu Dec 20 09:37:33 2018
Not Valid After : Sun Dec 20 09:37:33 2043
Fingerprint (SHA-256):
55:41:53:B1:3D:2C:F9:DD:B7:53:BF:BE:1A:4E:0A:E0:8D:0A:A4:18:70:58:FE:60:A2:B8:62:B2:E4:B8:7B:CB
Fingerprint (SHA1): 62:FF:D9:9E:C0:65:0D:03:CE:75:93:D2:ED:3F:2D:32:C9:E3:E5:4A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\142\377\331\236\300\145\015\003\316\165\223\322\355\077\055\062
\311\343\345\112
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\031\066\234\122\003\057\322\321\273\043\314\335\036\022\125\273
END
CKA_ISSUER MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\016\060\014\006\003\125\004\013\014\005\103\145\162
\145\163\061\030\060\026\006\003\125\004\141\014\017\126\101\124
\105\123\055\121\062\070\062\066\060\060\064\112\061\054\060\052
\006\003\125\004\003\014\043\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\040\123\105\122\126\111\104\117\122
\105\123\040\123\105\107\125\122\117\123
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\142\366\062\154\345\304\343\150\134\033\142\335\234\056
\235\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "GlobalSign Secure Mail Root R45"

#

# Issuer: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE

# Serial Number:76:53:fe:a8:4c:50:ab:9f:8d:32:b5:1d:03:8f:57:dc

# Subject: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE

# Not Valid Before: Wed Mar 18 00:00:00 2020

# Not Valid After : Sat Mar 18 00:00:00 2045

# Fingerprint (SHA-256):

31:9A:F0:A7:72:9E:6F:89:26:9C:13:1E:A6:A3:A1:6F:CD:86:38:9F:DC:AB:3C:47:A4:A6:75:C1:61:A3:F9:74

#

Fingerprint (SHA1): 76:18:D1:F3:80:24:3D:52:40:C6:11:6A:AD:57:77:09:7D:81:30:A0

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GlobalSign Secure Mail Root R45"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061  
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154  
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003  
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040  
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164  
\040\122\064\065

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061  
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154  
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003  
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040  
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164  
\040\122\064\065

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\166\123\376\250\114\120\253\237\215\062\265\035\003\217  
\127\334

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\160\060\202\003\130\240\003\002\001\002\002\020\166  
\123\376\250\114\120\253\237\215\062\265\035\003\217\127\334\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\122  
\061\013\060\011\006\003\125\004\006\023\002\102\105\061\031\060  
\027\006\003\125\004\012\023\020\107\154\157\142\141\154\123\151

\147\156\040\156\166\055\163\141\061\050\060\046\006\003\125\004  
\003\023\037\107\154\157\142\141\154\123\151\147\156\040\123\145  
\143\165\162\145\040\115\141\151\154\040\122\157\157\164\040\122  
\064\065\060\036\027\015\062\060\060\063\061\070\060\060\060\060  
\060\060\132\027\015\064\065\060\063\061\070\060\060\060\060\060  
\060\132\060\122\061\013\060\011\006\003\125\004\006\023\002\102  
\105\061\031\060\027\006\003\125\004\012\023\020\107\154\157\142  
\141\154\123\151\147\156\040\156\166\055\163\141\061\050\060\046  
\006\003\125\004\003\023\037\107\154\157\142\141\154\123\151\147  
\156\040\123\145\143\165\162\145\040\115\141\151\154\040\122\157  
\157\164\040\122\064\065\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202  
\002\012\002\202\002\001\000\334\171\314\155\006\371\155\273\340  
\126\004\154\177\340\165\314\055\005\111\350\113\334\124\354\133  
\167\225\162\277\177\142\235\205\251\212\044\120\137\123\345\333  
\164\157\244\051\133\023\052\011\255\232\305\057\302\367\166\073  
\241\105\106\252\103\346\044\376\053\260\157\062\160\031\106\132  
\171\046\057\374\075\175\137\144\313\127\314\141\141\250\331\225  
\156\343\225\240\156\177\107\022\030\326\357\003\311\373\212\372  
\232\275\202\025\251\125\167\113\021\117\131\340\153\303\161\363  
\014\330\124\325\201\150\076\023\271\025\056\207\212\074\104\047  
\066\142\044\156\370\054\005\162\060\141\275\102\221\043\304\235  
\045\247\331\124\232\024\243\061\255\200\171\014\247\143\154\230  
\243\254\127\107\063\037\145\226\341\320\322\065\332\371\161\367  
\241\246\045\265\101\135\337\076\140\330\321\366\237\245\362\270  
\314\023\252\217\371\262\156\341\203\055\223\335\076\205\032\335  
\350\261\134\046\001\313\111\205\374\374\322\324\177\205\142\206  
\164\371\313\354\065\042\242\014\060\217\073\253\171\353\126\362  
\372\102\363\355\371\037\105\211\100\051\255\352\222\164\352\122  
\375\126\264\053\332\242\355\165\302\156\253\316\122\220\113\366  
\336\360\111\217\232\110\324\210\031\155\105\346\314\214\271\335  
\144\140\140\002\100\370\271\317\274\130\353\075\205\271\306\012  
\323\234\007\146\217\307\030\071\043\106\341\074\036\243\057\120  
\141\222\013\075\053\154\361\243\107\070\127\221\253\015\217\306  
\235\115\004\322\046\122\134\345\245\375\052\055\026\052\001\151  
\347\251\175\341\066\267\261\052\305\331\261\215\275\271\213\316  
\314\213\241\076\013\110\315\120\225\064\304\330\010\131\330\153  
\046\364\276\365\324\042\027\000\127\311\256\233\004\060\063\237  
\013\373\337\126\242\311\156\124\166\332\261\227\142\047\131\017  
\021\212\042\033\144\226\077\250\361\267\044\112\215\074\123\174  
\155\203\166\075\262\046\110\163\365\104\026\001\055\011\052\216  
\026\226\120\320\163\006\135\273\042\110\202\114\012\106\132\077  
\200\377\134\362\362\232\254\054\010\340\326\352\360\022\070\201  
\117\246\020\355\106\253\314\026\234\013\317\144\246\231\002\205  
\104\147\106\255\375\115\347\002\003\001\000\001\243\102\060\100  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\035\006\003\125\035\016\004\026\004\024\240\223\025\050

\156\356\217\010\262\065\306\236\142\171\164\247\261\016\053\173  
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003  
\202\002\001\000\105\012\370\321\134\254\142\201\320\004\327\266  
\377\127\121\211\013\014\313\336\044\145\067\373\253\236\355\146  
\364\352\014\031\151\211\270\031\261\060\126\264\331\366\367\276  
\306\256\227\313\105\366\021\214\072\060\144\114\301\237\131\300  
\106\102\010\006\107\144\027\170\340\225\007\006\326\214\242\254  
\251\331\077\323\173\126\117\374\304\207\050\337\266\053\026\043  
\300\237\037\133\343\326\104\136\042\117\043\004\214\065\026\265  
\171\007\206\134\057\227\342\366\010\144\246\334\333\250\212\343  
\244\173\167\015\321\051\223\050\040\264\123\243\113\116\137\336  
\301\366\165\043\374\037\074\170\117\160\061\170\057\242\065\124  
\161\004\254\310\304\155\303\366\221\261\376\315\356\104\156\201  
\366\100\305\076\052\001\277\253\114\261\003\077\015\021\344\017  
\322\044\343\042\210\233\237\137\107\075\121\111\340\011\067\176  
\027\041\061\166\267\147\161\110\050\113\045\327\020\350\237\141  
\131\026\305\076\062\116\037\014\316\243\314\017\344\307\021\007  
\042\057\070\010\335\133\227\353\102\154\131\232\232\356\172\320  
\235\337\305\333\011\103\056\012\252\031\075\153\350\152\060\172  
\127\346\277\263\152\071\251\217\343\361\117\145\150\266\275\237  
\050\217\241\026\132\011\120\072\062\056\035\057\104\021\102\246  
\000\346\061\230\377\055\241\017\346\244\140\126\317\171\327\262  
\116\327\260\372\156\014\127\043\307\316\037\245\261\114\155\031  
\111\236\016\177\160\217\161\077\130\050\237\165\335\141\340\072  
\267\071\266\356\227\324\065\121\373\213\111\140\310\074\146\256  
\227\356\215\046\131\127\273\170\360\172\120\060\011\260\140\252  
\237\116\334\311\076\036\072\334\142\223\063\260\072\124\164\157  
\054\061\105\321\153\021\062\152\150\166\366\075\366\152\023\136  
\044\230\347\352\035\232\317\170\202\007\140\367\115\020\323\201  
\232\105\215\236\257\233\334\200\307\103\262\225\150\244\303\016  
\350\012\107\025\277\124\063\334\001\347\325\246\036\163\330\172  
\262\277\057\255\343\125\060\236\337\016\101\274\340\021\365\241  
\014\250\042\341\343\000\243\116\160\174\222\343\004\321\172\102  
\212\165\220\131\343\233\321\114\242\144\275\163\171\233\157\362  
\263\301\366\074

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Trust for "GlobalSign Secure Mail Root R45"

# Issuer: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE

# Serial Number:76:53:fe:a8:4c:50:ab:9f:8d:32:b5:1d:03:8f:57:dc

# Subject: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE

# Not Valid Before: Wed Mar 18 00:00:00 2020

# Not Valid After : Sat Mar 18 00:00:00 2045

```

Fingerprint (SHA-256):
31:9A:F0:A7:72:9E:6F:89:26:9C:13:1E:A6:A3:A1:6F:CD:86:38:9F:DC:AB:3C:47:A4:A6:75:C1:61:A3:F9:74
Fingerprint (SHA1): 76:18:D1:F3:80:24:3D:52:40:C6:11:6A:AD:57:77:09:7D:81:30:A0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Secure Mail Root R45"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\166\030\321\363\200\044\075\122\100\306\021\152\255\127\167\011
\175\201\060\240
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\223\304\173\263\016\124\107\034\103\054\213\276\160\205\142\051
END
CKA_ISSUER
MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\122\064\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\123\376\250\114\120\253\237\215\062\265\035\003\217
\127\334
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "GlobalSign Secure Mail Root E45"
#
Issuer: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
Serial Number:76:53:fe:aa:27:1d:95:46:5d:d6:f1:9e:e5:b8:90:0a
Subject: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
Not Valid Before: Wed Mar 18 00:00:00
2020
Not Valid After : Sat Mar 18 00:00:00 2045
Fingerprint (SHA-256):
5C:BF:6F:B8:1F:D4:17:EA:41:28:CD:6F:81:72:A3:C9:40:20:94:F7:4A:B2:ED:3A:06:B4:40:5D:04:F3:0B:19
Fingerprint (SHA1): 18:2E:1F:32:4F:89:DF:BE:FE:88:89:F0:93:C2:C4:A0:2B:67:75:21
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Secure Mail Root E45"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\105\064\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\105\064\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\166\123\376\252\047\035\225\106\135\326\361\236\345\270
\220\012
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\041\060\202\001\247\240\003\002\001\002\002\020\166
\123\376\252\047\035\225\106\135\326\361\236\345\270\220\012\060
\012\006\010\052\206\110\316\075\004\003\003\060\122\061\013\060
\011\006\003\125\004\006\023\002\102\105\061\031\060\027\006\003
\125\004\012\023\020\107\154\157\142\141\154\123\151\147\156\040
\156\166\055\163\141\061\050\060\046\006\003\125\004\003\023\037
\107\154\157\142\141\154\123\151\147\156\040\123\145\143\165\162
\145\040\115\141\151\154\040\122\157\157\164\040\105\064\065\060
\036\027\015\062\060\060\063\061\070\060\060\060\060\060\132
\027\015\064\065\060\063\061\070\060\060\060\060\060\132\060
\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061\031
\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154\123
\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003\125
\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040\123
\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164\040
\105\064\065\060\166\060\020\006\007\052\206\110\316\075\002\001
\006\005\053\201\004\000\042\003\142\000\004\371\171\213\201\107
\067\211\226\077\105\111\120\177\032\046\013\223\062\176\056\300
\300\247\010\232\303\156\217\233\076\013\042\354\067\123\267\157
\212\260\274\047\067\113\155\251\106\073\331\037\377\245\241\104
\273\055\163\277\236\101\007\134\123\233\121\010\072\132\273\157
\070\307\026\221\170\302\112\023\151\035\202\337\132\057\000\210
```



```
\226\242\056\034\164\371\235\176\146\067\212\243\102\060\100\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\337\023\136\213\137
\302\100\002\375\126\267\224\114\266\036\325\246\261\024\226\060
\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060\145
\002\060\023\260\276\327\161\040\076\344\253\234\316\066\022\175
\137\114\037\052\265\151\105\063\137\323\055\132\262\344\210\307
\336\012\066\102\062\171\235\246\153\272\341\371\104\052\173\212
\303\022\002\061\000\240\146\034\116\207\235\207\311\355\231\114
\033\012\356\055\140\303\067\307\035\315\265\162\260\331\306\357
\274\362\377\077\360\122\335\010\347\252\144\171\303\344\151\127
\221\057\244\313\174
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GlobalSign Secure Mail Root E45"

# Issuer: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE

# Serial Number:76:53:fe:aa:27:1d:95:46:5d:d6:f1:9e:e5:b8:90:0a

# Subject: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE

#

Not Valid Before: Wed Mar 18 00:00:00 2020

# Not Valid After : Sat Mar 18 00:00:00 2045

# Fingerprint (SHA-256):

5C:BF:6F:B8:1F:D4:17:EA:41:28:CD:6F:81:72:A3:C9:40:20:94:F7:4A:B2:ED:3A:06:B4:40:5D:04:F3:0B:19

# Fingerprint (SHA1): 18:2E:1F:32:4F:89:DF:BE:FE:88:89:F0:93:C2:C4:A0:2B:67:75:21

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GlobalSign Secure Mail Root E45"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\030\056\037\062\117\211\337\276\376\210\211\360\223\302\304\240
\053\147\165\041
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\305\374\306\056\237\364\122\055\052\250\244\272\373\147\062\377
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\105\064\065
```

```

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\166\123\376\252\047\035\225\106\135\326\361\236\345\270
\220\012
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "GlobalSign Root R46"
#
Issuer: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE
Serial Number:11:d2:bb:b9:d7:23:18:9e:40:5f:0a:9d:2d:d0:df:25:67:d1
Subject: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE
Not Valid Before: Wed Mar 20 00:00:00 2019
Not Valid After : Tue Mar 20 00:00:00 2046
Fingerprint (SHA-256):
4F:A3:12:6D:8D:3A:11:D1:C4:85:5A:4F:80:7C:BA:D6:CF:91:9D:3A:5A:88:B0:3B:EA:2C:63:72:D9:3C:40:C9
Fingerprint (SHA1): 53:A2:B0:4B:CA:6B:D6:45:E6:39:8A:8E:C4:0D:D2:BF:77:C3:A2:90
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root R46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\322\273\271\327\043\030\236\100\137\012\235\055\320
\337\045\147\321
END

```

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\132\060\202\003\102\240\003\002\001\002\002\022\021  
\322\273\271\327\043\030\236\100\137\012\235\055\320\337\045\147  
\321\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000  
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061  
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154  
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003  
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040  
\122\157\157\164\040\122\064\066\060\036\027\015\061\071\060\063  
\062\060\060\060\060\060\060\132\027\015\064\066\060\063\062  
\060\060\060\060\060\060\060\132\060\106\061\013\060\011\006\003  
\125\004\006\023\002\102\105\061\031\060\027\006\003\125\004\012  
\023\020\107\154\157\142\141\154\123\151\147\156\040\156\166\055  
\163\141\061\034\060\032\006\003\125\004\003\023\023\107\154\157  
\142\141\154\123\151\147\156\040\122\157\157\164\040\122\064\066  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\254\254\164\062\350\263\145\345\272\355\103\046\035\246\211  
\015\105\272\051\210\262\244\035\143\335\323\301\054\011\127\211  
\071\241\125\351\147\064\167\014\156\344\125\035\122\045\322\023  
\153\136\341\035\251\267\175\211\062\137\015\236\237\054\172\143  
\140\100\037\246\260\266\170\217\231\124\226\010\130\256\344\006  
\274\142\005\002\026\277\257\250\043\003\266\224\017\274\156\154  
\302\313\325\246\273\014\351\366\301\002\373\041\336\146\335\027  
\253\164\102\357\360\164\057\045\364\352\153\125\133\220\333\235  
\337\136\207\012\100\373\255\031\153\373\367\312\140\210\336\332  
\301\217\326\256\325\177\324\074\203\356\327\026\114\203\105\063  
\153\047\320\206\320\034\055\153\363\253\175\361\205\251\365\050  
\322\255\357\363\204\113\034\207\374\023\243\072\162\242\132\021  
\053\326\047\161\047\355\201\055\155\146\201\222\207\264\033\130  
\172\314\077\012\372\106\117\115\170\134\370\053\110\343\004\204  
\313\135\366\264\152\263\145\374\102\236\121\046\043\040\313\075  
\024\371\201\355\145\026\000\117\032\144\227\146\010\317\214\173  
\343\053\300\235\371\024\362\033\361\126\152\026\277\054\205\205  
\315\170\070\232\353\102\152\002\064\030\203\027\116\224\126\370  
\266\202\265\363\226\335\075\363\276\177\040\167\076\173\031\043  
\153\054\324\162\163\103\127\175\340\370\327\151\117\027\066\004  
\371\300\220\140\067\105\336\346\014\330\164\215\256\234\242\155  
\164\135\102\276\006\365\331\144\156\002\020\254\211\260\114\073  
\007\115\100\176\044\305\212\230\202\171\216\244\247\202\040\215  
\043\372\047\161\311\337\306\101\164\240\115\366\221\026\334\106  
\214\137\051\143\061\131\161\014\330\157\302\266\062\175\373\346  
\135\123\246\176\025\374\273\165\174\135\354\370\366\027\034\354  
\307\153\031\313\363\173\360\053\007\245\331\154\171\124\166\154  
\235\034\246\156\016\351\171\014\250\043\152\243\337\033\060\061  
\237\261\124\173\376\152\313\146\252\334\145\320\242\236\112\232  
\007\041\153\201\217\333\304\131\372\336\042\300\004\234\343\252  
\133\066\223\350\075\275\172\241\235\013\166\261\013\307\235\375

\317\230\250\006\302\370\052\243\241\203\240\267\045\162\245\002  
\343\002\003\001\000\001\243\102\060\100\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125  
\035\016\004\026\004\024\003\134\253\163\201\207\250\314\260\246  
\325\224\342\066\226\111\377\005\231\054\060\015\006\011\052\206  
\110\206\367\015\001\001\014\005\000\003\202\002\001\000\174\170  
\354\366\002\054\273\133\176\222\053\135\071\334\276\330\035\242  
\102\063\115\371\357\244\052\073\104\151\036\254\331\105\243\116  
\074\247\330\044\121\262\124\034\223\116\304\357\173\223\205\140  
\046\352\011\110\340\365\273\307\351\150\322\273\152\061\161\314  
\171\256\021\250\360\231\375\345\037\274\057\250\314\127\353\166  
\304\041\246\107\123\125\115\150\277\005\244\356\327\046\253\142  
\332\103\067\113\342\306\265\345\262\203\031\072\307\323\333\115  
\236\010\172\363\356\317\076\142\373\254\350\140\314\321\307\241  
\134\203\105\304\105\314\363\027\153\024\311\004\002\076\322\044  
\246\171\351\036\316\242\347\301\131\025\237\035\342\113\232\076  
\237\166\010\055\153\330\272\127\024\332\203\352\376\214\125\351  
\320\116\251\314\167\061\261\104\021\172\134\261\076\323\024\105  
\025\030\142\044\023\322\313\115\316\134\203\301\066\362\020\265  
\016\210\155\270\341\126\237\211\336\226\146\071\107\144\054\156  
\115\256\142\173\277\140\164\031\270\126\254\222\254\026\062\355  
\255\150\125\376\230\272\323\064\336\364\311\141\303\016\206\366  
\113\204\140\356\015\173\265\062\130\171\221\125\054\201\103\263  
\164\037\172\252\045\236\035\327\241\213\271\315\102\056\004\244  
\146\203\115\211\065\266\154\250\066\112\171\041\170\042\320\102  
\274\321\100\061\220\241\276\004\317\312\147\355\365\360\200\323  
\140\311\203\052\042\005\320\007\073\122\277\014\236\252\053\371  
\273\346\037\217\045\272\205\215\027\036\002\376\135\120\004\127  
\317\376\055\274\357\134\300\032\253\266\237\044\306\337\163\150  
\110\220\054\024\364\077\122\032\344\322\313\024\303\141\151\317  
\342\371\030\305\272\063\237\024\243\004\135\271\161\367\265\224  
\330\366\063\301\132\301\064\213\174\233\335\223\072\347\023\242  
\160\141\237\257\217\353\330\305\165\370\063\146\324\164\147\072  
\067\167\234\347\335\244\017\166\103\146\212\103\362\237\373\014  
\102\170\143\321\342\017\157\173\324\241\075\164\227\205\267\110  
\071\101\326\040\374\320\072\263\372\350\157\304\212\272\161\067  
\276\213\227\261\170\061\117\263\347\266\003\023\316\124\235\256  
\045\131\314\177\065\137\010\367\100\105\061\170\052\172

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GlobalSign Root R46"

# Issuer: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE

# Serial Number: 11:d2:bb:b9:d7:23:18:9e:40:5f:0a:9d:2d:d0:df:25:67:d1

```

Subject: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE
Not Valid Before: Wed Mar 20 00:00:00 2019
Not Valid After : Tue Mar 20 00:00:00 2046
Fingerprint
(SHA-256):
4F:A3:12:6D:8D:3A:11:D1:C4:85:5A:4F:80:7C:BA:D6:CF:91:9D:3A:5A:88:B0:3B:EA:2C:63:72:D9:3C:40:C9
Fingerprint (SHA1): 53:A2:B0:4B:CA:6B:D6:45:E6:39:8A:8E:C4:0D:D2:BF:77:C3:A2:90
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root R46"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\123\242\260\113\312\153\326\105\346\071\212\216\304\015\322\277
\167\303\242\220
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\304\024\060\344\372\146\103\224\052\152\033\044\137\031\320\357
END
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\322\273\271\327\043\030\236\100\137\012\235\055\320
\337\045\147\321
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "GlobalSign Root E46"
#
Issuer: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
Serial Number:11:d2:bb:ba:33:6e:d4:bc:e6:24:68:c5:0d:84:1d:98:e8:43
Subject: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
Not Valid Before: Wed Mar 20 00:00:00 2019
Not Valid After : Tue Mar 20 00:00:00 2046
Fingerprint (SHA-256):
CB:B9:C4:4D:84:B8:04:3E:10:50:EA:31:A6:9F:51:49:55:D7:BF:D2:E2:C6:B4:93:01:01:9A:D6:1D:9F:50:58
Fingerprint (SHA1): 39:B4:6C:D5:FE:80:06:EB:E2:2F:4A:BB:08:33:A0:AF:DB:B9:DD:84
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

```

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root E46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT
MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\105\064\066
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\105\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\322\273\272\063\156\324\274\346\044\150\305\015\204
\035\230\350\103
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\013\060\202\001\221\240\003\002\001\002\002\022\021
\322\273\272\063\156\324\274\346\044\150\305\015\204\035\230\350
\103\060\012\006\010\052\206\110\316\075\004\003\003\060\106\061
\013\060\011\006\003\125\004\006\023\002\102\105\061\031\060\027
\006\003\125\004\012\023\020\107\154\157\142\141\154\123\151\147
\156\040\156\166\055\163\141\061\034\060\032\006\003\125\004\003
\023\023\107\154\157\142\141\154\123\151\147\156\040\122\157\157
\164\040\105\064\066\060\036\027\015\061\071\060\063\062\060\060
\060\060\060\060\060\132\027\015\064\066\060\063\062\060\060\060
\060\060\060\060\132\060\106\061\013\060\011\006\003\125\004\006
\023\002\102\105\061\031\060\027\006\003\125\004\012\023\020\107
\154\157\142\141\154\123\151\147\156\040\156\166\055\163\141\061
\034\060\032\006\003\125\004\003\023\023\107\154\157\142\141\154
\123\151\147\156\040\122\157\157\164\040\105\064\066\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\234\016\261\317\267\350\236\122\167\165\064
\372\245\106\247\255\062\031\062\264\007\251\047\312\224\273\014
\322\012\020\307\332\211\260\227\014\160\023\011\001\216\330\352
\107\352\276\262\200\053\315\374\050\015\333\254\274\244\206\067
\355\160\010\000\165\352\223\013\173\056\122\234\043\150\043\006
\103\354\222\057\123\204\333\373\107\024\007\350\137\224\147\135
\311\172\201\074\040\243\102\060\100\060\016\006\003\125\035\017
```

```
\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\061\012\220\217\266\306\235\322\104\113\200
\265\242\346\037\261\022\117\033\225\060\012\006\010\052\206\110
\316\075\004\003\003\003\150\000\060\145\002\061\000\337\124\220
\355\233\357\213\224\002\223\027\202\231\276\263\236\054\366\013
\221\214\237\112\024\261\366\144\274\273\150\121\023\014\003\367
\025\213\204\140\271\213\377\122\216\347\214\274\034\002\060\074
\371\021\324\214\116\300\301\141\302\025\114\252\253\035\013\061
\137\073\034\342\000\227\104\061\346\376\163\226\057\332\226\323
\376\010\007\263\064\211\274\005\237\367\036\206\356\213\160
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GlobalSign Root E46"

# Issuer: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE

# Serial Number: 11:d2:bb:ba:33:6e:d4:bc:e6:24:68:c5:0d:84:1d:98:e8:43

# Subject: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE

# Not Valid Before: Wed Mar 20 00:00:00 2019

# Not Valid After : Tue Mar 20 00:00:00 2046

# Fingerprint (SHA-256):

CB:B9:C4:4D:84:B8:04:3E:10:50:EA:31:A6:9F:51:49:55:D7:BF:D2:E2:C6:B4:93:01:01:9A:D6:1D:9F:50:58

# Fingerprint (SHA1): 39:B4:6C:D5:FE:80:06:EB:E2:2F:4A:BB:08:33:A0:AF:DB:B9:DD:84

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GlobalSign Root E46"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\071\264\154\325\376\200\006\353\342\057\112\273\010\063\240\257
\333\271\335\204
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\265\270\146\355\336\010\203\343\311\342\001\064\006\254\121\157
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\105\064\066
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\022\021\322\273\272\063\156\324\274\346\044\150\305\015\204  
\035\230\350\103

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "GLOBALTRUST 2020"

#

# Issuer: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT

# Serial Number:5a:4b:bd:5a:fb:4f:8a:5b:fa:65:e5

# Subject: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT

# Not Valid Before: Mon Feb 10 00:00:00 2020

# Not Valid After : Sun Jun 10 00:00:00 2040

# Fingerprint (SHA-256):

9A:29:6A:51:82:D1:D4:51:A2:E3:7F:43:9B:74:DA:AF:A2:67:52:33:29:F9:0F:9A:0D:20:07:C3:34:E2:3C:9A

#

Fingerprint (SHA1): D0:67:C1:13:51:01:0C:AA:D0:C7:6A:65:37:31:16:26:4F:53:71:A2

# For Server Distrust After: Sun Jun 30 00:00:00 2024

# For Email Distrust After: Sun Jun 30 00:00:00 2024

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GLOBALTRUST 2020"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\115\061\013\060\011\006\003\125\004\006\023\002\101\124\061

\043\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155

\145\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040

\107\155\142\110\061\031\060\027\006\003\125\004\003\023\020\107

\114\117\102\101\114\124\122\125\123\124\040\062\060\062\060

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\115\061\013\060\011\006\003\125\004\006\023\002\101\124\061

\043\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155

\145\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040

\107\155\142\110\061\031\060\027\006\003\125\004\003\023\020\107

\114\117\102\101\114\124\122\125\123\124\040\062\060\062\060

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\013\132\113\275\132\373\117\212\133\372\145\345

END

CKA\_VALUE MULTILINE\_OCTAL



\060\202\005\202\060\202\003\152\240\003\002\001\002\002\013\132  
\113\275\132\373\117\212\133\372\145\345\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\060\115\061\013\060\011\006  
\003\125\004\006\023\002\101\124\061\043\060\041\006\003\125\004  
\012\023\032\145\055\143\157\155\155\145\162\143\145\040\155\157  
\156\151\164\157\162\151\156\147\040\107\155\142\110\061\031\060  
\027\006\003\125\004\003\023\020\107\114\117\102\101\114\124\122  
\125\123\124\040\062\060\062\060\060\060\036\027\015\062\060\060\062  
\061\060\060\060\060\060\060\060\132\027\015\064\060\060\066\061  
\060\060\060\060\060\060\060\132\060\115\061\013\060\011\006\003  
\125\004\006\023\002\101\124\061\043\060\041\006\003\125\004\012  
\023\032\145\055\143\157\155\155\145\162\143\145\040\155\157\156  
\151\164\157\162\151\156\147\040\107\155\142\110\061\031\060\027  
\006\003\125\004\003\023\020\107\114\117\102\101\114\124\122\125  
\123\124\040\062\060\062\060\060\202\002\042\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060  
\202\002\012\002\202\002\001\000\256\056\126\255\033\034\357\366  
\225\217\240\167\033\053\323\143\217\204\115\105\242\017\237\133  
\105\253\131\173\121\064\371\354\213\212\170\305\335\153\257\275  
\304\337\223\105\036\277\221\070\013\256\016\026\347\101\163\370  
\333\273\321\270\121\340\313\203\073\163\070\156\167\212\017\131  
\143\046\315\247\052\316\124\373\270\342\300\174\107\316\140\174  
\077\262\163\362\300\031\266\212\222\207\065\015\220\050\242\344  
\025\004\143\076\272\257\356\174\136\314\246\213\120\262\070\367  
\101\143\312\316\377\151\217\150\016\225\066\345\314\271\214\011  
\312\113\335\061\220\226\310\314\037\375\126\226\064\333\216\034  
\352\054\276\205\056\143\335\252\251\225\323\375\051\225\023\360  
\310\230\223\331\055\026\107\220\021\203\242\072\042\242\050\127  
\242\353\376\300\214\050\240\246\175\347\052\102\073\202\200\143  
\245\143\037\031\314\174\262\146\250\302\323\155\067\157\342\176  
\006\121\331\105\204\037\022\316\044\122\144\205\013\110\200\116  
\207\261\042\042\060\252\353\256\276\340\002\340\100\350\260\102  
\200\003\121\252\264\176\252\104\327\103\141\363\242\153\026\211  
\111\244\243\244\053\212\002\304\170\364\150\212\301\344\172\066  
\261\157\033\226\033\167\111\215\324\311\006\162\217\317\123\343  
\334\027\205\040\112\334\230\047\323\221\046\053\107\036\151\007  
\257\336\242\344\344\324\153\013\263\136\174\324\044\200\107\051  
\151\073\156\350\254\375\100\353\330\355\161\161\053\362\350\130  
\035\353\101\227\042\305\037\324\071\320\047\217\207\343\030\364  
\340\251\106\015\365\164\072\202\056\320\156\054\221\243\061\134  
\073\106\352\173\004\020\126\136\200\035\365\245\145\350\202\374  
\342\007\214\142\105\365\040\336\106\160\206\241\274\223\323\036  
\164\246\154\260\054\367\003\014\210\014\313\324\162\123\206\274  
\140\106\363\230\152\302\361\277\103\371\160\040\167\312\067\101  
\171\125\122\143\215\133\022\237\305\150\304\210\235\254\362\060  
\253\267\243\061\227\147\255\217\027\017\154\307\163\355\044\224  
\153\310\203\232\320\232\067\111\004\253\261\026\310\154\111\111  
\055\253\241\320\214\222\362\101\112\171\041\045\333\143\327\266

\234\247\176\102\151\373\072\143\002\003\001\000\001\243\143\060  
\141\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\006\060\035\006\003\125\035\016\004\026\004\024\334\056\037  
\321\141\067\171\344\253\325\325\263\022\161\150\075\152\150\234  
\042\060\037\006\003\125\035\043\004\030\060\026\200\024\334\056  
\037\321\141\067\171\344\253\325\325\263\022\161\150\075\152\150  
\234\042\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\003\202\002\001\000\221\360\102\002\150\100\356\303\150\300  
\124\057\337\354\142\303\303\236\212\240\061\050\252\203\216\244  
\126\226\022\020\206\126\272\227\162\322\124\060\174\255\031\325  
\035\150\157\373\024\102\330\215\016\363\265\321\245\343\002\102  
\136\334\350\106\130\007\065\002\060\340\274\164\112\301\103\052  
\377\333\032\320\260\257\154\303\375\313\263\365\177\155\003\056  
\131\126\235\055\055\065\214\262\326\103\027\054\222\012\313\135  
\350\214\017\113\160\103\320\202\377\250\314\277\244\224\300\276  
\207\275\212\343\223\173\306\217\233\026\235\047\145\274\172\305  
\102\202\154\134\007\320\251\301\210\140\104\351\230\205\026\137  
\370\217\312\001\020\316\045\303\371\140\033\240\305\227\303\323  
\054\210\061\242\275\060\354\320\320\300\022\361\301\071\343\345  
\365\370\326\112\335\064\315\373\157\301\117\343\000\213\126\342  
\222\367\050\262\102\167\162\043\147\307\077\021\025\262\304\003  
\005\276\273\021\173\012\277\250\156\347\377\130\103\317\233\147  
\240\200\007\266\035\312\255\155\352\101\021\176\055\164\223\373  
\302\274\276\121\104\305\357\150\045\047\200\343\310\240\324\022  
\354\331\245\067\035\067\174\264\221\312\332\324\261\226\201\357  
\150\134\166\020\111\257\176\245\067\200\261\034\122\275\063\201  
\114\217\371\335\145\331\024\315\212\045\130\364\342\305\203\245  
\011\220\324\154\024\143\265\100\337\353\300\374\304\130\176\015  
\024\026\207\124\047\156\126\344\160\204\270\154\062\022\176\202  
\061\103\276\327\335\174\241\255\256\326\253\040\022\357\012\303  
\020\214\111\226\065\334\013\165\136\261\117\325\117\064\016\021  
\040\007\165\103\105\351\243\021\332\254\243\231\302\266\171\047  
\342\271\357\310\342\366\065\051\172\164\372\305\177\202\005\142  
\246\012\352\150\262\171\107\006\156\362\127\250\025\063\306\367  
\170\112\075\102\173\153\176\376\367\106\352\321\353\216\357\210  
\150\133\350\301\331\161\176\375\144\357\377\147\107\210\130\045  
\057\076\206\007\275\373\250\345\202\250\254\245\323\151\103\315  
\061\210\111\204\123\222\300\261\071\033\071\203\001\060\304\362  
\251\372\320\003\275\162\067\140\126\037\066\174\275\071\221\365  
\155\015\277\173\327\222

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER\_MULTILINE\_OCTAL

\062\064\060\066\063\060\060\060\060\060\060\060\132

END

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER\_MULTILINE\_OCTAL

\062\064\060\066\063\060\060\060\060\060\060\132

END

# Trust for "GLOBALTRUST 2020"

# Issuer: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT

# Serial Number:5a:4b:bd:5a:fb:4f:8a:5b:fa:65:e5

# Subject: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT

# Not Valid Before: Mon Feb 10 00:00:00 2020

# Not Valid After : Sun Jun 10 00:00:00 2040

# Fingerprint (SHA-256):

9A:29:6A:51:82:D1:D4:51:A2:E3:7F:43:9B:74:DA:AF:A2:67:52:33:29:F9:0F:9A:0D:20:07:C3:34:E2:3C:9A

# Fingerprint (SHA1): D0:67:C1:13:51:01:0C:AA:D0:C7:6A:65:37:31:16:26:4F:53:71:A2

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GLOBALTRUST 2020"

CKA\_CERT\_SHA1\_HASH

MULTILINE\_OCTAL

\320\147\301\023\121\001\014\252\320\307\152\145\067\061\026\046

\117\123\161\242

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\212\307\157\313\155\343\314\242\361\174\203\372\016\170\327\350

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\115\061\013\060\011\006\003\125\004\006\023\002\101\124\061

\043\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155

\145\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040

\107\155\142\110\061\031\060\027\006\003\125\004\003\023\020\107

\114\117\102\101\114\124\122\125\123\124\040\062\060\062\060

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\013\132\113\275\132\373\117\212\133\372\145\345

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "ANF Secure Server Root CA"

#

# Issuer: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad  
de Certificacion,C=ES,serialNumber=G63287510

# Serial Number:0d:d3:e3:bc:6c:f9:6b:b1

# Subject: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de  
Certificacion,C=ES,serialNumber=G63287510

```
Not Valid Before: Wed Sep 04 10:00:38 2019
Not Valid After : Tue Aug 30 10:00:38 2039
Fingerprint (SHA-256):
FB:8F:EC:75:91:69:B9:10:6B:1E:51:16:44:C6:18:C5:13:04:37:3F:6C:06:43:08:8D:8B:EF:FD:1B:99:75:99
Fingerprint (SHA1): 5B:6E:68:D0:CC:15:B6:A0:5F:1E:C1:5F:AE:02:FC:6B:2F:5D:6F:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANF Secure Server Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\204\061\022\060\020\006\003\125\004\005\023\011\107\066
\063\062\070\067\065\061\060\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\047\060\045\006\003\125\004\012\023\036\101
\116\106\040\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\061\024\060
\022\006\003\125\004\013\023\013\101\116\106\040\103\101\040\122
\141\151\172\061\042\060\040\006\003\125\004\003\023\031\101\116
\106\040\123\145\143\165\162\145\040\123\145\162\166\145\162\040
\122\157\157\164\040\103\101
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UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\023\002\105\123\061\047\060\045\006\003\125\004\012\023\036\101
\116\106\040\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\061\024\060
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\141\151\172\061\042\060\040\006\003\125\004\003\023\031\101\116
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\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\015\323\343\274\154\371\153\261
END
CKA_VALUE MULTILINE_OCTAL
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\015\001\001\013\005\000\060\201\204\061\022\060\020\006\003\125
\004\005\023\011\107\066\063\062\070\067\065\061\060\061\013\060
\011\006\003\125\004\006\023\002\105\123\061\047\060\045\006\003
\125\004\012\023\036\101\116\106\040\101\165\164\157\162\151\144
\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141\143
\151\157\156\061\024\060\022\006\003\125\004\013\023\013\101\116
\106\040\103\101\040\122\141\151\172\061\042\060\040\006\003\125
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\004\003\023\031\101\116\106\040\123\145\143\165\162\145\040\123  
\145\162\166\145\162\040\122\157\157\164\040\103\101\060\036\027  
\015\061\071\060\071\060\064\061\060\060\060\063\070\132\027\015  
\063\071\060\070\063\060\061\060\060\060\063\070\132\060\201\204  
\061\022\060\020\006\003\125\004\005\023\011\107\066\063\062\070  
\067\065\061\060\061\013\060\011\006\003\125\004\006\023\002\105  
\123\061\047\060\045\006\003\125\004\012\023\036\101\116\106\040  
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162  
\164\151\146\151\143\141\143\151\157\156\061\024\060\022\006\003  
\125\004\013\023\013\101\116\106\040\103\101\040\122\141\151\172  
\061\042\060\040\006\003\125\004\003\023\031\101\116\106\040\123  
\145\143\165\162\145\040\123\145\162\166\145\162\040\122\157\157  
\164\040\103\101\060\202\002\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012  
\002\202\002\001\000\333\353\153\053\346\144\124\225\202\220\243  
\162\244\031\001\235\234\013\201\137\163\111\272\247\254\363\004  
\116\173\226\013\354\021\340\133\246\034\316\033\322\015\203\034  
\053\270\236\035\176\105\062\140\017\007\351\167\130\176\237\152  
\310\141\116\266\046\301\114\215\377\114\357\064\262\037\145\330  
\271\170\365\255\251\161\271\357\117\130\035\245\336\164\040\227  
\241\355\150\114\336\222\027\113\274\253\377\145\232\236\373\107  
\331\127\162\363\011\241\256\166\104\023\156\234\055\104\071\274  
\371\307\073\244\130\075\101\275\264\302\111\243\310\015\322\227  
\057\007\145\122\000\247\156\310\257\150\354\364\024\226\266\127  
\037\126\303\071\237\053\155\344\363\076\366\065\144\332\014\034  
\241\204\113\057\113\113\342\054\044\235\155\223\100\353\265\043  
\216\062\312\157\105\323\250\211\173\036\317\036\372\133\103\213  
\315\315\250\017\152\312\014\136\271\236\107\217\360\331\266\012  
\013\130\145\027\063\271\043\344\167\031\175\313\112\056\222\173  
\117\057\020\167\261\215\057\150\234\142\314\340\120\370\354\221  
\247\124\114\127\011\325\166\143\305\350\145\036\356\155\152\317  
\011\235\372\174\117\255\140\010\375\126\231\017\025\054\173\251  
\200\253\214\141\217\112\007\166\102\336\075\364\335\262\044\063  
\133\270\265\243\104\311\254\177\167\074\035\043\354\202\251\246  
\342\310\006\114\002\376\254\134\231\231\013\057\020\212\246\364  
\177\325\207\164\015\131\111\105\366\360\161\134\071\051\326\277  
\112\043\213\365\137\001\143\322\207\163\050\265\113\012\365\370  
\253\202\054\176\163\045\062\035\013\143\012\027\201\000\377\266  
\166\136\347\264\261\100\312\041\273\325\200\121\345\110\122\147  
\054\322\141\211\007\015\017\316\102\167\300\104\163\234\104\120  
\240\333\020\012\055\225\034\201\257\344\034\345\024\036\361\066  
\101\001\002\057\175\163\247\336\102\314\114\351\211\015\126\367  
\237\221\324\003\306\154\311\217\333\330\034\340\100\230\135\146  
\231\230\200\156\055\377\001\305\316\313\106\037\254\002\306\103  
\346\256\242\204\074\305\116\036\075\155\311\024\114\343\056\101  
\273\312\071\277\066\074\052\031\252\101\207\116\245\316\113\062  
\171\335\220\111\177\002\003\001\000\001\243\143\060\141\060\037  
\006\003\125\035\043\004\030\060\026\200\024\234\137\320\154\143

\243\137\223\312\223\230\010\255\214\207\245\054\134\301\067\060  
\035\006\003\125\035\016\004\026\004\024\234\137\320\154\143\243  
\137\223\312\223\230\010\255\214\207\245\054\134\301\067\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202  
\002\001\000\116\036\271\212\306\240\230\077\156\303\151\300\152  
\134\111\122\254\313\053\135\170\070\301\325\124\204\237\223\360  
\207\031\075\054\146\211\353\015\102\374\314\360\165\205\077\213  
\364\200\135\171\345\027\147\275\065\202\342\362\074\216\175\133  
\066\313\132\200\000\051\362\316\053\054\361\217\252\155\005\223  
\154\162\307\126\353\337\120\043\050\345\105\020\075\350\147\243  
\257\016\125\017\220\011\142\357\113\131\242\366\123\361\300\065  
\344\057\301\044\275\171\057\116\040\042\073\375\032\040\260\244  
\016\054\160\355\164\077\270\023\225\006\121\310\350\207\046\312  
\244\133\152\026\041\222\335\163\140\236\020\030\336\074\201\352  
\350\030\303\174\211\362\213\120\076\275\021\342\025\003\250\066  
\175\063\001\154\110\025\327\210\220\231\004\305\314\346\007\364  
\274\364\220\355\023\342\352\213\303\217\243\063\017\301\051\114  
\023\116\332\025\126\161\163\162\202\120\366\232\063\174\242\261  
\250\032\064\164\145\134\316\321\353\253\123\340\032\200\330\352  
\072\111\344\046\060\233\345\034\212\250\251\025\062\206\231\222  
\012\020\043\126\022\340\366\316\114\342\273\276\333\215\222\163  
\001\146\057\142\076\262\162\047\105\066\355\115\126\343\227\231  
\377\072\065\076\245\124\112\122\131\113\140\333\356\376\170\021  
\177\112\334\024\171\140\266\153\144\003\333\025\203\341\242\276  
\366\043\227\120\360\011\063\066\247\161\226\045\363\271\102\175  
\333\070\077\054\130\254\350\102\341\016\330\323\073\114\056\202  
\351\203\056\153\061\331\335\107\206\117\155\227\221\056\117\342  
\050\161\065\026\321\362\163\376\045\053\007\107\044\143\047\310  
\370\366\331\153\374\022\061\126\010\300\123\102\257\234\320\063  
\176\374\006\360\061\104\003\024\361\130\352\362\152\015\251\021  
\262\203\276\305\032\277\007\352\131\334\243\210\065\357\234\166  
\062\074\115\006\042\316\025\345\335\236\330\217\332\336\322\304  
\071\345\027\201\317\070\107\353\177\210\155\131\033\337\237\102  
\024\256\176\317\250\260\146\145\332\067\257\237\252\075\352\050  
\266\336\325\061\130\026\202\133\352\273\031\165\002\163\032\312  
\110\032\041\223\220\012\216\223\204\247\175\073\043\030\222\211  
\240\215\254

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "ANF Secure Server Root CA"

# Issuer: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de  
Certificacion,C=ES,serialNumber=G63287510

```

Serial Number:0d:d3:e3:bc:6c:f9:6b:b1
Subject: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de
Certificacion,C=ES,serialNumber=G63287510
Not Valid Before: Wed Sep 04 10:00:38 2019
Not Valid After : Tue Aug 30 10:00:38 2039
Fingerprint (SHA-256):
FB:8F:EC:75:91:69:B9:10:6B:1E:51:16:44:C6:18:C5:13:04:37:3F:6C:06:43:08:8D:8B:EF:FD:1B:99:75:99
Fingerprint (SHA1): 5B:6E:68:D0:CC:15:B6:A0:5F:1E:C1:5F:AE:02:FC:6B:2F:5D:6F:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANF Secure Server Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\133\156\150\320\314\025\266\240\137\036\301\137\256\002\374\153
\057\135\157\164
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\046\246\104\132\331\257\116\057\262\035\266\145\260\116\350\226
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\204\061\022\060\020\006\003\125\004\005\023\011\107\066
\063\062\070\067\065\061\060\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\047\060\045\006\003\125\004\012\023\036\101
\116\106\040\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\061\024\060
\022\006\003\125\004\013\023\013\101\116\106\040\103\101\040\122
\141\151\172\061\042\060\040\006\003\125\004\003\023\031\101\116
\106\040\123\145\143\165\162\145\040\123\145\162\166\145\162\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\015\323\343\274\154\371\153\261
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Certum EC-384 CA"
#
Issuer: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
Serial Number:78:8f:27:5c:81:12:52:20:a5:04:d0:2d:dd:ba:73:f4
Subject: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
Not Valid Before: Mon Mar 26 07:24:54 2018

```

# Not Valid After : Thu Mar 26 07:24:54 2043

# Fingerprint (SHA-256):

6B:32:80:85:62:53:18:AA:50:D1:73:C9:8D:8B:DA:09:D5:7E:27:41:3D:11:4C:F7:87:A0:F5:D0:6C:03:0C:F6

# Fingerprint (SHA1): F3:3E:78:3C:AC:DF:F4:A2:CC:AC:67:55:69:56:D7:E5:16:3C:E1:ED

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certum EC-384 CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE

CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114\061  
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157  
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056  
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162  
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027\006  
\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103\055  
\063\070\064\040\103\101

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114\061  
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157  
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056  
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162  
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027\006  
\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103\055  
\063\070\064\040\103\101

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\170\217\047\134\201\022\122\040\245\004\320\055\335\272  
\163\364

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\145\060\202\001\353\240\003\002\001\002\002\020\170  
\217\047\134\201\022\122\040\245\004\320\055\335\272\163\364\060  
\012\006\010\052\206\110\316\075\004\003\003\060\164\061\013\060  
\011\006\003\125\004\006\023\002\120\114\061\041\060\037\006\003  
\125\004\012\023\030\101\163\163\145\143\157\040\104\141\164\141  
\040\123\171\163\164\145\155\163\040\123\056\101\056\061\047\060  
\045\006\003\125\004\013\023\036\103\145\162\164\165\155\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\061\031\060\027\006\003\125\004\003\023  
\020\103\145\162\164\165\155\040\105\103\055\063\070\064\040\103



\101\060\036\027\015\061\070\060\063\062\066\060\067\062\064\065  
\064\132\027\015\064\063\060\063\062\066\060\067\062\064\065\064  
\132\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114  
\061\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143  
\157\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123  
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145  
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151  
\157\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027  
\006\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103  
\055\063\070\064\040\103\101\060\166\060\020\006\007\052\206\110  
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\304  
\050\216\253\030\133\152\276\156\144\067\143\344\315\354\253\072  
\367\314\241\270\016\202\111\327\206\051\237\241\224\362\343\140  
\170\230\201\170\006\115\362\354\232\016\127\140\203\237\264\346  
\027\057\032\263\135\002\133\211\043\074\302\021\005\052\247\210  
\023\030\363\120\204\327\275\064\054\047\211\125\377\316\114\347  
\337\246\037\050\304\360\124\303\271\174\267\123\255\353\302\243  
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\215  
\006\146\164\044\166\072\363\211\367\274\326\275\107\175\057\274  
\020\137\113\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\012\006\010\052\206\110\316\075\004\003\003\003  
\150\000\060\145\002\060\003\125\055\246\346\030\304\174\357\311  
\120\156\301\047\017\234\207\257\156\325\033\010\030\275\222\051  
\301\357\224\221\170\322\072\034\125\211\142\345\033\011\036\272  
\144\153\361\166\264\324\002\061\000\264\102\204\231\377\253\347  
\236\373\221\227\047\135\334\260\133\060\161\316\136\070\032\152  
\331\045\347\352\367\141\222\126\370\352\332\066\302\207\145\226  
\056\162\045\057\177\337\303\023\311

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Certum EC-384 CA"

# Issuer: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL

# Serial Number:78:8f:27:5c:81:12:52:20:a5:04:d0:2d:dd:ba:73:f4

#

Subject: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL

# Not Valid Before: Mon Mar 26 07:24:54 2018

# Not Valid After : Thu Mar 26 07:24:54 2043

# Fingerprint (SHA-256):

6B:32:80:85:62:53:18:AA:50:D1:73:C9:8D:8B:DA:09:D5:7E:27:41:3D:11:4C:F7:87:A0:F5:D0:6C:03:0C:F6

# Fingerprint (SHA1): F3:3E:78:3C:AC:DF:F4:A2:CC:AC:67:55:69:56:D7:E5:16:3C:E1:ED

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum EC-384 CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\363\076\170\074\254\337\364\242\314\254\147\125\151\126\327\345
\026\074\341\355
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\266\145\263\226\140\227\022\241\354\116\341\075\243\306\311\361
END
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027\006
\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103\055
\063\070\064\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\170\217\047\134\201\022\122\040\245\004\320\055\335\272
\163\364
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Certum Trusted Root CA"
#
Issuer: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
Serial Number: 1e:bf:59:50:b8:c9:80:37:4c:06:f7:eb:55:4f:b5:ed
Subject: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
Not Valid Before: Fri Mar
16 12:10:13 2018
Not Valid After : Mon Mar 16 12:10:13 2043
Fingerprint (SHA-256):
FE:76:96:57:38:55:77:3E:37:A9:5E:7A:D4:D9:CC:96:C3:01:57:C1:5D:31:76:5B:A9:B1:57:04:E1:AE:78:FD
Fingerprint (SHA1): C8:83:44:C0:18:AE:9F:CC:F1:87:B7:8F:22:D1:C5:D7:45:84:BA:E5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL

```

\060\172\061\013\060\011\006\003\125\004\006\023\002\120\114\061  
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157  
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056  
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162  
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\061\037\060\035\006  
\003\125\004\003\023\026\103\145\162\164\165\155\040\124\162\165  
\163\164\145\144\040\122\157\157\164\040\103\101

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\172\061\013\060\011\006\003\125\004\006\023\002\120\114\061  
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157  
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056  
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162  
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\061\037\060\035\006  
\003\125\004\003\023\026\103\145\162\164\165\155\040\124\162\165  
\163\164\145\144\040\122\157\157\164\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\036\277\131\120\270\311\200\067\114\006\367\353\125\117  
\265\355

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\300\060\202\003\250\240\003\002\001\002\002\020\036  
\277\131\120\270\311\200\067\114\006\367\353\125\117\265\355\060  
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060\172  
\061\013\060\011\006\003\125\004\006\023\002\120\114\061\041\060  
\037\006\003\125\004\012\023\030\101\163\163\145\143\157\040\104  
\141\164\141\040\123\171\163\164\145\155\163\040\123\056\101\056  
\061\047\060\045\006\003\125\004\013\023\036\103\145\162\164\165  
\155\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040  
\101\165\164\150\157\162\151\164\171\061\037\060\035\006\003\125  
\004\003\023\026\103\145\162\164\165\155\040\124\162\165\163\164  
\145\144\040\122\157\157\164\040\103\101\060\036\027\015\061\070  
\060\063\061\066\061\062\061\060\061\063\132\027\015\064\063\060  
\063\061\066\061\062\061\060\061\063\132\060\172\061\013\060\011  
\006\003\125\004\006\023\002\120\114\061\041\060\037\006\003\125  
\004\012\023\030\101\163\163\145\143\157\040\104\141\164\141\040  
\123\171\163\164\145\155\163\040\123\056\101\056\061\047\060\045  
\006\003\125\004\013\023\036\103\145\162\164\165\155\040\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150  
\157\162\151\164\171\061\037\060\035\006\003\125\004\003\023\026  
\103\145\162\164\165\155\040\124\162\165\163\164\145\144\040\122  
\157\157\164\040\103\101\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202

\002\012\002\202\002\001\000\321\055\216\273\267\066\352\155\067  
\221\237\116\223\247\005\344\051\003\045\316\034\202\367\174\231  
\237\101\006\315\355\243\272\300\333\011\054\301\174\337\051\176  
\113\145\057\223\247\324\001\153\003\050\030\243\330\235\005\301  
\052\330\105\361\221\336\337\073\320\200\002\214\317\070\017\352  
\247\134\170\021\244\301\310\205\134\045\323\323\262\347\045\317  
\021\124\227\253\065\300\036\166\034\357\000\123\237\071\334\024  
\245\054\042\045\263\162\162\374\215\263\345\076\010\036\024\052  
\067\013\210\074\312\260\364\310\302\241\256\274\301\276\051\147  
\125\342\374\255\131\134\376\275\127\054\260\220\215\302\355\067  
\266\174\231\210\265\325\003\232\075\025\015\075\072\250\250\105  
\360\225\116\045\131\035\315\230\151\273\323\314\062\311\215\357  
\201\376\255\175\211\273\272\140\023\312\145\225\147\240\363\031  
\366\003\126\324\152\323\047\342\241\255\203\360\112\022\042\167  
\034\005\163\342\031\161\102\300\354\165\106\232\220\130\340\152  
\216\053\245\106\060\004\216\031\262\027\343\276\251\272\177\126  
\361\044\003\327\262\041\050\166\016\066\060\114\171\325\101\232  
\232\250\270\065\272\014\072\362\104\033\040\210\367\305\045\327  
\075\306\343\076\103\335\207\376\304\352\365\123\076\114\145\377  
\073\112\313\170\132\153\027\137\015\307\303\117\116\232\052\242  
\355\127\115\042\342\106\232\077\017\221\064\044\175\125\343\214  
\225\067\323\032\360\011\053\054\322\311\215\264\015\000\253\147  
\051\050\330\001\365\031\004\266\035\276\166\376\162\134\304\205  
\312\322\200\101\337\005\250\243\325\204\220\117\013\363\340\077  
\233\031\322\067\211\077\362\173\122\034\214\366\341\367\074\007  
\227\214\016\242\131\201\014\262\220\075\323\343\131\106\355\017  
\251\247\336\200\153\132\252\007\266\031\313\274\127\363\227\041  
\172\014\261\053\164\076\353\332\247\147\055\114\304\230\236\066  
\011\166\146\146\374\032\077\352\110\124\034\276\060\275\200\120  
\277\174\265\316\000\366\014\141\331\347\044\003\340\343\001\201  
\016\275\330\205\064\210\275\262\066\250\173\134\010\345\104\200  
\214\157\370\057\325\041\312\035\034\320\373\304\265\207\321\072  
\116\307\166\265\065\110\265\002\003\001\000\001\243\102\060\100  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\035\006\003\125\035\016\004\026\004\024\214\373\034\165  
\274\002\323\237\116\056\110\331\371\140\124\252\304\263\117\372  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000\003  
\202\002\001\000\110\242\325\000\013\056\320\077\274\034\325\265  
\124\111\036\132\153\364\344\362\340\100\067\340\314\024\173\271  
\311\372\065\265\165\027\223\152\005\151\205\234\315\117\031\170  
\133\031\201\363\143\076\303\316\133\217\365\057\136\001\166\023  
\077\054\000\271\315\226\122\071\111\155\004\116\305\351\017\206  
\015\341\372\263\137\202\022\361\072\316\146\006\044\064\053\350  
\314\312\347\151\334\207\235\302\064\327\171\321\323\167\270\252  
\131\130\376\235\046\372\070\206\076\235\212\207\144\127\345\027  
\072\342\371\215\271\343\063\170\301\220\330\270\335\267\203\121  
\344\304\314\043\325\006\174\346\121\323\315\064\061\300\366\106

\273\013\255\374\075\020\005\052\073\112\221\045\356\214\324\204  
\207\200\052\274\011\214\252\072\023\137\350\064\171\120\301\020  
\031\371\323\050\036\324\321\121\060\051\263\256\220\147\326\037  
\012\143\261\305\251\306\102\061\143\027\224\357\151\313\057\372  
\214\024\175\304\103\030\211\331\360\062\100\346\200\342\106\137  
\345\343\301\000\131\250\371\350\040\274\211\054\016\107\064\013  
\352\127\302\123\066\374\247\324\257\061\315\376\002\345\165\372  
\271\047\011\371\363\365\073\312\175\237\251\042\313\210\311\252  
\321\107\075\066\167\250\131\144\153\047\317\357\047\301\343\044  
\265\206\367\256\176\062\115\260\171\150\321\071\350\220\130\303  
\203\274\017\054\326\227\353\316\014\341\040\307\332\267\076\303  
\077\277\057\334\064\244\373\053\041\315\147\217\113\364\343\352  
\324\077\347\117\272\271\245\223\105\034\146\037\041\372\144\136  
\157\340\166\224\062\313\165\365\156\345\366\217\307\270\244\314  
\250\226\175\144\373\044\132\112\003\154\153\070\306\350\003\103  
\232\367\127\271\263\051\151\223\070\364\003\362\273\373\202\153  
\007\040\321\122\037\232\144\002\173\230\146\333\134\115\132\017  
\320\204\225\240\074\024\103\006\312\312\333\270\101\066\332\152  
\104\147\207\257\257\343\105\021\025\151\010\262\276\026\071\227  
\044\157\022\105\321\147\135\011\250\311\025\332\372\322\246\137  
\023\141\037\277\205\254\264\255\255\005\224\010\203\036\165\027  
\323\161\073\223\120\043\131\240\355\074\221\124\235\166\000\305  
\303\270\070\333

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Certum Trusted Root CA"

# Issuer: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL

# Serial

Number:1e:bf:59:50:b8:c9:80:37:4c:06:f7:eb:55:4f:b5:ed

# Subject: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL

# Not Valid Before: Fri Mar 16 12:10:13 2018

# Not Valid After : Mon Mar 16 12:10:13 2043

# Fingerprint (SHA-256):

FE:76:96:57:38:55:77:3E:37:A9:5E:7A:D4:D9:CC:96:C3:01:57:C1:5D:31:76:5B:A9:B1:57:04:E1:AE:78:FD

# Fingerprint (SHA1): C8:83:44:C0:18:AE:9F:CC:F1:87:B7:8F:22:D1:C5:D7:45:84:BA:E5

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certum Trusted Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\310\203\104\300\030\256\237\314\361\207\267\217\042\321\305\327  
\105\204\272\345

END

```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\121\341\302\347\376\114\204\257\131\016\057\364\124\157\352\051
END
CKA_ISSUER MULTILINE_OCTAL
\060\172\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\037\060\035\006
\003\125\004\003\023\026\103\145\162\164\165\155\040\124\162\165
\163\164\145\144\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\036\277\131\120\270\311\200\067\114\006\367\353\125\117
\265\355
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "TunTrust Root CA"
#
Issuer: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN
Serial Number: 13:02:d5:e2:40:4c:92:46:86:16:67:5d:b4:bb:bb:b2:6b:3e:fc:13
Subject: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN
#
Not Valid Before: Fri Apr 26 08:57:56 2019
Not Valid After : Tue Apr 26 08:57:56 2044
Fingerprint (SHA-256):
2E:44:10:2A:B5:8C:B8:54:19:45:1C:8E:19:D9:AC:F3:66:2C:AF:BC:61:4B:6A:53:96:0A:30:F7:D0:E2:EB:41
Fingerprint (SHA1): CF:E9:70:84:0F:E0:73:0F:9D:F6:0C:7F:2C:4B:EE:20:46:34:9C:BB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TunTrust Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\067\060\065\006\003\125\004\012\014\056\101\147\145\156\143\145
\040\116\141\164\151\157\156\141\154\145\040\144\145\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\105\154\145\143
\164\162\157\156\151\161\165\145\061\031\060\027\006\003\125\004
\003\014\020\124\165\156\124\162\165\163\164\040\122\157\157\164

```

```
\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\067\060\065\006\003\125\004\012\014\056\101\147\145\156\143\145
\040\116\141\164\151\157\156\141\154\145\040\144\145\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\105\154\145\143
\164\162\157\156\151\161\165\145\061\031\060\027\006\003\125\004
\003\014\020\124\165\156\124\162\165\163\164\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\023\002\325\342\100\114\222\106\206\026\147\135\264\273
\273\262\153\076\374\023
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\263\060\202\003\233\240\003\002\001\002\002\024\023
\002\325\342\100\114\222\106\206\026\147\135\264\273\273\262\153
\076\374\023\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\141\061\013\060\011\006\003\125\004\006\023\002\124
\116\061\067\060\065\006\003\125\004\012\014\056\101\147\145\156
\143\145\040\116\141\164\151\157\156\141\154\145\040\144\145\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\105\154
\145\143\164\162\157\156\151\161\165\145\061\031\060\027\006\003
\125\004\003\014\020\124\165\156\124\162\165\163\164\040\122\157
\157\164\040\103\101\060\036\027\015\061\071\060\064\062\066\060
\070\065\067\065\066\132\027\015\064\064\060\064\062\066\060\070
\065\067\065\066\132\060\141\061\013\060\011\006\003\125\004\006
\023\002\124\116\061\067\060\065\006\003\125\004\012\014\056\101
\147\145\156\143\145\040\116\141\164\151\157\156\141\154\145\040
\144\145\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\105\154\145\143\164\162\157\156\151\161\165\145\061\031\060
\027\006\003\125\004\003\014\020\124\165\156\124\162\165\163\164
\040\122\157\157\164\040\103\101\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\303\315\323\374\275\004\123
\335\014\040\072\325\210\056\005\113\101\365\203\202\176\367\131
\237\236\236\143\350\163\332\366\006\251\117\037\264\371\013\037
\071\214\232\040\320\176\006\324\354\064\331\206\274\165\133\207
\210\360\322\331\324\243\012\262\154\033\353\111\054\076\254\135
\330\224\003\240\354\064\345\060\304\065\175\373\046\115\033\156
\060\124\330\365\200\105\234\071\255\234\311\045\004\115\232\220
\076\116\100\156\212\153\315\051\147\306\314\055\340\164\350\005
\127\012\110\120\372\172\103\332\176\354\133\232\016\142\166\376
\352\235\035\205\162\354\021\273\065\350\037\047\277\301\241\307
\273\110\026\335\126\327\314\116\240\341\271\254\333\325\203\031
```

\032\205\321\224\227\327\312\243\145\013\363\070\371\002\256\335  
\366\147\317\311\077\365\212\054\107\032\231\157\005\015\375\320  
\035\202\061\374\051\314\000\130\227\221\114\200\000\034\063\205  
\226\057\313\101\302\213\020\204\303\011\044\211\037\265\017\331  
\331\167\107\030\222\224\140\134\307\231\003\074\376\367\225\247  
\175\120\241\200\302\251\203\255\130\226\125\041\333\206\131\324  
\257\306\274\335\201\156\007\333\140\142\376\354\020\156\332\150  
\001\364\203\033\251\076\242\133\043\327\144\306\337\334\242\175  
\330\113\272\202\322\121\370\146\277\006\106\344\171\052\046\066  
\171\217\037\116\231\035\262\217\014\016\034\377\311\135\300\375  
\220\020\246\261\067\363\315\072\044\156\264\205\220\277\200\271  
\014\214\325\233\326\310\361\126\077\032\200\211\172\251\342\033  
\062\121\054\076\362\337\173\366\135\172\051\031\216\345\310\275  
\066\161\213\135\114\302\035\077\255\130\242\317\075\160\115\246  
\120\230\045\334\043\371\270\130\101\010\161\277\117\270\204\240  
\217\000\124\025\374\221\155\130\247\226\073\353\113\226\047\315  
\153\242\241\206\254\015\174\124\346\146\114\146\137\220\276\041  
\232\002\106\055\344\203\302\200\271\317\113\076\350\177\074\001  
\354\217\136\315\177\322\050\102\001\225\212\342\227\075\020\041  
\175\366\235\034\305\064\241\354\054\016\012\122\054\022\125\160  
\044\075\313\302\024\065\103\135\047\116\276\300\275\252\174\226  
\347\374\236\141\255\104\323\000\227\002\003\001\000\001\243\143  
\060\141\060\035\006\003\125\035\016\004\026\004\024\006\232\233  
\037\123\175\361\365\244\310\323\206\076\241\163\131\264\367\104  
\041\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024\006  
\232\233\037\123\175\361\365\244\310\323\206\076\241\163\131\264  
\367\104\041\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\002\001\000\252\005\156\266\335\025\311\277\263  
\306\040\366\006\107\260\206\223\045\323\215\271\310\000\077\227  
\365\122\047\210\161\311\164\375\353\312\144\333\133\357\036\135  
\272\277\321\353\356\134\151\272\026\310\363\271\217\323\066\056  
\100\111\007\015\131\336\213\020\260\111\005\342\377\221\077\113  
\267\335\002\216\370\201\050\134\314\334\155\257\137\024\234\175  
\130\170\015\366\200\011\271\351\016\227\051\031\270\267\353\370  
\026\313\125\022\344\306\175\273\304\354\370\265\034\116\076\147  
\277\305\137\033\155\155\107\050\252\004\130\141\326\166\277\042  
\177\320\007\152\247\144\123\360\227\215\235\200\077\273\301\007  
\333\145\257\346\233\062\232\303\124\223\304\034\010\303\104\373  
\173\143\021\103\321\152\032\141\152\171\155\220\117\051\216\107  
\005\301\022\151\151\326\306\066\061\341\374\372\200\272\134\117  
\304\353\267\062\254\370\165\141\027\327\020\031\271\361\322\011  
\357\172\102\235\133\132\013\324\306\225\116\052\316\377\007\327  
\117\176\030\006\210\361\031\265\331\230\273\256\161\304\034\347  
\164\131\130\357\014\211\317\213\037\165\223\032\004\024\222\110  
\120\251\353\127\051\000\026\343\066\034\310\370\277\360\063\325  
\101\017\304\314\074\335\351\063\103\001\221\020\053\036\321\271



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\135\315\062\031\213\217\214\040\167\327\042\304\102\334\204\026
\233\045\155\350\264\125\161\177\260\174\263\323\161\111\271\317
\122\244\004\077\334\075\240\273\257\063\236\012\060\140\216\333
\235\135\224\250\275\140\347\142\200\166\201\203\014\214\314\060
\106\111\342\014\322\250\257\353\141\161\357\347\042\142\251\367
\134\144\154\237\026\214\147\066\047\105\365\011\173\277\366\020
\012\361\260\215\124\103\214\004\272\243\077\357\342\065\307\371
\164\340\157\064\101\320\277\163\145\127\040\371\233\147\172\146
\150\044\116\200\145\275\020\231\006\131\362\145\257\270\306\107
\273\375\220\170\213\101\163\056\257\125\037\334\073\222\162\156
\204\323\320\141\114\015\314\166\127\342\055\205\042\025\066\015
\353\001\235\353\330\353\304\204\231\373\300\014\314\062\350\343
\167\332\203\104\213\236\125\050\300\213\130\323\220\076\116\033
\000\361\025\255\203\053\232
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "TunTrust Root CA"

# Issuer: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN

# Serial Number:13:02:d5:e2:40:4c:92:46:86:16:67:5d:b4:bb:bb:b2:6b:3e:fc:13

# Subject: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN

# Not Valid Before: Fri Apr 26 08:57:56 2019

# Not Valid After : Tue Apr 26 08:57:56 2044

#

Fingerprint (SHA-256):

2E:44:10:2A:B5:8C:B8:54:19:45:1C:8E:19:D9:AC:F3:66:2C:AF:BC:61:4B:6A:53:96:0A:30:F7:D0:E2:EB:41

# Fingerprint (SHA1): CF:E9:70:84:0F:E0:73:0F:9D:F6:0C:7F:2C:4B:EE:20:46:34:9C:BB

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "TunTrust Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\317\351\160\204\017\340\163\017\235\366\014\177\054\113\356\040
\106\064\234\273
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\205\023\271\220\133\066\134\266\136\270\132\370\340\061\127\264
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\141\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\067\060\065\006\003\125\004\012\014\056\101\147\145\156\143\145
\040\116\141\164\151\157\156\141\154\145\040\144\145\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\105\154\145\143
\164\162\157\156\151\161\165\145\061\031\060\027\006\003\125\004
```

\003\014\020\124\165\156\124\162\165\163\164\040\122\157\157\164  
\040\103\101

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\024\023\002\325\342\100\114\222\106\206\026\147\135\264\273

\273\262\153\076\374\023

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "HARICA TLS RSA Root CA 2021"

#

# Issuer: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Serial Number:39:ca:93:1c:ef:43:f3:c6:8e:93:c7:f4:64:89:38:7e

# Subject: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Not Valid Before: Fri Feb 19 10:55:38 2021

# Not Valid After : Mon Feb 13 10:55:37 2045

# Fingerprint (SHA-256):

D9:5D:0E:8E:DA:79:52:5B:F9:BE:B1:1B:14:D2:10:0D:32:94:98:5F:0C:62:D9:FA:BD:9C:D9:99:EC:CB:7B:1D

# Fingerprint (SHA1): 02:2D:05:82:FA:88:CE:14:0C:06:79:DE:7F:14:10:E9:45:D7:A5:6D

CKA\_CLASS CK\_OBJECT\_CLASS

CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "HARICA TLS RSA Root CA 2021"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061

\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156

\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040

\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165

\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004

\003\014\033\110\101\122\111\103\101\040\124\114\123\040\122\123

\101\040\122\157\157\164\040\103\101\040\062\060\062\061

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061

\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156

\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040

\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165

\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004

\003\014\033\110\101\122\111\103\101\040\124\114\123\040\122\123

\101\040\122\157\157\164\040\103\101\040\062\060\062\061  
END  
CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\020\071\312\223\034\357\103\363\306\216\223\307\364\144\211  
\070\176  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\005\244\060\202\003\214\240\003\002\001\002\002\020\071  
\312\223\034\357\103\363\306\216\223\307\364\144\211\070\176\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\154  
\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067\060  
\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151\143  
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145  
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151  
\157\156\163\040\103\101\061\044\060\042\006\003\125\004\003\014  
\033\110\101\122\111\103\101\040\124\114\123\040\122\123\101\040  
\122\157\157\164\040\103\101\040\062\060\062\061\060\036\027\015  
\062\061\060\062\061\071\061\060\065\065\063\070\132\027\015\064  
\065\060\062\061\063\061\060\065\065\063\067\132\060\154\061\013  
\060\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006  
\003\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101  
\143\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145  
\141\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156  
\163\040\103\101\061\044\060\042\006\003\125\004\003\014\033\110  
\101\122\111\103\101\040\124\114\123\040\122\123\101\040\122\157  
\157\164\040\103\101\040\062\060\062\061\060\202\002\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002  
\017\000\060\202\002\012\002\202\002\001\000\213\302\347\257\145  
\233\005\147\226\311\015\044\271\320\016\144\374\316\342\044\030  
\054\204\177\167\121\313\004\021\066\270\136\355\151\161\247\236  
\344\045\011\227\147\301\107\302\317\221\026\066\142\075\070\004  
\341\121\202\377\254\322\264\151\335\056\354\021\243\105\356\153  
\153\073\114\277\214\215\244\036\235\021\271\351\070\371\172\016  
\014\230\342\043\035\321\116\143\324\347\270\101\104\373\153\257  
\153\332\037\323\305\221\210\133\244\211\222\321\201\346\214\071  
\130\240\326\151\103\251\255\230\122\130\156\333\012\373\153\317  
\150\372\343\244\136\072\105\163\230\007\352\137\002\162\336\014  
\245\263\237\256\251\035\267\035\263\374\212\131\347\156\162\145  
\255\365\060\224\043\007\363\202\026\113\065\230\234\123\273\057  
\312\344\132\331\307\215\035\374\230\231\373\054\244\202\153\360  
\052\037\216\013\137\161\134\134\256\102\173\051\211\201\313\003  
\243\231\312\210\236\013\100\011\101\063\333\346\130\172\375\256  
\231\160\300\132\017\326\023\206\161\057\166\151\374\220\335\333  
\055\156\321\362\233\365\032\153\236\157\025\214\172\360\113\050  
\240\042\070\200\044\154\066\244\073\362\060\221\363\170\023\317  
\301\077\065\253\361\035\021\043\265\103\042\236\001\222\267\030  
\002\345\021\321\202\333\025\000\314\141\067\301\052\174\232\341

\320\272\263\120\106\356\202\254\235\061\370\373\043\342\003\000  
\110\160\243\011\046\171\025\123\140\363\070\134\255\070\352\201  
\000\143\024\271\063\136\335\013\333\240\105\007\032\063\011\370  
\115\264\247\002\246\151\364\302\131\005\210\145\205\126\256\113  
\313\340\336\074\175\055\032\310\351\373\037\243\141\112\326\052  
\023\255\167\114\032\030\233\221\017\130\330\006\124\305\227\370  
\252\077\040\212\246\205\246\167\366\246\374\034\342\356\156\224  
\063\052\203\120\204\012\345\117\206\370\120\105\170\000\201\353  
\133\150\343\046\215\314\173\134\121\364\024\054\100\276\032\140  
\035\172\162\141\035\037\143\055\210\252\316\242\105\220\010\374  
\153\276\263\120\052\132\375\250\110\030\106\326\220\100\222\220  
\012\204\136\150\061\370\353\355\015\323\035\306\175\231\030\125  
\126\047\145\056\215\105\305\044\354\316\343\002\003\001\000\001  
\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024  
\012\110\043\246\140\244\222\012\063\352\223\133\305\127\352\045  
\115\275\022\356\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\206\060\015\006\011\052\206\110\206\367\015\001\001  
\013\005\000\003\202\002\001\000\076\220\110\252\156\142\025\045  
\146\173\014\325\214\213\211\235\327\355\116\007\357\234\320\024  
\137\136\120\275\150\226\220\244\024\021\252\150\155\011\065\071  
\100\011\332\364\011\054\064\245\173\131\204\111\051\227\164\310  
\007\036\107\155\362\316\034\120\046\343\236\075\100\123\077\367  
\177\226\166\020\305\106\245\320\040\113\120\364\065\073\030\364  
\125\152\101\033\107\006\150\074\273\011\010\142\331\137\125\102  
\252\254\123\205\254\225\126\066\126\253\344\005\214\305\250\332  
\037\243\151\275\123\017\304\377\334\312\343\176\362\114\210\206  
\107\106\032\363\000\365\200\221\242\334\103\102\224\233\040\360  
\321\315\262\353\054\123\302\123\170\112\117\004\224\101\232\217  
\047\062\301\345\111\031\277\361\362\302\213\250\012\071\061\050  
\264\175\142\066\054\115\354\037\063\266\176\167\155\176\120\360  
\237\016\327\021\217\317\030\305\343\047\376\046\357\005\235\317  
\317\067\305\320\173\332\073\260\026\204\014\072\223\326\276\027  
\333\017\076\016\031\170\011\307\251\002\162\042\113\367\067\166  
\272\165\304\205\003\132\143\325\261\165\005\302\271\275\224\255  
\214\025\231\247\223\175\366\305\363\252\164\317\004\205\224\230  
\000\364\342\371\312\044\145\277\340\142\257\310\305\372\262\311  
\236\126\110\332\171\375\226\166\025\276\243\216\126\304\263\064  
\374\276\107\364\301\264\250\374\325\060\210\150\356\313\256\311  
\143\304\166\276\254\070\030\341\136\134\317\256\072\042\121\353  
\321\213\263\363\053\063\007\124\207\372\264\262\023\173\272\123  
\004\142\001\235\361\300\117\356\341\072\324\213\040\020\372\002  
\127\346\357\301\013\267\220\106\234\031\051\214\334\157\240\112  
\151\151\224\267\044\145\240\377\254\077\316\001\373\041\056\375  
\150\370\233\362\245\317\061\070\134\025\252\346\227\000\301\337  
\132\245\247\071\252\351\204\177\074\121\250\072\331\224\133\214  
\277\117\010\161\345\333\250\134\324\322\246\376\000\243\306\026  
\307\017\350\200\316\034\050\144\164\031\010\323\102\343\316\000

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\135\177\261\334\023\260\341\005\313\321\040\252\206\164\236\071
\347\221\375\377\133\326\367\255\246\057\003\013\155\343\127\124
\353\166\123\030\215\021\230\272
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "HARICA TLS RSA Root CA 2021"

# Issuer: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Serial Number:39:ca:93:1c:ef:43:f3:c6:8e:93:c7:f4:64:89:38:7e

# Subject: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Not Valid Before: Fri Feb 19 10:55:38 2021

# Not Valid After : Mon Feb 13 10:55:37 2045

# Fingerprint (SHA-256):

D9:5D:0E:8E:DA:79:52:5B:F9:BE:B1:1B:14:D2:10:0D:32:94:98:5F:0C:62:D9:FA:BD:9C:D9:99:EC:CB:7B:1D

# Fingerprint (SHA1): 02:2D:05:82:FA:88:CE:14:0C:06:79:DE:7F:14:10:E9:45:D7:A5:6D

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE

CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "HARICA TLS RSA Root CA 2021"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\002\055\005\202\372\210\316\024\014\006\171\336\177\024\020\351
\105\327\245\155
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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\145\107\233\130\206\335\054\360\374\242\204\037\036\226\304\221
END
```

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\122\123
\101\040\122\157\157\164\040\103\101\040\062\060\062\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\020\071\312\223\034\357\103\363\306\216\223\307\364\144\211
\070\176
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "HARICA TLS ECC Root CA 2021"

#

# Issuer: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Serial Number:67:74:9d:8d:77:d8:3b:6a:db:22:f4:ff:59:e2:bf:ce

# Subject: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Not Valid Before: Fri Feb 19 11:01:10 2021

# Not Valid After : Mon Feb 13 11:01:09 2045

# Fingerprint (SHA-256):

3F:99:CC:47:4A:CF:CE:4D:FE:D5:87:94:66:5E:47:8D:15:47:73:9F:2E:78:0F:1B:B4:CA:9B:13:30:97:D4:01

# Fingerprint (SHA1): BC:B0:C1:9D:E9:98:92:70:19:38:57:E9:8D:A7:B4:5D:6E:EE:01:48

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "HARICA TLS ECC Root CA 2021"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061  
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156  
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040  
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165  
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004  
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\105\103  
\103\040\122\157\157\164\040\103\101\040\062\060\062\061

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061  
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156  
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040  
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165  
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004  
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\105\103  
\103\040\122\157\157\164\040\103\101\040\062\060\062\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\147\164\235\215\167\330\073\152\333\042\364\377\131\342  
\277\316

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\002\124\060\202\001\333\240\003\002\001\002\002\020\147  
\164\235\215\167\330\073\152\333\042\364\377\131\342\277\316\060  
\012\006\010\052\206\110\316\075\004\003\003\060\154\061\013\060

\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006\003  
\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101\143  
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141  
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163  
\040\103\101\061\044\060\042\006\003\125\004\003\014\033\110\101  
\122\111\103\101\040\124\114\123\040\105\103\103\040\122\157\157  
\164\040\103\101\040\062\060\062\061\060\036\027\015\062\061\060  
\062\061\071\061\061\060\061\061\060\132\027\015\064\065\060\062  
\061\063\061\061\060\061\060\071\132\060\154\061\013\060\011\006  
\003\125\004\006\023\002\107\122\061\067\060\065\006\003\125\004  
\012\014\056\110\145\154\154\145\156\151\143\040\101\143\141\144  
\145\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143  
\150\040\111\156\163\164\151\164\165\164\151\157\156\163\040\103  
\101\061\044\060\042\006\003\125\004\003\014\033\110\101\122\111  
\103\101\040\124\114\123\040\105\103\103\040\122\157\157\164\040  
\103\101\040\062\060\062\061\060\166\060\020\006\007\052\206\110  
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\070  
\010\376\261\240\226\322\172\254\257\111\072\320\300\340\303\073  
\050\252\361\162\155\145\000\107\210\204\374\232\046\153\252\113  
\272\154\004\012\210\136\027\362\125\207\374\060\260\064\342\064  
\130\127\032\204\123\351\060\331\251\362\226\164\303\121\037\130  
\111\061\314\230\116\140\021\207\165\323\162\224\220\117\233\020  
\045\052\250\170\055\276\220\101\130\220\025\162\247\241\267\243  
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\311  
\033\123\201\022\376\004\325\026\321\252\274\232\157\267\240\225  
\031\156\312\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\206\060\012\006\010\052\206\110\316\075\004\003\003\003  
\147\000\060\144\002\060\021\336\256\370\334\116\210\260\251\360  
\042\255\302\121\100\357\140\161\055\356\217\002\304\135\003\160  
\111\244\222\352\305\024\210\160\246\323\015\260\252\312\054\100  
\234\373\351\202\156\232\002\060\053\107\232\007\306\321\302\201  
\174\312\013\226\030\101\033\243\364\060\011\236\265\043\050\015  
\237\024\266\074\123\242\114\006\151\175\372\154\221\306\052\111  
\105\346\354\267\023\341\072\154

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "HARICA TLS ECC Root CA 2021"

# Issuer: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Serial Number:67:74:9d:8d:77:d8:3b:6a:db:22:f4:ff:59:e2:bf:ce

# Subject: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Not Valid Before: Fri Feb 19 11:01:10 2021

#

Not Valid After : Mon Feb 13 11:01:09 2045

# Fingerprint (SHA-256):

3F:99:CC:47:4A:CF:CE:4D:FE:D5:87:94:66:5E:47:8D:15:47:73:9F:2E:78:0F:1B:B4:CA:9B:13:30:97:D4:01

# Fingerprint (SHA1): BC:B0:C1:9D:E9:98:92:70:19:38:57:E9:8D:A7:B4:5D:6E:EE:01:48

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "HARICA TLS ECC Root CA 2021"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\274\260\301\235\351\230\222\160\031\070\127\351\215\247\264\135

\156\356\001\110

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\256\367\114\345\146\065\321\267\233\214\042\223\164\323\113\260

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061

\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156

\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040

\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165

\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004

\003\014\033\110\101\122\111\103\101\040\124\114\123\040\105\103

\103\040\122\157\157\164\040\103\101\040\062\060\062\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\147\164\235\215\167\330\073\152\333\042\364\377\131\342

\277\316

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "HARICA Client RSA Root CA 2021"

#

# Issuer: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Serial Number:55:52:f8:1e:db:1b:24:2c:9e:bb:96:18:cd:02:28:3e

# Subject: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Not Valid Before: Fri Feb 19 10:58:46 2021

# Not Valid After : Mon Feb 13 10:58:45 2045

# Fingerprint (SHA-256):

1B:E7:AB:E3:06:86:B1:63:48:AF:D1:C6:1B:68:66:A0:EA:7F:48:21:E6:7D:5E:8A:F9:37:CF:80:11:BC:75:0D

# Fingerprint (SHA1):

46:C6:90:0A:77:3A:B6:BC:F4:65:AD:AC:FC:E3:F7:07:00:6E:DE:6E

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE



```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Client RSA Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\125\122\370\036\333\033\044\054\236\273\226\030\315\002
\050\076
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\252\060\202\003\222\240\003\002\001\002\002\020\125
\122\370\036\333\033\044\054\236\273\226\030\315\002\050\076\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\157
\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067\060
\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151\143
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151
\157\156\163\040\103\101\061\047\060\045\006\003\125\004\003\014
\036\110\101\122\111\103\101\040\103\154\151\145\156\164\040\122
\123\101\040\122\157\157\164\040\103\101\040\062\060\062\061\060
\036\027\015\062\061\060\062\061\071\061\060\065\070\064\066\132
\027\015\064\065\060\062\061\063\061\060\065\070\064\065\132\060
\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067
\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151
\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122
\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164
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\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004\003  
\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164\040  
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\061  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\201\333\127\102\220\054\164\065\364\370\270\164\031\115\253  
\011\132\167\105\201\163\142\260\065\237\370\320\267\063\000\207  
\023\266\226\253\016\124\022\060\007\274\233\267\110\327\321\031  
\203\256\216\330\251\361\251\000\204\260\214\136\236\350\014\217  
\124\151\277\366\324\010\117\046\160\376\030\101\143\032\263\062  
\213\100\370\007\253\127\061\360\306\026\166\147\232\264\335\057  
\362\321\153\305\320\222\204\221\161\156\017\056\143\351\037\123  
\244\335\122\023\314\011\203\051\201\014\305\123\165\104\261\016  
\147\123\030\320\303\037\210\113\237\224\044\264\051\274\273\350  
\116\375\157\322\025\035\111\334\215\160\362\021\032\040\121\125  
\021\272\210\157\304\367\120\171\326\252\061\342\204\075\136\062  
\310\167\052\120\161\345\013\057\351\266\352\357\253\012\063\071  
\016\375\217\245\147\103\202\216\230\151\011\011\033\100\315\070  
\147\107\352\311\354\227\161\022\336\044\365\162\074\321\367\103  
\114\046\367\220\262\211\351\105\113\125\075\061\005\172\101\342  
\225\272\103\300\027\305\266\205\075\031\215\144\160\363\133\254  
\315\237\323\051\165\207\113\225\147\152\246\370\321\335\274\220  
\206\211\103\051\251\067\133\365\135\260\046\132\123\102\166\220  
\053\317\236\126\154\053\124\317\134\232\145\337\133\213\110\140  
\070\174\373\305\013\317\166\004\143\002\063\052\175\365\203\147  
\347\372\306\103\375\053\017\324\046\057\167\244\062\301\044\352  
\144\235\277\263\070\161\061\104\362\107\270\242\146\101\241\373  
\233\173\274\307\106\152\165\277\132\242\214\350\152\104\301\270  
\226\265\300\062\010\055\173\164\065\163\262\312\306\376\257\021  
\162\030\366\347\310\302\317\245\052\352\173\326\131\350\174\240  
\262\152\100\011\151\016\245\226\333\321\000\271\361\210\156\066  
\360\210\262\235\361\122\362\303\174\277\060\211\074\012\151\371  
\042\244\145\341\233\340\164\306\261\205\227\226\054\256\224\217  
\120\246\071\022\037\276\107\362\201\170\323\165\066\236\175\132  
\040\227\342\122\256\231\237\306\174\233\146\363\376\330\317\356  
\275\227\006\035\055\205\334\076\066\123\226\173\040\272\350\310  
\341\255\226\142\076\021\174\263\000\204\236\247\114\161\253\112  
\067\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125  
\035\016\004\026\004\024\240\326\007\075\136\044\367\173\240\104  
\056\044\122\015\031\252\053\004\221\247\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\015\107  
\371\011\146\061\122\354\171\356\302\250\362\150\076\355\226\105  
\313\072\246\230\143\077\352\053\115\116\003\320\034\202\341\313  
\323\345\326\253\133\147\050\274\235\376\014\231\012\200\125\247  
\316\033\043\141\015\260\127\360\376\340\312\276\346\220\333\203  
\054\276\203\216\364\171\266\376\320\015\102\247\130\037\151\352

\201\365\005\245\376\106\150\353\154\170\311\340\352\347\346\336  
\061\305\322\325\054\202\143\050\235\135\250\032\176\210\346\347  
\053\361\054\325\320\005\236\334\055\275\067\146\324\004\242\247  
\255\277\072\302\250\073\255\377\215\235\063\340\271\232\204\241  
\207\037\166\364\202\164\327\016\371\060\110\076\133\210\076\252  
\134\153\326\057\014\350\216\163\302\030\221\203\071\266\146\132  
\320\037\140\047\135\115\343\366\072\015\146\120\234\170\173\253  
\363\023\020\256\017\057\253\350\144\263\030\040\235\106\065\144  
\045\163\352\233\020\134\130\065\211\261\106\110\247\364\254\324  
\035\236\133\314\251\245\032\023\117\044\120\252\331\033\155\261  
\100\373\235\335\130\164\304\302\157\024\162\354\333\065\237\270  
\124\165\105\303\246\310\032\050\065\072\256\145\362\251\230\316  
\257\133\311\070\214\061\073\177\314\334\226\375\342\133\326\320  
\131\364\166\272\013\313\117\203\020\307\100\320\035\140\351\052  
\345\110\130\167\014\105\151\276\031\161\004\044\342\343\044\037  
\112\310\301\076\231\365\226\230\070\110\045\241\025\260\033\327  
\342\204\030\133\366\161\065\232\150\173\100\314\030\134\014\044  
\235\324\225\365\231\252\106\352\256\254\277\364\024\031\044\350  
\214\354\343\365\274\006\150\212\052\014\005\137\012\227\165\247  
\334\176\300\375\327\172\030\337\060\321\070\113\037\260\230\160  
\277\314\174\163\360\156\304\061\245\244\227\035\254\277\316\154  
\041\112\276\047\043\147\363\006\126\201\012\221\216\266\341\003  
\005\063\054\332\064\010\115\116\120\043\255\037\245\305\324\172  
\376\352\011\354\247\050\140\213\106\174\265\352\233\335\117\371  
\347\153\025\306\210\317\103\333\345\047\334\004\126\156\157\106  
\025\361\126\055\350\134\014\163\303\043\201\070\040\313\311\014  
\151\317\054\253\073\204\140\063\031\122\375\151\024\063

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "HARICA Client RSA Root CA 2021"

# Issuer: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Serial Number:55:52:f8:1e:db:1b:24:2c:9e:bb:96:18:cd:02:28:3e

# Subject: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Not Valid Before: Fri Feb 19 10:58:46 2021

# Not Valid After : Mon Feb 13 10:58:45 2045

# Fingerprint (SHA-256):

1B:E7:AB:E3:06:86:B1:63:48:AF:D1:C6:1B:68:66:A0:EA:7F:48:21:E6:7D:5E:8A:F9:37:CF:80:11:BC:75:0D

#

Fingerprint (SHA1): 46:C6:90:0A:77:3A:B6:BC:F4:65:AD:AC:FC:E3:F7:07:00:6E:DE:6E

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "HARICA Client RSA Root CA 2021"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\106\306\220\012\167\072\266\274\364\145\255\254\374\343\367\007
\000\156\336\156
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\157\355\134\327\210\314\070\251\334\351\335\331\135\333\330\355
END
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\125\122\370\036\333\033\044\054\236\273\226\030\315\002
\050\076
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "HARICA Client ECC Root CA 2021"
#
Issuer: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
Serial Number:31:68:d9:d8:e1:62:57:1e:d2:19:44:88:e6:10:7d:f0
Subject: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
Not Valid Before: Fri Feb 19 11:03:34 2021
Not Valid After : Mon Feb 13 11:03:33 2045
Fingerprint (SHA-256):
8D:D4:B5:37:3C:B0:DE:36:76:9C:12:33:92:80:D8:27:46:B3:AA:6C:D4:26:E7:97:A3:1B:AB:E4:27:9C:F0:0B
Fingerprint (SHA1): BE:64:D3:DA:14:4B:D2:6B:CD:AF:8F:DB:A6:A6:72:F8:DE:26:F9:00
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Client ECC Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156

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\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040  
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\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004  
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164  
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062  
\061

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040  
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165  
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004  
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164  
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062  
\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\061\150\331\330\341\142\127\036\322\031\104\210\346\020  
\175\360

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\132\060\202\001\341\240\003\002\001\002\002\020\061  
\150\331\330\341\142\127\036\322\031\104\210\346\020\175\360\060  
\012\006\010\052\206\110\316\075\004\003\003\060\157\061\013\060  
\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006\003  
\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101\143  
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141  
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163  
\040\103\101\061\047\060\045\006\003\125\004\003\014\036\110\101  
\122\111\103\101\040\103\154\151\145\156\164\040\105\103\103\040  
\122\157\157\164\040\103\101\040\062\060\062\061\060\036\027\015  
\062\061\060\062\061\071\061\061\060\063\063\064\132\027\015\064  
\065\060\062\061\063\061\061\060\063\063\063\132\060\157\061\013  
\060\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006  
\003\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101  
\143\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145  
\141\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156  
\163\040\103\101\061\047\060\045\006\003\125\004\003\014\036\110  
\101\122\111\103\101\040\103\154\151\145\156\164\040\105\103\103  
\040\122\157\157\164\040\103\101\040\062\060\062\061\060\166\060  
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000  
\042\003\142\000\004\007\030\255\225\226\224\320\134\017\202\367  
\052\100\372\002\311\311\075\066\246\243\004\152\301\155\225\001  
\210\140\022\124\154\134\242\053\156\023\072\210\225\014\034\046  
\206\066\112\211\031\267\030\336\073\350\250\120\037\312\337\133

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\277\111\200\025\333\343\060\341\035\132\307\052\212\001\007\376
\155\054\064\357\050\050\227\274\301\371\127\206\225\213\065\317
\236\132\321\150\225\243\102\060\100\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\122\010\322\276\062\201\045\375\365\032\227
\354\116\137\032\273\123\315\220\255\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\206\060\012\006\010\052\206\110
\316\075\004\003\003\003\147\000\060\144\002\060\114\061\105\106
\117\250\346\276\303\167\262\032\030\113\055\210\173\130\346\253
\224\153\104\003\260\027\377\337\202\163\104\121\054\375\223\035
\006\173\024\322\211\354\100\014\357\041\001\056\002\060\057\311
\056\132\154\054\035\331\225\340\236\260\271\134\122\174\366\370
\070\312\056\361\324\035\362\242\111\242\225\370\301\130\136\117
\376\163\012\357\061\260\253\043\130\023\214\213\336\073
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "HARICA Client ECC Root CA 2021"

# Issuer: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and  
Research Institutions CA,C=GR

# Serial Number:31:68:d9:d8:e1:62:57:1e:d2:19:44:88:e6:10:7d:f0

# Subject: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

# Not Valid Before: Fri Feb 19 11:03:34 2021

# Not Valid After : Mon Feb 13 11:03:33 2045

# Fingerprint (SHA-256):

8D:D4:B5:37:3C:B0:DE:36:76:9C:12:33:92:80:D8:27:46:B3:AA:6C:D4:26:E7:97:A3:1B:AB:E4:27:9C:F0:0B

# Fingerprint (SHA1): BE:64:D3:DA:14:4B:D2:6B:CD:AF:8F:DB:A6:A6:72:F8:DE:26:F9:00

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "HARICA Client ECC Root CA 2021"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\276\144\323\332\024\113\322\153\315\257\217\333\246\246\162\370
\336\046\371\000
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\255\270\120\246\251\202\172\154\075\032\252\244\322\143\244\104
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
```

```

\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\061\150\331\330\341\142\127\036\322\031\104\210\346\020
\175\360
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Autoridad de Certificacion Firmaprofesional CIF A62634068"
#
Issuer: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
Serial Number:1b:70:e9:d2:ff:ae:6c:71
Subject: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
Not Valid Before:
 Tue Sep 23 15:22:07 2014
Not Valid After : Mon May 05 15:22:07 2036
Fingerprint (SHA-256):
57:DE:05:83:EF:D2:B2:6E:03:61:DA:99:DA:9D:F4:64:8D:EF:7E:E8:44:1C:3B:72:8A:FA:9B:CD:E0:F9:B2:6A
Fingerprint (SHA1): 0B:BE:C2:27:22:49:CB:39:AA:DB:35:5C:53:E3:8C:AE:78:FF:B6:FE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion Firmaprofesional CIF A62634068"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070

```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\010\033\160\351\322\377\256\154\161

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\024\060\202\003\374\240\003\002\001\002\002\010\033  
\160\351\322\377\256\154\161\060\015\006\011\052\206\110\206\367  
\015\001\001\013\005\000\060\121\061\013\060\011\006\003\125\004  
\006\023\002\105\123\061\102\060\100\006\003\125\004\003\014\071  
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162  
\164\151\146\151\143\141\143\151\157\156\040\106\151\162\155\141  
\160\162\157\146\145\163\151\157\156\141\154\040\103\111\106\040  
\101\066\062\066\063\064\060\066\070\060\036\027\015\061\064\060  
\071\062\063\061\065\062\062\060\067\132\027\015\063\066\060\065  
\060\065\061\065\062\062\060\067\132\060\121\061\013\060\011\006  
\003\125\004\006\023\002\105\123\061\102\060\100\006\003\125\004  
\003\014\071\101\165\164\157\162\151\144\141\144\040\144\145\040  
\103\145\162\164\151\146\151\143\141\143\151\157\156\040\106\151  
\162\155\141\160\162\157\146\145\163\151\157\156\141\154\040\103  
\111\106\040\101\066\062\066\063\064\060\066\070\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\312\226\153  
\216\352\370\373\361\242\065\340\177\114\332\340\303\122\327\175  
\266\020\310\002\136\263\103\052\304\117\152\262\312\034\135\050  
\232\170\021\032\151\131\127\257\265\040\102\344\213\017\346\337  
\133\246\003\222\057\365\021\344\142\327\062\161\070\331\004\014  
\161\253\075\121\176\017\007\337\143\005\134\351\277\224\157\301  
\051\202\300\264\332\121\260\301\074\273\255\067\112\134\312\361  
\113\066\016\044\253\277\303\204\167\375\250\120\364\261\347\306  
\057\322\055\131\215\172\012\116\226\151\122\002\252\066\230\354  
\374\372\024\203\014\067\037\311\222\067\177\327\201\055\345\304  
\271\340\076\064\376\147\364\076\146\321\323\364\100\317\136\142  
\064\017\160\006\076\040\030\132\316\367\162\033\045\154\223\164  
\024\223\243\163\261\016\252\207\020\043\131\137\040\005\031\107  
\355\150\216\222\022\312\135\374\326\053\262\222\074\040\317\341  
\137\257\040\276\240\166\177\166\345\354\032\206\141\063\076\347  
\173\264\077\240\017\216\242\271\152\157\271\207\046\157\101\154  
\210\246\120\375\152\143\013\365\223\026\033\031\217\262\355\233  
\233\311\220\365\001\014\337\031\075\017\076\070\043\311\057\217  
\014\321\002\376\033\125\326\116\320\215\074\257\117\244\363\376  
\257\052\323\005\235\171\010\241\313\127\061\264\234\310\220\262  
\147\364\030\026\223\072\374\107\330\321\170\226\061\037\272\053  
\014\137\135\231\255\143\211\132\044\040\166\330\337\375\253\116  
\246\042\252\235\136\346\047\212\175\150\051\243\347\212\270\332  
\021\273\027\055\231\235\023\044\106\367\305\342\330\237\216\177  
\307\217\164\155\132\262\350\162\365\254\356\044\020\255\057\024  
\332\377\055\232\106\161\107\276\102\337\273\001\333\364\177\323



\050\217\061\131\133\323\311\002\246\264\122\312\156\227\373\103  
\305\010\046\157\212\364\273\375\237\050\252\015\325\105\363\023  
\072\035\330\300\170\217\101\147\074\036\224\144\256\173\013\305  
\350\331\001\210\071\032\227\206\144\101\325\073\207\014\156\372  
\017\306\275\110\024\277\071\115\324\236\101\266\217\226\035\143  
\226\223\331\225\006\170\061\150\236\067\006\073\200\211\105\141  
\071\043\307\033\104\243\025\345\034\370\222\060\273\002\003\001  
\000\001\243\201\357\060\201\354\060\035\006\003\125\035\016\004  
\026\004\024\145\315\353\253\065\036\000\076\176\325\164\300\034  
\264\163\107\016\032\144\057\060\022\006\003\125\035\023\001\001  
\377\004\010\060\006\001\001\377\002\001\001\060\201\246\006\003  
\125\035\040\004\201\236\060\201\233\060\201\230\006\004\125\035  
\040\000\060\201\217\060\057\006\010\053\006\001\005\005\007\002  
\001\026\043\150\164\164\160\072\057\057\167\167\167\056\146\151  
\162\155\141\160\162\157\146\145\163\151\157\156\141\154\056\143  
\157\155\057\143\160\163\060\134\006\010\053\006\001\005\005\007  
\002\002\060\120\036\116\000\120\000\141\000\163\000\145\000\157  
\000\040\000\144\000\145\000\040\000\154\000\141\000\040\000\102  
\000\157\000\156\000\141\000\156\000\157\000\166\000\141\000\040  
\000\064\000\067\000\040\000\102\000\141\000\162\000\143\000\145  
\000\154\000\157\000\156\000\141\000\040\000\060\000\070\000\060  
\000\061\000\067\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001  
\013\005\000\003\202\002\001\000\164\207\050\002\053\167\037\146  
\211\144\355\217\164\056\106\034\273\250\370\370\013\035\203\266  
\072\247\350\105\212\007\267\340\076\040\313\341\010\333\023\010  
\370\050\241\065\262\200\263\013\121\300\323\126\232\215\063\105  
\111\257\111\360\340\075\007\172\105\023\132\377\310\227\330\323  
\030\054\175\226\370\335\242\145\103\160\223\220\025\272\220\337  
\350\031\260\333\054\212\140\017\267\157\224\007\036\035\246\311  
\205\366\275\064\370\100\170\142\020\160\072\276\175\113\071\201  
\251\020\324\226\101\273\370\137\034\013\035\010\362\261\260\211  
\172\362\367\240\340\304\217\213\170\265\073\130\245\043\216\117  
\125\376\066\073\340\014\267\312\052\060\101\040\264\200\315\256  
\374\166\146\163\250\256\156\341\174\332\003\350\224\040\346\042  
\243\320\037\220\135\040\123\024\046\127\332\124\227\337\026\104  
\020\001\036\210\146\217\162\070\223\335\040\267\064\276\327\361  
\356\143\216\107\171\050\006\374\363\131\105\045\140\042\063\033  
\243\137\250\272\052\332\032\075\315\100\352\214\356\005\025\225  
\325\245\054\040\057\247\230\050\356\105\374\361\270\210\000\054  
\217\102\332\121\325\234\345\023\150\161\105\103\213\236\013\041  
\074\113\134\005\334\032\237\230\216\332\275\042\236\162\315\255  
\012\313\314\243\147\233\050\164\304\233\327\032\074\004\130\246  
\202\235\255\307\173\157\377\200\226\351\370\215\152\275\030\220  
\035\377\111\032\220\122\067\223\057\074\002\135\202\166\013\121  
\347\026\307\127\370\070\371\247\315\233\042\124\357\143\260\025  
\155\123\145\003\112\136\112\240\262\247\216\111\000\131\070\325  
\307\364\200\144\365\156\225\120\270\021\176\025\160\070\112\260

```
\177\320\304\062\160\300\031\377\311\070\055\024\054\146\364\102
\104\346\125\166\033\200\025\127\377\300\247\247\252\071\252\330
\323\160\320\056\272\353\224\152\372\137\064\206\347\142\265\375
\212\360\060\205\224\311\257\044\002\057\157\326\335\147\376\343
\260\125\117\004\230\117\244\101\126\342\223\320\152\350\326\363
\373\145\340\316\165\304\061\131\014\356\202\310\014\140\063\112
\031\272\204\147\047\017\274\102\135\275\044\124\015\354\035\160
\006\137\244\274\372\040\174\125
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Autoridad de Certificacion Firmaprofesional CIF A62634068"

# Issuer: CN=Autoridad de Certificacion Firmaprofesional

CIF A62634068,C=ES

# Serial Number:1b:70:e9:d2:ff:ae:6c:71

# Subject: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES

# Not Valid Before: Tue Sep 23 15:22:07 2014

# Not Valid After : Mon May 05 15:22:07 2036

# Fingerprint (SHA-256):

57:DE:05:83:EF:D2:B2:6E:03:61:DA:99:DA:9D:F4:64:8D:EF:7E:E8:44:1C:3B:72:8A:FA:9B:CD:E0:F9:B2:6A

# Fingerprint (SHA1): 0B:BE:C2:27:22:49:CB:39:AA:DB:35:5C:53:E3:8C:AE:78:FF:B6:FE

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Autoridad de Certificacion Firmaprofesional CIF A62634068"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\013\276\302\047\042\111\313\071\252\333\065\134\123\343\214\256
\170\377\266\376
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\116\156\233\124\114\312\267\372\110\344\220\261\025\113\034\243
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\010\033\160\351\322\377\256\154\161
```

END

```

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "vTrus ECC Root CA"
#
Issuer: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN
Serial Number:6e:6a:bc:59:aa:53:be:98:39:67:a2:d2:6b:a4:3b:e6:6d:1c:d6:da
Subject: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN
Not Valid Before: Tue Jul 31 07:26:44 2018
Not Valid After : Fri Jul 31 07:26:44 2043
Fingerprint (SHA-256):
30:FB:BA:2C:32:23:8E:2A:98:54:7A:F9:79:31:E5:50:42:8B:9B:3F:1C:8E:EB:66:33:DC:FA:86:C5:B2:7D:D3
Fingerprint (SHA1):
F6:9C:DB:B0:FC:F6:02:13:B6:52:32:A6:A3:91:3F:16:70:DA:C3:E1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "vTrus ECC Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060
\030\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103
\103\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060
\030\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103
\103\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\156\152\274\131\252\123\276\230\071\147\242\322\153\244
\073\346\155\034\326\332
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\017\060\202\001\225\240\003\002\001\002\002\024\156
\152\274\131\252\123\276\230\071\147\242\322\153\244\073\346\155
\034\326\332\060\012\006\010\052\206\110\316\075\004\003\003\060
\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061\034

```

\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103\150  
\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060\030  
\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103\103  
\040\122\157\157\164\040\103\101\060\036\027\015\061\070\060\067  
\063\061\060\067\062\066\064\064\132\027\015\064\063\060\067\063  
\061\060\067\062\066\064\064\132\060\107\061\013\060\011\006\003  
\125\004\006\023\002\103\116\061\034\060\032\006\003\125\004\012  
\023\023\151\124\162\165\163\103\150\151\156\141\040\103\157\056  
\054\114\164\144\056\061\032\060\030\006\003\125\004\003\023\021  
\166\124\162\165\163\040\105\103\103\040\122\157\157\164\040\103  
\101\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005  
\053\201\004\000\042\003\142\000\004\145\120\112\256\214\171\226  
\112\252\034\010\303\243\242\315\376\131\126\101\167\375\046\224  
\102\273\035\315\010\333\163\262\133\165\363\317\234\116\202\364  
\277\370\141\046\205\154\326\205\133\162\160\322\375\333\142\264  
\337\123\213\275\261\104\130\142\102\011\307\372\177\133\020\347  
\376\100\375\300\330\303\053\062\347\160\246\267\246\040\125\035  
\173\200\135\113\217\147\114\361\020\243\102\060\100\060\035\006  
\003\125\035\016\004\026\004\024\230\071\315\276\330\262\214\367  
\262\253\341\255\044\257\173\174\241\333\037\317\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\012\006  
\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002\060  
\127\235\335\126\361\307\343\351\270\111\120\153\233\151\303\157  
\354\303\175\045\344\127\225\023\100\233\122\323\073\363\100\031  
\274\046\307\055\006\236\265\173\066\237\365\045\324\143\153\000  
\002\061\000\351\323\306\236\126\232\052\314\241\332\077\310\146  
\053\323\130\234\040\205\372\253\221\212\160\160\021\070\140\144  
\013\142\011\221\130\000\371\115\373\064\150\332\011\255\041\006  
\030\224\316

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "vTrus ECC Root CA"

# Issuer: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN

# Serial Number:6e:6a:bc:59:aa:53:be:98:39:67:a2:d2:6b:a4:3b:e6:6d:1c:d6:da

# Subject: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN

# Not Valid Before: Tue Jul 31 07:26:44 2018

# Not Valid After : Fri Jul 31 07:26:44 2043

# Fingerprint (SHA-256):

30:FB:BA:2C:32:23:8E:2A:98:54:7A:F9:79:31:E5:50:42:8B:9B:3F:1C:8E:EB:66:33:DC:FA:86:C5:B2:7D:D3

# Fingerprint (SHA1): F6:9C:DB:B0:FC:F6:02:13:B6:52:32:A6:A3:91:3F:16:70:DA:C3:E1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE

```
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "vTrus ECC Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\366\234\333\260\374\366\002\023\266\122\062\246\243\221\077\026
\160\332\303\341
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\336\113\301\365\122\214\233\103\341\076\217\125\124\027\215\205
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060
\030\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103
\103\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\156\152\274\131\252\123\276\230\071\147\242\322\153\244
\073\346\155\034\326\332
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

#

#

Certificate "vTrus Root CA"

#

# Issuer: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN

# Serial Number:43:e3:71:13:d8:b3:59:14:5d:b7:ce:8c:fd:35:fd:6f:bc:05:8d:45

# Subject: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN

# Not Valid Before: Tue Jul 31 07:24:05 2018

# Not Valid After : Fri Jul 31 07:24:05 2043

# Fingerprint (SHA-256):

8A:71:DE:65:59:33:6F:42:6C:26:E5:38:80:D0:0D:88:A1:8D:A4:C6:A9:1F:0D:CB:61:94:E2:06:C5:C9:63:87

# Fingerprint (SHA1): 84:1A:69:FB:F5:CD:1A:25:34:13:3D:E3:F8:FC:B8:99:D0:C9:14:B7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "vTrus Root CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\103\061\013\060\011\006\003\125\004\006\023\002\103\116\061

\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103

\150\151\156\141\040\103\157\056\054\114\164\144\056\061\026\060

```
\024\006\003\125\004\003\023\015\166\124\162\165\163\040\122\157
\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\026\060
\024\006\003\125\004\003\023\015\166\124\162\165\163\040\122\157
\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\103\343\161\023\330\263\131\024\135\267\316\214\375\065
\375\157\274\005\215\105
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\126\060\202\003\076\240\003\002\001\002\002\024\103
\343\161\023\330\263\131\024\135\267\316\214\375\065\375\157\274
\005\215\105\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\103\061\013\060\011\006\003\125\004\006\023\002\103
\116\061\034\060\032\006\003\125\004\012\023\023\151\124\162\165
\163\103\150\151\156\141\040\103\157\056\054\114\164\144\056\061
\026\060\024\006\003\125\004\003\023\015\166\124\162\165\163\040
\122\157\157\164\040\103\101\060\036\027\015\061\070\060\067\063
\061\060\067\062\064\060\065\132\027\015\064\063\060\067\063\061
\060\067\062\064\060\065\132\060\103\061\013\060\011\006\003\125
\004\006\023\002\103\116\061\034\060\032\006\003\125\004\012\023
\023\151\124\162\165\163\103\150\151\156\141\040\103\157\056\054
\114\164\144\056\061\026\060\024\006\003\125\004\003\023\015\166
\124\162\165\163\040\122\157\157\164\040\103\101\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\275\125\174
\141\323\270\035\004\142\005\240\256\154\267\160\264\101\352\113
\003\136\020\077\220\132\034\213\073\260\146\213\154\110\246\034
\042\272\325\100\222\356\063\262\043\131\311\216\274\130\332\213
\236\320\031\362\057\131\306\214\143\132\272\237\243\013\260\263
\232\134\272\021\270\022\351\014\273\317\156\154\200\207\051\024
\003\054\215\044\232\310\144\203\265\152\254\023\054\063\361\237
\334\054\141\074\032\077\160\125\233\255\000\122\177\317\004\271
\376\066\372\234\300\026\256\142\376\226\114\103\176\125\024\276
\032\263\322\155\302\257\166\146\225\153\052\260\224\167\205\136
\004\017\142\035\143\165\367\153\347\313\133\232\160\354\076\147
\005\360\376\007\010\200\317\050\333\005\306\024\047\057\206\175
\360\047\336\377\346\176\063\110\347\013\036\130\321\047\053\123
\016\127\112\145\327\373\242\200\140\374\114\274\065\123\001\152
\227\162\202\257\361\035\160\350\234\365\357\136\302\154\307\107
\176\132\224\205\046\115\073\272\353\114\350\260\011\302\145\302
```

\235\235\011\233\116\265\227\005\254\365\006\240\367\066\005\176  
\364\220\262\153\304\264\371\144\352\351\032\012\310\015\250\355  
\047\311\324\347\263\271\253\202\042\220\047\075\052\350\174\220  
\357\274\117\375\342\012\044\247\336\145\044\244\135\352\300\166  
\060\323\167\120\370\015\004\233\224\066\001\163\312\006\130\246  
\323\073\334\372\004\106\023\125\212\311\104\107\270\121\071\032  
\056\350\064\342\171\313\131\112\012\177\274\246\357\037\003\147  
\152\131\053\045\142\223\331\123\031\146\074\047\142\051\206\115  
\244\153\356\377\324\116\272\325\264\342\216\110\132\000\031\011  
\361\005\331\316\221\261\367\353\351\071\117\366\157\004\103\232  
\125\365\076\005\024\275\277\263\131\264\330\216\063\204\243\220  
\122\252\263\002\225\140\371\014\114\150\371\356\325\027\015\370  
\161\127\265\045\344\051\356\145\135\257\321\356\074\027\013\132  
\103\305\245\206\352\044\236\342\005\007\334\064\102\022\221\326  
\071\164\256\114\101\202\333\362\246\110\321\263\233\363\063\252  
\363\246\300\305\116\365\364\235\166\143\346\002\306\042\113\301  
\225\077\120\144\054\124\345\266\360\074\051\317\127\002\003\001  
\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004  
\024\124\142\160\143\361\165\204\103\130\216\321\026\040\261\306  
\254\032\274\366\211\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015  
\001\001\013\005\000\003\202\002\001\000\051\272\222\111\247\255  
\360\361\160\303\344\227\360\237\251\045\325\153\236\064\376\346  
\032\144\366\072\153\122\262\020\170\032\237\114\332\212\332\354  
\034\067\122\340\102\113\373\154\166\312\044\013\071\022\025\235  
\237\021\055\374\171\144\334\340\340\365\335\340\127\311\245\262  
\166\160\120\244\376\267\012\160\325\240\064\361\165\327\115\111  
\272\021\321\263\330\354\202\377\353\016\304\277\144\055\175\143  
\156\027\170\354\135\174\210\310\353\216\127\166\331\131\004\372  
\274\122\037\105\254\360\172\200\354\354\157\166\256\221\333\020  
\216\004\334\222\337\240\366\346\256\111\323\301\154\022\033\314  
\051\252\371\010\245\342\067\024\312\261\270\146\357\032\202\344  
\360\370\361\247\026\151\267\333\251\141\074\237\365\061\313\344  
\000\106\302\057\164\261\261\327\201\356\250\046\225\274\210\257  
\114\065\007\052\002\312\170\024\155\107\053\100\126\351\313\052  
\140\241\147\003\240\316\214\274\260\162\147\304\061\316\333\064  
\345\045\003\140\045\173\161\230\344\300\033\053\137\164\102\322  
\113\305\131\010\007\207\276\305\303\177\347\226\331\341\334\050  
\227\326\217\005\343\365\233\116\312\035\120\107\005\123\260\312  
\071\347\205\240\211\301\005\073\001\067\323\077\111\342\167\353  
\043\310\210\146\073\075\071\166\041\106\361\354\137\043\270\353  
\242\146\165\164\301\100\367\330\150\232\223\342\055\251\056\275  
\034\243\036\310\164\306\244\055\172\040\253\073\270\260\106\375  
\157\335\137\122\125\165\142\360\227\240\174\327\070\375\045\337  
\315\240\233\020\317\213\270\070\136\136\305\264\246\002\066\241  
\036\137\034\317\342\226\235\051\252\375\230\256\122\341\363\101  
\122\373\251\056\162\226\237\047\343\252\163\175\370\032\043\146

```
\173\073\253\145\260\062\001\113\025\076\075\242\117\014\053\065
\242\306\331\147\022\065\060\315\166\056\026\263\231\236\115\117
\116\055\073\064\103\341\232\016\015\244\146\227\272\322\034\112
\114\054\052\213\213\201\117\161\032\251\335\134\173\173\010\305
\000\015\067\100\343\174\173\124\137\057\205\137\166\366\367\247
\260\034\127\126\301\162\350\255\242\257\215\063\111\272\037\212
\334\346\164\174\140\206\157\207\227\173
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "vTrus Root CA"

# Issuer: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN

# Serial Number:43:e3:71:13:d8:b3:59:14:5d:b7:ce:8c:fd:35:fd:6f:bc:05:8d:45

# Subject: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN

# Not Valid Before: Tue Jul 31 07:24:05 2018

# Not Valid After : Fri Jul 31 07:24:05 2043

# Fingerprint (SHA-256):

8A:71:DE:65:59:33:6F:42:6C:26:E5:38:80:D0:0D:88:A1:8D:A4:C6:A9:1F:0D:CB:61:94:E2:06:C5:C9:63:87

# Fingerprint (SHA1): 84:1A:69:FB:F5:CD:1A:25:34:13:3D:E3:F8:FC:B8:99:D0:C9:14:B7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "vTrus Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\204\032\151\373\365\315\032\045\064\023\075\343\370\374\270\231
\320\311\024\267
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\270\311\067\337\372\153\061\204\144\305\352\021\152\033\165\374
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\103\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\026\060
\024\006\003\125\004\003\023\015\166\124\162\165\163\040\122\157
\157\164\040\103\101
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\024\103\343\161\023\330\263\131\024\135\267\316\214\375\065
\375\157\274\005\215\105
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST



CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "ISRG Root X2"

#

# Issuer: CN=ISRG Root X2,O=Internet Security Research Group,C=US

# Serial Number:41:d2:9d:d1:72:ea:ee:a7:80:c1:2c:6c:e9:2f:87:52

# Subject: CN=ISRG Root X2,O=Internet Security  
Research Group,C=US

# Not Valid Before: Fri Sep 04 00:00:00 2020

# Not Valid After : Mon Sep 17 16:00:00 2040

# Fingerprint (SHA-256):

69:72:9B:8E:15:A8:6E:FC:17:7A:57:AF:B7:17:1D:FC:64:AD:D2:8C:2F:CA:8C:F1:50:7E:34:45:3C:CB:14:70

# Fingerprint (SHA1): BD:B1:B9:3C:D5:97:8D:45:C6:26:14:55:F8:DB:95:C7:5A:D1:53:AF

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ISRG Root X2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156  
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145  
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003  
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130  
\062

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156  
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145  
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003  
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130  
\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\101\322\235\321\162\352\356\247\200\301\054\154\351\057  
\207\122

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\033\060\202\001\241\240\003\002\001\002\002\020\101  
\322\235\321\162\352\356\247\200\301\054\154\351\057\207\122\060  
\012\006\010\052\206\110\316\075\004\003\003\060\117\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\051\060\047\006\003

\125\004\012\023\040\111\156\164\145\162\156\145\164\040\123\145  
\143\165\162\151\164\171\040\122\145\163\145\141\162\143\150\040  
\107\162\157\165\160\061\025\060\023\006\003\125\004\003\023\014  
\111\123\122\107\040\122\157\157\164\040\130\062\060\036\027\015  
\062\060\060\071\060\064\060\060\060\060\060\132\027\015\064  
\060\060\071\061\067\061\066\060\060\060\060\132\060\117\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\051\060\047\006  
\003\125\004\012\023\040\111\156\164\145\162\156\145\164\040\123  
\145\143\165\162\151\164\171\040\122\145\163\145\141\162\143\150  
\040\107\162\157\165\160\061\025\060\023\006\003\125\004\003\023  
\014\111\123\122\107\040\122\157\157\164\040\130\062\060\166\060  
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000  
\042\003\142\000\004\315\233\325\237\200\203\012\354\011\112\363  
\026\112\076\134\317\167\254\336\147\005\015\035\007\266\334\026  
\373\132\213\024\333\342\161\140\304\272\105\225\021\211\216\352  
\006\337\367\052\026\034\244\271\305\305\062\340\003\340\036\202  
\030\070\213\327\105\330\012\152\156\346\000\167\373\002\121\175  
\042\330\012\156\232\133\167\337\360\372\101\354\071\334\165\312  
\150\007\014\037\352\243\102\060\100\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035  
\016\004\026\004\024\174\102\226\256\336\113\110\073\372\222\370  
\236\214\317\155\213\251\162\067\225\060\012\006\010\052\206\110  
\316\075\004\003\003\003\150\000\060\145\002\060\173\171\116\106  
\120\204\302\104\207\106\033\105\160\377\130\231\336\364\375\244  
\322\125\246\040\055\164\326\064\274\101\243\120\137\001\047\126  
\264\276\047\165\006\257\022\056\165\230\215\374\002\061\000\213  
\365\167\154\324\310\145\252\340\013\054\356\024\235\047\067\244  
\371\123\245\121\344\051\203\327\370\220\061\133\102\237\012\365  
\376\256\000\150\347\214\111\017\266\157\133\133\025\362\347

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "ISRG Root X2"

# Issuer: CN=ISRG Root X2,O=Internet Security Research Group,C=US

# Serial Number:41:d2:9d:d1:72:ea:ee:a7:80:c1:2c:6c:e9:2f:87:52

# Subject: CN=ISRG Root X2,O=Internet Security Research Group,C=US

# Not Valid Before: Fri

Sep 04 00:00:00 2020

# Not Valid After : Mon Sep 17 16:00:00 2040

# Fingerprint (SHA-256):

69:72:9B:8E:15:A8:6E:FC:17:7A:57:AF:B7:17:1D:FC:64:AD:D2:8C:2F:CA:8C:F1:50:7E:34:45:3C:CB:14:70

# Fingerprint (SHA1): BD:B1:B9:3C:D5:97:8D:45:C6:26:14:55:F8:DB:95:C7:5A:D1:53:AF

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ISRG Root X2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\275\261\271\074\325\227\215\105\306\046\024\125\370\333\225\307
\132\321\123\257
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\323\236\304\036\043\074\246\337\317\243\176\155\340\024\346\345
END
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\101\322\235\321\162\352\356\247\200\301\054\154\351\057
\207\122
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "HiPKI Root CA - G1"
#
Issuer: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
Serial Number:2d:dd:ac:ce:62:97:94:a1:43:e8:b0:cd:76:6a:5e:60
Subject: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
Not Valid Before: Fri Feb 22 09:46:04 2019
Not Valid After : Thu Dec 31 15:59:59 2037
Fingerprint (SHA-256):
F0:15:CE:3C:C2:39:BF:EF:06:4B:E9:F1:D2:C4:17:E1:A0:26:4A:0A:94:BE:1F:0C:8D:12:18:64:EB:69:49:CC
Fingerprint (SHA1): 6A:92:E4:A8:EE:1B:EC:96:45:37:E3:29:57:49:CD:96:E3:E5:D2:60
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "HiPKI Root CA - G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061

```

\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150  
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040  
\114\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110  
\151\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107  
\061

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061  
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150  
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040  
\114\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110  
\151\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107  
\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\055\335\254\316\142\227\224\241\103\350\260\315\166\152  
\136\140

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\152\060\202\003\122\240\003\002\001\002\002\020\055  
\335\254\316\142\227\224\241\103\350\260\315\166\152\136\140\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\117  
\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043\060  
\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167\141  
\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114\164  
\144\056\061\033\060\031\006\003\125\004\003\014\022\110\151\120  
\113\111\040\122\157\157\164\040\103\101\040\055\040\107\061\060  
\036\027\015\061\071\060\062\062\062\060\071\064\066\060\064\132  
\027\015\063\067\061\062\063\061\061\065\065\071\065\071\132\060  
\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043  
\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167  
\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114  
\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110\151  
\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107\061  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\364\036\177\122\163\062\014\163\344\275\023\164\243\324\060  
\250\320\256\113\330\266\337\165\107\146\364\174\347\071\004\036  
\152\160\040\322\132\107\162\147\125\364\245\350\235\325\036\041  
\241\360\147\272\314\041\150\276\104\123\277\215\371\342\334\057  
\125\310\067\077\037\244\300\234\263\344\167\134\240\106\376\167  
\372\032\240\070\352\355\232\162\336\053\275\224\127\072\272\354  
\171\347\137\175\102\144\071\172\046\066\367\044\360\325\057\272  
\225\230\021\146\255\227\065\326\165\001\200\340\257\364\204\141  
\214\015\036\137\174\207\226\136\101\257\353\207\352\370\135\361  
\056\210\005\076\114\042\273\332\037\052\335\122\106\144\071\363  
\102\316\331\236\014\263\260\167\227\144\234\300\364\243\056\037

\225\007\260\027\337\060\333\000\030\226\114\241\201\113\335\004  
\155\123\243\075\374\007\254\324\305\067\202\353\344\225\010\031  
\050\202\322\102\072\243\330\123\354\171\211\140\110\140\310\162  
\222\120\334\003\217\203\077\262\102\127\132\333\152\351\021\227  
\335\205\050\274\060\114\253\343\302\261\105\104\107\037\340\212  
\026\007\226\322\041\017\123\300\355\251\176\324\116\354\233\011  
\354\257\102\254\060\326\277\321\020\105\340\246\026\262\245\305  
\323\117\163\224\063\161\002\241\152\243\326\063\227\117\041\143  
\036\133\217\331\301\136\105\161\167\017\201\135\137\041\232\255  
\203\314\372\136\326\215\043\137\033\075\101\257\040\165\146\132  
\112\366\237\373\253\030\367\161\300\266\035\061\354\073\040\353  
\313\342\270\365\256\222\262\367\341\204\113\362\242\362\223\232  
\042\236\323\024\157\066\124\275\037\136\131\025\271\163\250\301  
\174\157\173\142\351\026\154\107\132\145\363\016\021\233\106\331  
\375\155\334\326\234\300\264\175\245\260\335\077\126\157\241\371  
\366\344\022\110\375\006\177\022\127\266\251\043\117\133\003\303  
\340\161\052\043\267\367\260\261\073\274\230\275\326\230\250\014  
\153\366\216\022\147\246\362\262\130\344\002\011\023\074\251\273  
\020\264\322\060\105\361\354\367\000\021\337\145\370\334\053\103  
\125\277\026\227\304\017\325\054\141\204\252\162\206\376\346\072  
\176\302\077\175\356\374\057\024\076\346\205\335\120\157\267\111  
\355\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125  
\035\016\004\026\004\024\362\167\027\372\136\250\376\366\075\161  
\325\150\272\311\106\014\070\330\257\260\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\120\121  
\360\165\334\160\004\343\377\252\165\324\161\242\313\236\217\250  
\251\323\257\165\307\124\317\072\034\004\231\042\254\304\021\342  
\357\063\112\246\043\035\016\015\107\330\067\307\157\257\064\177  
\117\201\153\065\117\351\162\245\061\342\170\347\367\116\224\030  
\133\100\175\317\153\041\124\206\346\225\172\373\306\312\352\234  
\110\116\127\011\135\057\254\364\245\264\227\063\130\325\254\171  
\251\314\137\371\205\372\122\305\215\370\221\024\353\072\015\027  
\320\122\302\173\343\302\163\216\106\170\006\070\054\350\134\332  
\146\304\364\244\360\126\031\063\051\132\145\222\005\107\106\112  
\253\204\303\036\047\241\037\021\222\231\047\165\223\017\274\066  
\073\227\127\217\046\133\014\273\234\017\324\156\060\007\324\334  
\137\066\150\146\071\203\226\047\046\212\310\304\071\376\232\041  
\157\325\162\206\351\177\142\345\227\116\320\044\320\100\260\320  
\165\010\216\275\150\356\010\327\156\174\020\160\106\033\174\340  
\210\262\236\162\206\231\001\343\277\237\111\031\264\045\276\126  
\145\256\027\143\345\036\337\350\377\107\245\277\341\046\005\204  
\344\260\300\257\347\010\231\250\014\136\046\200\105\324\370\150  
\057\226\217\256\342\112\034\234\026\014\023\157\070\207\366\273  
\310\064\137\222\003\121\171\160\246\337\313\365\231\115\171\315  
\116\274\127\237\103\116\153\056\053\030\370\152\163\214\272\305  
\065\357\071\152\101\036\317\161\250\242\262\206\007\133\072\311

\341\357\077\145\004\200\107\062\104\160\225\116\061\147\152\164  
\133\020\105\165\352\260\237\320\346\065\376\116\237\213\314\053  
\222\105\133\156\045\140\205\106\315\321\252\260\166\146\223\167  
\226\276\203\276\070\266\044\116\046\013\314\355\172\126\032\340  
\351\132\306\144\255\114\172\000\110\104\057\271\100\273\023\076  
\276\025\170\235\205\201\112\052\127\336\325\031\103\332\333\312  
\133\107\206\203\013\077\266\015\166\170\163\171\042\136\261\200  
\037\317\276\321\077\126\020\230\053\225\207\241\037\235\144\024  
\140\071\054\263\000\125\056\344\365\263\016\127\304\221\101\000  
\234\077\350\245\337\352\366\377\310\360\255\155\122\250\027\253  
\233\141\374\022\121\065\344\045\375\257\252\152\206\071

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "HiPKI Root CA - G1"

# Issuer: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW

# Serial Number:2d:dd:ac:ce:62:97:94:a1:43:e8:b0:cd:76:6a:5e:60

# Subject: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW

#

Not Valid Before: Fri Feb 22 09:46:04 2019

# Not Valid After : Thu Dec 31 15:59:59 2037

# Fingerprint (SHA-256):

F0:15:CE:3C:C2:39:BF:EF:06:4B:E9:F1:D2:C4:17:E1:A0:26:4A:0A:94:BE:1F:0C:8D:12:18:64:EB:69:49:CC

# Fingerprint (SHA1): 6A:92:E4:A8:EE:1B:EC:96:45:37:E3:29:57:49:CD:96:E3:E5:D2:60

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "HiPKI Root CA - G1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\152\222\344\250\356\033\354\226\105\067\343\051\127\111\315\226  
\343\345\322\140

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\151\105\337\026\145\113\350\150\232\217\166\137\377\200\236\323  
END

CKA\_ISSUER MULTILINE\_OCTAL

\060\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061  
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150  
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040  
\114\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110  
\151\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107  
\061

END

CKA\_SERIAL\_NUMBER

```

MULTILINE_OCTAL
\002\020\055\335\254\316\142\227\224\241\103\350\260\315\166\152
\136\140
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "GlobalSign ECC Root CA - R4"
#
Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4
Serial Number:02:03:e5:7e:f5:3f:93:fd:a5:09:21:b2:a6
Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4
Not Valid Before: Tue Nov 13 00:00:00 2012
Not Valid After : Tue Jan 19 03:14:07 2038
Fingerprint (SHA-256):
B0:85:D7:0B:96:4F:19:1A:73:E4:AF:0D:54:AE:7A:0E:07:AA:FD:AF:9B:71:DD:08:62:13:8A:B7:32:5A:24:A2
Fingerprint (SHA1): 6B:A0:B0:98:E1:71:EF:5A:AD:FE:48:15:80:77:10:F4:BD:6F:0B:28
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign ECC Root CA - R4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\064\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\064\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\176\365\077\223\375\245\011\041\262\246
END
CKA_VALUE MULTILINE_OCTAL

```

\060\202\001\334\060\202\001\203\240\003\002\001\002\002\015\002  
\003\345\176\365\077\223\375\245\011\041\262\246\060\012\006\010  
\052\206\110\316\075\004\003\002\060\120\061\044\060\042\006\003  
\125\004\013\023\033\107\154\157\142\141\154\123\151\147\156\040  
\105\103\103\040\122\157\157\164\040\103\101\040\055\040\122\064  
\061\023\060\021\006\003\125\004\012\023\012\107\154\157\142\141  
\154\123\151\147\156\061\023\060\021\006\003\125\004\003\023\012  
\107\154\157\142\141\154\123\151\147\156\060\036\027\015\061\062  
\061\061\061\063\060\060\060\060\060\060\132\027\015\063\070\060  
\061\061\071\060\063\061\064\060\067\132\060\120\061\044\060\042  
\006\003\125\004\013\023\033\107\154\157\142\141\154\123\151\147  
\156\040\105\103\103\040\122\157\157\164\040\103\101\040\055\040  
\122\064\061\023\060\021\006\003\125\004\012\023\012\107\154\157  
\142\141\154\123\151\147\156\061\023\060\021\006\003\125\004\003  
\023\012\107\154\157\142\141\154\123\151\147\156\060\131\060\023  
\006\007\052\206\110\316\075\002\001\006\010\052\206\110\316\075  
\003\001\007\003\102\000\004\270\306\171\323\217\154\045\016\237  
\056\071\031\034\003\244\256\232\345\071\007\011\026\312\143\261  
\271\206\370\212\127\301\127\316\102\372\163\241\367\145\102\377  
\036\301\000\262\156\163\016\377\307\041\345\030\244\252\331\161  
\077\250\324\271\316\214\035\243\102\060\100\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003  
\125\035\016\004\026\004\024\124\260\173\255\105\270\342\100\177  
\373\012\156\373\276\063\311\074\243\204\325\060\012\006\010\052  
\206\110\316\075\004\003\002\003\107\000\060\104\002\040\042\117  
\164\162\271\140\257\361\346\234\240\026\005\120\137\303\136\073  
\156\141\164\357\276\001\304\276\030\110\131\141\202\062\002\040  
\046\235\124\143\100\336\067\140\120\317\310\330\355\235\202\256  
\067\230\274\243\217\114\114\251\064\053\154\357\373\225\233\046  
END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL

CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GlobalSign ECC Root CA - R4"

# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4

# Serial Number:02:03:e5:7e:f5:3f:93:fd:a5:09:21:b2:a6

# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4

# Not Valid Before: Tue Nov 13 00:00:00 2012

# Not Valid After : Tue Jan 19 03:14:07 2038

# Fingerprint (SHA-256):

B0:85:D7:0B:96:4F:19:1A:73:E4:AF:0D:54:AE:7A:0E:07:AA:FD:AF:9B:71:DD:08:62:13:8A:B7:32:5A:24:A2

# Fingerprint (SHA1): 6B:A0:B0:98:E1:71:EF:5A:AD:FE:48:15:80:77:10:F4:BD:6F:0B:28

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE



```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign ECC Root CA - R4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\153\240\260\230\341\161\357\132\255\376\110\025\200\167\020\364
\275\157\013\050
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\046\051\370\155\341\210\277\242\145\177\252\304\315\017\177\374
END
CKA_ISSUER
MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\064\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\176\365\077\223\375\245\011\041\262\246
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "GTS Root R1"
#
Issuer: CN=GTS Root R1,O=Google Trust Services LLC,C=US
Serial Number:02:03:e5:93:6f:31:b0:13:49:88:6b:a2:17
Subject: CN=GTS Root R1,O=Google Trust Services LLC,C=US
Not Valid Before: Wed Jun 22 00:00:00 2016
Not Valid After : Sun Jun 22
00:00:00 2036
Fingerprint (SHA-256):
D9:47:43:2A:BD:E7:B7:FA:90:FC:2E:6B:59:10:1B:12:80:E0:E1:C7:E4:E4:0F:A3:C6:88:7F:FF:57:A7:F4:CF
Fingerprint (SHA1): E5:8C:1C:C4:91:3B:38:63:4B:E9:10:6E:E3:AD:8E:6B:9D:D9:81:4A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145

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\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040  
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124  
\123\040\122\157\157\164\040\122\061

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145  
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040  
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124  
\123\040\122\157\157\164\040\122\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\015\002\003\345\223\157\061\260\023\111\210\153\242\027

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\127\060\202\003\077\240\003\002\001\002\002\015\002  
\003\345\223\157\061\260\023\111\210\153\242\027\060\015\006\011  
\052\206\110\206\367\015\001\001\014\005\000\060\107\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\042\060\040\006\003  
\125\004\012\023\031\107\157\157\147\154\145\040\124\162\165\163  
\164\040\123\145\162\166\151\143\145\163\040\114\114\103\061\024  
\060\022\006\003\125\004\003\023\013\107\124\123\040\122\157\157  
\164\040\122\061\060\036\027\015\061\066\060\066\062\062\060\060  
\060\060\060\060\132\027\015\063\066\060\066\062\062\060\060\060  
\060\060\060\132\060\107\061\013\060\011\006\003\125\004\006\023  
\002\125\123\061\042\060\040\006\003\125\004\012\023\031\107\157  
\157\147\154\145\040\124\162\165\163\164\040\123\145\162\166\151  
\143\145\163\040\114\114\103\061\024\060\022\006\003\125\004\003  
\023\013\107\124\123\040\122\157\157\164\040\122\061\060\202\002  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\266\021  
\002\213\036\343\241\167\233\073\334\277\224\076\267\225\247\100  
\074\241\375\202\371\175\062\006\202\161\366\366\214\177\373\350  
\333\274\152\056\227\227\243\214\113\371\053\366\261\371\316\204  
\035\261\371\305\227\336\357\271\362\243\351\274\022\211\136\247  
\252\122\253\370\043\047\313\244\261\234\143\333\327\231\176\360  
\012\136\353\150\246\364\306\132\107\015\115\020\063\343\116\261  
\023\243\310\030\154\113\354\374\011\220\337\235\144\051\045\043  
\007\241\264\322\075\056\140\340\317\322\011\207\273\315\110\360  
\115\302\302\172\210\212\273\272\317\131\031\326\257\217\260\007  
\260\236\061\361\202\301\300\337\056\246\155\154\031\016\265\330  
\176\046\032\105\003\075\260\171\244\224\050\255\017\177\046\345  
\250\010\376\226\350\074\150\224\123\356\203\072\210\053\025\226  
\011\262\340\172\214\056\165\326\234\353\247\126\144\217\226\117  
\150\256\075\227\302\204\217\300\274\100\300\013\134\275\366\207  
\263\065\154\254\030\120\177\204\340\114\315\222\323\040\351\063

\274\122\231\257\062\265\051\263\045\052\264\110\371\162\341\312  
\144\367\346\202\020\215\350\235\302\212\210\372\070\146\212\374  
\143\371\001\371\170\375\173\134\167\372\166\207\372\354\337\261  
\016\171\225\127\264\275\046\357\326\001\321\353\026\012\273\216  
\013\265\305\305\212\125\253\323\254\352\221\113\051\314\031\244  
\062\045\116\052\361\145\104\320\002\316\252\316\111\264\352\237  
\174\203\260\100\173\347\103\253\247\154\243\217\175\211\201\372  
\114\245\377\325\216\303\316\113\340\265\330\263\216\105\317\166  
\300\355\100\053\375\123\017\260\247\325\073\015\261\212\242\003  
\336\061\255\314\167\352\157\173\076\326\337\221\042\022\346\276  
\372\330\062\374\020\143\024\121\162\336\135\326\026\223\275\051  
\150\063\357\072\146\354\007\212\046\337\023\327\127\145\170\047  
\336\136\111\024\000\242\000\177\232\250\041\266\251\261\225\260  
\245\271\015\026\021\332\307\154\110\074\100\340\176\015\132\315  
\126\074\321\227\005\271\313\113\355\071\113\234\304\077\322\125  
\023\156\044\260\326\161\372\364\301\272\314\355\033\365\376\201  
\101\330\000\230\075\072\310\256\172\230\067\030\005\225\002\003  
\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001  
\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004  
\026\004\024\344\257\053\046\161\032\053\110\047\205\057\122\146  
\054\357\360\211\023\161\076\060\015\006\011\052\206\110\206\367  
\015\001\001\014\005\000\003\202\002\001\000\237\252\102\046\333  
\013\233\276\377\036\226\222\056\076\242\145\112\152\230\272\042  
\313\175\301\072\330\202\012\006\306\366\245\336\300\116\207\146  
\171\241\371\246\130\234\252\371\265\346\140\347\340\350\261\036  
\102\101\063\013\067\075\316\211\160\025\312\265\044\250\317\153  
\265\322\100\041\230\317\042\064\317\073\305\042\204\340\305\016  
\212\174\135\210\344\065\044\316\233\076\032\124\036\156\333\262  
\207\247\374\363\372\201\125\024\142\012\131\251\042\005\061\076  
\202\326\356\333\127\064\274\063\225\323\027\033\350\047\242\213  
\173\116\046\032\172\132\144\266\321\254\067\361\375\240\363\070  
\354\162\360\021\165\235\313\064\122\215\346\166\153\027\306\337  
\206\253\047\216\111\053\165\146\201\020\041\246\352\076\364\256  
\045\377\174\025\336\316\214\045\077\312\142\160\012\367\057\011  
\146\007\310\077\034\374\360\333\105\060\337\142\210\301\265\017  
\235\303\237\112\336\131\131\107\305\207\042\066\346\202\247\355  
\012\271\342\007\240\215\173\172\112\074\161\322\342\003\241\037  
\062\007\335\033\344\102\316\014\000\105\141\200\265\013\040\131  
\051\170\275\371\125\313\143\305\074\114\364\266\377\333\152\137  
\061\153\231\236\054\301\153\120\244\327\346\030\024\275\205\077  
\147\253\106\237\240\377\102\247\072\177\134\313\135\260\160\035  
\053\064\365\324\166\011\014\353\170\114\131\005\363\063\102\303  
\141\025\020\033\167\115\316\042\214\324\205\362\105\175\267\123  
\352\357\100\132\224\012\134\040\137\116\100\135\142\042\166\337  
\377\316\141\275\214\043\170\322\067\002\340\216\336\321\021\067  
\211\366\277\355\111\007\142\256\222\354\100\032\257\024\011\331  
\320\116\262\242\367\276\356\356\330\377\334\032\055\336\270\066

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\161\342\374\171\267\224\045\321\110\163\133\241\065\347\263\231
\147\165\301\031\072\053\107\116\323\102\216\375\061\310\026\146
\332\322\014\074\333\263\216\311\241\015\200\017\173\026\167\024
\277\377\333\011\224\262\223\274\040\130\025\351\333\161\103\363
\336\020\303\000\334\250\052\225\266\302\326\077\220\153\166\333
\154\376\214\274\362\160\065\014\334\231\031\065\334\327\310\106
\143\325\066\161\256\127\373\267\202\155\334
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GTS Root R1"

# Issuer: CN=GTS Root R1,O=Google

Trust Services LLC,C=US

# Serial Number:02:03:e5:93:6f:31:b0:13:49:88:6b:a2:17

# Subject: CN=GTS Root R1,O=Google Trust Services LLC,C=US

# Not Valid Before: Wed Jun 22 00:00:00 2016

# Not Valid After : Sun Jun 22 00:00:00 2036

# Fingerprint (SHA-256):

D9:47:43:2A:BD:E7:B7:FA:90:FC:2E:6B:59:10:1B:12:80:E0:E1:C7:E4:E4:0F:A3:C6:88:7F:FF:57:A7:F4:CF

# Fingerprint (SHA1): E5:8C:1C:C4:91:3B:38:63:4B:E9:10:6E:E3:AD:8E:6B:9D:D9:81:4A

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GTS Root R1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\345\214\034\304\221\073\070\143\113\351\020\156\343\255\216\153
\235\331\201\112
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\005\376\320\277\161\250\243\166\143\332\001\340\330\122\334\100
```

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\061
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\015\002\003\345\223\157\061\260\023\111\210\153\242\027
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "GTS Root R2"

#

# Issuer: CN=GTS Root R2,O=Google Trust Services LLC,C=US

# Serial Number:02:03:e5:ae:c5:8d:04:25:1a:ab:11:25:aa

# Subject: CN=GTS Root R2,O=Google Trust Services LLC,C=US

# Not Valid Before: Wed Jun 22 00:00:00 2016

# Not Valid After : Sun Jun 22 00:00:00 2036

# Fingerprint (SHA-256):

8D:25:CD:97:22:9D:BF:70:35:6B:DA:4E:B3:CC:73:40:31:E2:4C:F0:0F:AF:CF:D3:2D:C7:6E:B5:84:1C:7E:A8

# Fingerprint (SHA1): 9A:44:49:76:32:DB:DE:FA:D0:BC:FB:5A:7B:17:BD:9E:56:09:24:94

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GTS Root R2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145  
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040  
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124  
\123\040\122\157\157\164\040\122\062

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145  
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040  
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124  
\123\040\122\157\157\164\040\122\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\015\002\003\345\256\305\215\004\045\032\253\021\045\252

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\127\060\202\003\077\240\003\002\001\002\002\015\002  
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\052\206\110\206\367\015\001\001\014\005\000\060\107\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\042\060\040\006\003  
\125\004\012\023\031\107\157\157\147\154\145\040\124\162\165\163  
\164\040\123\145\162\166\151\143\145\163\040\114\114\103\061\024  
\060\022\006\003\125\004\003\023\013\107\124\123\040\122\157\157  
\164\040\122\062\060\036\027\015\061\066\060\066\062\062\060\060

\060\060\060\060\132\027\015\063\066\060\066\062\062\060\060\060  
\060\060\060\132\060\107\061\013\060\011\006\003\125\004\006\023  
\002\125\123\061\042\060\040\006\003\125\004\012\023\031\107\157  
\157\147\154\145\040\124\162\165\163\164\040\123\145\162\166\151  
\143\145\163\040\114\114\103\061\024\060\022\006\003\125\004\003  
\023\013\107\124\123\040\122\157\157\164\040\122\062\060\202\002  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\316\336  
\375\246\373\354\354\024\064\074\007\006\132\154\131\367\031\065  
\335\367\301\235\125\252\323\315\073\244\223\162\357\012\372\155  
\235\366\360\205\200\133\241\110\122\237\071\305\267\356\050\254  
\357\313\166\150\024\271\337\255\001\154\231\037\304\042\035\237  
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\350\071\150\354\225\045\173\166\241\346\151\271\205\031\275\211  
\214\376\255\355\066\352\163\274\377\203\342\313\175\301\322\316  
\112\263\215\005\236\213\111\223\337\301\133\320\156\136\360\056  
\060\056\202\374\372\274\264\027\012\110\345\210\233\305\233\153  
\336\260\312\264\003\360\332\364\220\270\145\144\367\134\114\255  
\350\176\146\136\231\327\270\302\076\310\320\023\235\255\356\344  
\105\173\211\125\367\212\037\142\122\204\022\263\302\100\227\343  
\212\037\107\221\246\164\132\322\370\261\143\050\020\270\263\011  
\270\126\167\100\242\046\230\171\306\376\337\045\356\076\345\240  
\177\324\141\017\121\113\074\077\214\332\341\160\164\330\302\150  
\241\371\301\014\351\241\342\177\273\125\074\166\006\356\152\116  
\314\222\210\060\115\232\275\117\013\110\232\204\265\230\243\325  
\373\163\301\127\141\335\050\126\165\023\256\207\216\347\014\121  
\011\020\165\210\114\274\215\371\173\074\324\042\110\037\052\334  
\353\153\273\104\261\313\063\161\062\106\257\255\112\361\214\350  
\164\072\254\347\032\042\163\200\322\060\367\045\102\307\042\073  
\073\022\255\226\056\306\303\166\007\252\040\267\065\111\127\351  
\222\111\350\166\026\162\061\147\053\226\176\212\243\307\224\126  
\042\277\152\113\176\001\041\262\043\062\337\344\232\104\155\131  
\133\135\365\000\240\034\233\306\170\227\215\220\377\233\310\252  
\264\257\021\121\071\136\331\373\147\255\325\133\021\235\062\232  
\033\275\325\272\133\245\311\313\045\151\123\125\047\134\340\312  
\066\313\210\141\373\036\267\320\313\356\026\373\323\246\114\336  
\222\245\324\342\337\365\006\124\336\056\235\113\264\223\060\252  
\201\316\335\032\334\121\163\015\117\160\351\345\266\026\041\031  
\171\262\346\211\013\165\144\312\325\253\274\011\301\030\241\377  
\324\124\241\205\074\375\024\044\003\262\207\323\244\267\002\003  
\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001  
\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004  
\026\004\024\273\377\312\216\043\237\117\231\312\333\342\150\246  
\245\025\047\027\036\331\016\060\015\006\011\052\206\110\206\367  
\015\001\001\014\005\000\003\202\002\001\000\037\312\316\335\307  
\276\241\237\331\047\114\013\334\027\230\021\152\210\336\075\346  
\161\126\162\262\236\032\116\234\325\053\230\044\135\233\153\173

\260\063\202\011\275\337\045\106\352\230\236\266\033\376\203\074  
\322\142\141\301\004\355\316\340\305\311\310\023\023\125\347\250  
\143\255\214\173\001\376\167\060\341\316\150\233\005\370\022\356  
\171\061\240\101\105\065\050\012\161\244\044\117\214\334\074\202  
\007\137\146\334\175\020\376\014\141\263\005\225\356\341\256\201  
\017\250\370\307\217\115\250\043\002\046\153\035\203\122\125\316  
\265\057\000\312\200\100\340\341\164\254\140\365\207\200\235\256  
\066\144\221\135\260\150\030\352\212\141\311\167\250\227\304\311  
\307\245\374\125\113\363\360\177\271\145\075\047\150\320\314\153  
\372\123\235\341\221\032\311\135\032\226\155\062\207\355\003\040  
\310\002\316\132\276\331\352\375\262\115\304\057\033\337\137\172  
\365\370\213\306\356\061\072\045\121\125\147\215\144\062\173\351  
\236\303\202\272\052\055\351\036\264\340\110\006\242\374\147\257  
\037\042\002\163\373\040\012\257\235\124\113\241\315\377\140\107  
\260\077\135\357\033\126\275\227\041\226\055\012\321\136\235\070  
\002\107\154\271\364\366\043\045\270\240\152\232\053\167\010\372  
\304\261\050\220\046\130\010\074\342\176\252\327\075\157\272\061  
\210\012\005\353\047\265\241\111\356\240\105\124\173\346\047\145  
\231\040\041\250\243\274\373\030\226\273\122\157\014\355\203\121  
\114\351\131\342\040\140\305\302\145\222\202\214\363\020\037\016  
\212\227\276\167\202\155\077\217\035\135\274\111\047\275\314\117  
\017\341\316\166\206\004\043\305\300\214\022\133\375\333\204\240  
\044\361\110\377\144\174\320\276\134\026\321\357\231\255\300\037  
\373\313\256\274\070\042\006\046\144\332\332\227\016\077\050\025  
\104\250\117\000\312\360\232\314\317\164\152\264\076\074\353\225  
\354\265\323\132\330\201\231\351\103\030\067\353\263\273\321\130  
\142\101\363\146\322\217\252\170\225\124\040\303\132\056\164\053  
\325\321\276\030\151\300\254\325\244\317\071\272\121\204\003\145  
\351\142\300\142\376\330\115\125\226\342\320\021\372\110\064\021  
\354\236\355\005\035\344\310\326\035\206\313

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GTS Root R2"

# Issuer: CN=GTS Root R2,O=Google Trust Services LLC,C=US

# Serial Number:02:03:e5:ae:c5:8d:04:25:1a:ab:11:25:aa

# Subject: CN=GTS Root R2,O=Google Trust Services LLC,C=US

# Not Valid Before: Wed Jun 22 00:00:00 2016

# Not Valid After : Sun Jun 22 00:00:00 2036

# Fingerprint (SHA-256):

8D:25:CD:97:22:9D:BF:70:35:6B:DA:4E:B3:CC:73:40:31:E2:4C:F0:0F:AF:CF:D3:2D:C7:6E:B5:84:1C:7E:A8

#

Fingerprint (SHA1): 9A:44:49:76:32:DB:DE:FA:D0:BC:FB:5A:7B:17:BD:9E:56:09:24:94

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\232\104\111\166\062\333\336\372\320\274\373\132\173\027\275\236
\126\011\044\224
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\036\071\300\123\346\036\051\202\013\312\122\125\066\135\127\334
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\256\305\215\004\045\032\253\021\045\252
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "GTS Root R3"
#
Issuer: CN=GTS Root R3,O=Google Trust Services LLC,C=US
Serial Number:02:03:e5:b8:82:eb:20:f8:25:27:6d:3d:66
Subject: CN=GTS Root R3,O=Google Trust Services LLC,C=US
Not Valid Before: Wed Jun 22 00:00:00 2016
Not Valid After : Sun Jun 22 00:00:00 2036
Fingerprint (SHA-256):
34:D8:A7:3E:E2:08:D9:BC:DB:0D:95:65:20:93:4B:4E:40:E6:94:82:59:6E:8B:6F:73:C8:42:6B:01:0A:6F:48
Fingerprint (SHA1): ED:E5:71:80:2B:C8:92:B9:5B:83:3C:D2:32:68:3F:09:CD:A0:1E:46
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124

```



\123\040\122\157\157\164\040\122\063  
END  
CKA\_ID  
UTF8 "0"  
CKA\_ISSUER MULTILINE\_OCTAL  
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145  
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040  
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124  
\123\040\122\157\157\164\040\122\063  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\015\002\003\345\270\202\353\040\370\045\047\155\075\146  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\002\011\060\202\001\216\240\003\002\001\002\002\015\002  
\003\345\270\202\353\040\370\045\047\155\075\146\060\012\006\010  
\052\206\110\316\075\004\003\003\060\107\061\013\060\011\006\003  
\125\004\006\023\002\125\123\061\042\060\040\006\003\125\004\012  
\023\031\107\157\157\147\154\145\040\124\162\165\163\164\040\123  
\145\162\166\151\143\145\163\040\114\114\103\061\024\060\022\006  
\003\125\004\003\023\013\107\124\123\040\122\157\157\164\040\122  
\063\060\036\027\015\061\066\060\066\062\062\060\060\060\060  
\060\132\027\015\063\066\060\066\062\062\060\060\060\060\060  
\132\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154  
\145\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163  
\040\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107  
\124\123\040\122\157\157\164\040\122\063\060\166\060\020\006\007  
\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142  
\000\004\037\117\063\207\063\051\212\241\204\336\313\307\041\130  
\101\211\352\126\235\053\113\205\306\035\114\047\274\177\046\121  
\162\157\342\237\326\243\312\314\105\024\106\213\255\357\176\206  
\214\354\261\176\057\377\251\161\235\030\204\105\004\101\125\156  
\053\352\046\177\273\220\001\343\113\031\272\344\124\226\105\011  
\261\325\154\221\104\255\204\023\216\232\214\015\200\014\062\366  
\340\047\243\102\060\100\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\301\361\046\272\240\055\256\205\201\317\323\361\052\022  
\275\270\012\147\375\274\060\012\006\010\052\206\110\316\075\004  
\003\003\003\151\000\060\146\002\061\000\366\341\040\225\024\173  
\124\243\220\026\021\277\204\310\352\157\153\027\236\036\106\230  
\040\233\237\323\015\331\254\323\057\315\174\370\133\056\125\273  
\277\335\222\367\244\014\334\061\341\242\002\061\000\374\227\146  
\146\345\103\026\023\203\335\307\337\057\276\024\070\355\001\316  
\261\027\032\021\165\351\275\003\217\046\176\204\345\311\140\246  
\225\327\124\131\267\347\021\054\211\324\271\356\027

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust
for "GTS Root R3"
Issuer: CN=GTS Root R3,O=Google Trust Services LLC,C=US
Serial Number:02:03:e5:b8:82:eb:20:f8:25:27:6d:3d:66
Subject: CN=GTS Root R3,O=Google Trust Services LLC,C=US
Not Valid Before: Wed Jun 22 00:00:00 2016
Not Valid After : Sun Jun 22 00:00:00 2036
Fingerprint (SHA-256):
34:D8:A7:3E:E2:08:D9:BC:DB:0D:95:65:20:93:4B:4E:40:E6:94:82:59:6E:8B:6F:73:C8:42:6B:01:0A:6F:48
Fingerprint (SHA1): ED:E5:71:80:2B:C8:92:B9:5B:83:3C:D2:32:68:3F:09:CD:A0:1E:46
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\35\34\161\200\05\310\222\271\133\203\074\322\062\150\077\011
\315\240\036\106
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\076\347\235\130\002\224\106\121\224\345\340\042\112\213\347\163
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\002\003\345\270\202\353\040\370\045\047\155\075\146
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "GTS Root R4"
#
Issuer: CN=GTS Root R4,O=Google Trust Services LLC,C=US

```

```
Serial Number:02:03:e5:c0:68:ef:63:1a:9c:72:90:50:52
Subject: CN=GTS Root R4,O=Google Trust Services LLC,C=US
Not Valid Before: Wed Jun 22 00:00:00 2016
Not Valid After : Sun Jun 22 00:00:00 2036
Fingerprint (SHA-256):
34:9D:FA:40:58:C5:E2:63:12:3B:39:8A:E7:95:57:3C:4E:13:13:C8:3F:E6:8F:93:55:6C:D5:E8:03:1B:3C:7D
Fingerprint (SHA1): 77:D3:03:67:B5:E0:0C:15:F6:0C:38:61:DF:7C:E1:3B:92:46:4D:47
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\064
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\300\150\357\143\032\234\162\220\120\122
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\002\011\060\202\001\216\240\003\002\001\002\002\015\002
\003\345\300\150\357\143\032\234\162\220\120\122\060\012\006\010
\052\206\110\316\075\004\003\003\060\107\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\042\060\040\006\003\125\004\012
\023\031\107\157\157\147\154\145\040\124\162\165\163\164\040\123
\145\162\166\151\143\145\163\040\114\114\103\061\024\060\022\006
\003\125\004\003\023\013\107\124\123\040\122\157\157\164\040\122
\064\060\036\027\015\061\066\060\066\062\062\060\060\060\060\060
\060\132\027\015\063\066\060\066\062\062\060\060\060\060\060\060
\132\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154
\145\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163
\040\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107
\124\123\040\122\157\157\164\040\122\064\060\166\060\020\006\007
```

```
\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142
\000\004\363\164\163\247\150\213\140\256\103\270\065\305\201\060
\173\113\111\235\373\301\141\316\346\336\106\275\153\325\141\030
\065\256\100\335\163\367\211\221\060\132\353\074\356\205\174\242
\100\166\073\251\306\270\107\330\052\347\222\221\152\163\351\261
\162\071\237\051\237\242\230\323\137\136\130\206\145\017\241\204
\145\006\321\334\213\311\307\163\310\214\152\057\345\304\253\321
\035\212\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\200\114\326\353\164\377\111\066\243\325\330\374\265\076
\305\152\360\224\035\214\060\012\006\010\052\206\110\316\075\004
\003\003\003\151\000\060\146\002\061\000\350\100\377\203\336\003
\364\237\256\035\172\247\056\271\257\117\366\203\035\016\055\205
\001\035\321\331\152\354\017\302\257\307\136\126\136\134\325\034
\130\042\050\013\367\060\266\057\261\174\002\061\000\360\141\074
\247\364\240\202\343\041\325\204\035\163\206\234\055\257\312\064
\233\361\237\271\043\066\342\274\140\003\235\200\263\232\126\310
\341\342\273\024\171\312\315\041\324\224\265\111\103
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "GTS Root R4"

# Issuer: CN=GTS Root R4,O=Google Trust Services LLC,C=US

# Serial Number:02:03:e5:c0:68:ef:63:1a:9c:72:90:50:52

# Subject: CN=GTS Root R4,O=Google Trust Services LLC,C=US

# Not Valid Before: Wed Jun 22 00:00:00 2016

# Not Valid After : Sun Jun 22 00:00:00 2036

# Fingerprint (SHA-256):

34:9D:FA:40:58:C5:E2:63:12:3B:39:8A:E7:95:57:3C:4E:13:13:C8:3F:E6:8F:93:55:6C:D5:E8:03:1B:3C:7D

# Fingerprint (SHA1): 77:D3:03:67:B5:E0:0C:15:F6:0C:38:61:DF:7C:E1:3B:92:46:4D:47

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GTS Root R4"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\167\323\003\147\265\340\014\025\366\014\070\141\337\174\341\073
\222\106\115\107
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\103\226\203\167\031\115\166\263\235\145\122\344\035\042\245\350
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\064
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\015\002\003\345\300\150\357\143\032\234\162\220\120\122
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Telia Root CA v2"

#

# Issuer: CN=Telia Root CA v2,O=Telia Finland Oyj,C=FI

# Serial Number:01:67:5f:27:d6:fe:7a:e3:e4:ac:be:09:5b:05:9e

# Subject: CN=Telia Root

CA v2,O=Telia Finland Oyj,C=FI

# Not Valid Before: Thu Nov 29 11:55:54 2018

# Not Valid After : Sun Nov 29 11:55:54 2043

# Fingerprint (SHA-256):

24:2B:69:74:2F:CB:1E:5B:2A:BF:98:89:8B:94:57:21:87:54:4E:5B:4D:99:11:78:65:73:62:1F:6A:74:B8:2C

# Fingerprint (SHA1): B9:99:CD:D1:73:50:8A:C4:47:05:08:9C:8C:88:FB:BE:A0:2B:40:CD

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Telia Root CA v2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\104\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\032\060\030\006\003\125\004\012\014\021\124\145\154\151\141\040
\106\151\156\154\141\156\144\040\117\171\152\061\031\060\027\006
\003\125\004\003\014\020\124\145\154\151\141\040\122\157\157\164
\040\103\101\040\166\062
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\104\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\032\060\030\006\003\125\004\012\014\021\124\145\154\151\141\040
\106\151\156\154\141\156\144\040\117\171\152\061\031\060\027\006
\003\125\004\003\014\020\124\145\154\151\141\040\122\157\157\164
\040\103\101\040\166\062
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\017\001\147\137\047\326\376\172\343\344\254\276\011\133\005  
\236  
END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\164\060\202\003\134\240\003\002\001\002\002\017\001  
\147\137\047\326\376\172\343\344\254\276\011\133\005\236\060\015  
\006\011\052\206\110\206\367\015\001\001\013\005\000\060\104\061  
\013\060\011\006\003\125\004\006\023\002\106\111\061\032\060\030  
\006\003\125\004\012\014\021\124\145\154\151\141\040\106\151\156  
\154\141\156\144\040\117\171\152\061\031\060\027\006\003\125\004  
\003\014\020\124\145\154\151\141\040\122\157\157\164\040\103\101  
\040\166\062\060\036\027\015\061\070\061\061\062\071\061\061\065  
\065\065\064\132\027\015\064\063\061\061\062\071\061\061\065\065  
\065\064\132\060\104\061\013\060\011\006\003\125\004\006\023\002  
\106\111\061\032\060\030\006\003\125\004\012\014\021\124\145\154  
\151\141\040\106\151\156\154\141\156\144\040\117\171\152\061\031  
\060\027\006\003\125\004\003\014\020\124\145\154\151\141\040\122  
\157\157\164\040\103\101\040\166\062\060\202\002\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017  
\000\060\202\002\012\002\202\002\001\000\262\320\077\007\274\342  
\173\320\153\231\370\342\167\151\347\316\235\244\003\274\202\155  
\241\376\201\145\037\114\047\254\216\000\272\026\173\353\060\152  
\000\300\263\164\150\176\262\257\307\325\142\263\172\077\120\312  
\214\066\104\044\143\322\066\351\014\205\366\103\166\325\114\241  
\140\162\147\342\050\063\245\313\061\270\072\042\043\064\270\175  
\275\126\042\100\235\352\364\173\003\255\150\374\262\201\117\230  
\320\164\352\215\345\175\315\143\303\243\366\336\222\302\130\031  
\340\226\273\305\304\251\075\245\164\226\376\257\371\211\252\275  
\225\027\124\330\170\104\361\014\167\025\222\340\230\102\247\244  
\326\252\040\222\315\301\240\263\226\262\072\204\102\215\175\325  
\225\344\326\333\351\142\304\130\263\171\305\214\323\065\063\203  
\237\165\241\122\047\141\070\361\131\075\216\120\340\275\171\074  
\347\154\226\376\136\331\002\145\264\216\134\320\021\064\337\135  
\277\122\247\201\000\303\177\231\105\231\025\325\027\310\012\123  
\354\143\363\231\175\314\151\022\206\302\027\360\001\236\277\204  
\274\321\122\313\033\222\146\316\244\123\345\241\277\304\333\011  
\326\346\211\126\053\310\343\174\336\343\377\211\345\065\156\050  
\350\154\013\043\121\251\045\005\353\110\370\335\261\312\372\154  
\010\121\357\267\030\154\104\312\046\341\163\306\211\006\201\345  
\212\254\260\342\051\306\271\044\263\153\104\021\364\245\103\302  
\114\103\345\160\066\214\266\063\127\172\225\056\202\240\364\134  
\020\263\141\203\366\002\005\206\056\174\055\154\334\003\106\156  
\065\223\325\172\225\057\336\040\330\133\176\224\220\004\152\272  
\131\075\004\005\165\235\067\242\016\056\075\353\301\244\122\203  
\376\320\153\324\146\216\334\306\351\022\116\035\052\127\252\020  
\274\174\136\202\175\246\246\311\362\055\271\365\027\047\255\321  
\016\211\124\053\225\372\300\255\035\230\024\170\063\102\206\012

\251\163\265\373\164\015\267\033\060\031\304\132\016\034\047\267  
\332\030\320\377\212\310\005\272\361\252\034\242\067\267\346\110  
\244\106\054\224\352\250\166\142\107\213\020\123\007\110\127\154  
\342\222\115\266\256\005\313\334\301\112\136\217\254\075\031\116  
\302\355\140\165\053\333\301\312\102\325\002\003\001\000\001\243  
\143\060\141\060\037\006\003\125\035\043\004\030\060\026\200\024  
\162\254\344\063\171\252\105\207\366\375\254\035\236\326\307\057  
\206\330\044\071\060\035\006\003\125\035\016\004\026\004\024\162  
\254\344\063\171\252\105\207\366\375\254\035\236\326\307\057\206  
\330\044\071\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001  
\013\005\000\003\202\002\001\000\240\073\131\247\011\224\076\066  
\204\322\176\057\071\245\226\227\372\021\255\374\147\363\161\011  
\362\262\211\204\147\104\257\271\357\355\226\354\234\144\333\062  
\060\157\147\232\254\176\137\262\253\001\066\176\201\372\344\204  
\136\322\254\066\340\153\142\305\175\113\016\202\155\322\166\142  
\321\376\227\370\237\060\174\030\371\264\122\167\202\035\166\333  
\323\035\251\360\301\232\000\275\155\165\330\175\347\372\307\070  
\243\234\160\350\106\171\003\257\056\164\333\165\370\156\123\014  
\003\310\231\032\211\065\031\074\323\311\124\174\250\360\054\346  
\156\007\171\157\152\341\346\352\221\202\151\012\035\303\176\131  
\242\236\153\106\025\230\133\323\257\106\035\142\310\316\200\122  
\111\021\077\311\004\022\303\023\174\077\073\212\226\333\074\240  
\036\012\264\213\124\262\044\147\015\357\202\313\276\074\175\321  
\342\177\256\026\326\126\130\271\332\040\261\203\025\241\357\212  
\115\062\157\101\057\023\122\202\224\327\032\301\170\242\121\335  
\053\160\155\267\032\371\367\260\340\147\227\126\333\174\141\123  
\011\003\050\002\100\307\263\330\375\234\160\152\306\050\303\205  
\351\342\355\032\223\240\336\113\230\242\204\076\005\167\001\226  
\075\373\264\040\017\234\162\002\172\022\057\325\243\272\121\170  
\257\052\053\104\145\116\265\375\012\350\301\315\171\207\141\053  
\336\200\127\105\277\147\361\233\221\136\245\244\354\131\110\020  
\015\070\307\260\372\303\104\155\004\365\170\120\034\222\226\133  
\332\365\270\056\272\133\317\345\360\152\235\113\057\130\163\055  
\117\055\304\034\076\364\263\077\253\025\016\073\031\101\212\244  
\301\127\022\146\161\114\372\123\343\127\353\142\225\011\236\124  
\335\321\302\074\127\074\275\070\255\230\144\267\270\003\232\123  
\126\140\135\263\330\102\033\134\113\022\212\034\353\353\175\306  
\172\151\307\047\177\244\370\213\362\344\224\146\207\113\351\224  
\007\011\022\171\212\262\353\164\004\334\316\364\104\131\340\026  
\312\305\054\130\327\074\173\317\142\206\152\120\175\065\066\146  
\247\373\067\347\050\307\330\320\255\245\151\224\217\350\301\337  
\044\370\033\007\061\207\201\330\135\366\350\050\330\112\122\200  
\254\023\356\120\024\036\230\307

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Telia Root CA v2"
Issuer: CN=Telia Root CA v2,O=Telia Finland Oyj,C=FI
Serial Number:01:67:5f:27:d6:fe:7a:e3:e4:ac:be:09:5b:05:9e
Subject: CN=Telia Root CA v2,O=Telia Finland Oyj,C=FI
Not Valid Before: Thu Nov 29 11:55:54 2018
Not Valid After : Sun Nov 29 11:55:54 2043
Fingerprint (SHA-256):
24:2B:69:74:2F:CB:1E:5B:2A:BF:98:89:8B:94:57:21:87:54:4E:5B:4D:99:11:78:65:73:62:1F:6A:74:B8:2C
Fingerprint (SHA1): B9:99:CD:D1:73:50:8A:C4:47:05:08:9C:8C:88:FB:BE:A0:2B:40:CD
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telia Root CA v2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\271\231\315\321\163\120\212\304\107\005\010\234\214\210\373\276
\240\053\100\315
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\016\217\254\252\202\337\205\261\364\334\020\034\374\231\331\110
END
CKA_ISSUER
MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\032\060\030\006\003\125\004\012\014\021\124\145\154\151\141\040
\106\151\156\154\141\156\144\040\117\171\152\061\031\060\027\006
\003\125\004\003\014\020\124\145\154\151\141\040\122\157\157\164
\040\103\101\040\166\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\001\147\137\047\326\376\172\343\344\254\276\011\133\005
\236
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "D-TRUST BR Root CA 1 2020"
#
Issuer: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE
Serial Number:7c:c9:8f:2b:84:d7:df:ea:0f:c9:65:9a:d3:4b:4d:96
Subject: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE

```



# Not Valid Before: Tue Feb 11 09:45:00 2020

# Not Valid After : Sun Feb 11 09:44:59

2035

# Fingerprint (SHA-256):

E5:9A:AA:81:60:09:C2:2B:FF:5B:25:BA:D3:7D:F3:06:F0:49:79:7C:1F:81:D8:5A:B0:89:E6:57:BD:8F:00:44

# Fingerprint (SHA1): 1F:5B:98:F0:E3:B5:F7:74:3C:ED:E6:B0:36:7D:32:CD:F4:09:41:67

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "D-TRUST BR Root CA 1 2020"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163  
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023  
\031\104\055\124\122\125\123\124\040\102\122\040\122\157\157\164  
\040\103\101\040\061\040\062\060\062\060

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163  
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023  
\031\104\055\124\122\125\123\124\040\102\122\040\122\157\157\164  
\040\103\101\040\061\040\062\060\062\060

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\174\311\217\053\204\327\337\352\017\311\145\232\323\113  
\115\226

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\333\060\202\002\140\240\003\002\001\002\002\020\174  
\311\217\053\204\327\337\352\017\311\145\232\323\113\115\226\060  
\012\006\010\052\206\110\316\075\004\003\003\060\110\061\013\060  
\011\006\003\125\004\006\023\002\104\105\061\025\060\023\006\003  
\125\004\012\023\014\104\055\124\162\165\163\164\040\107\155\142  
\110\061\042\060\040\006\003\125\004\003\023\031\104\055\124\122  
\125\123\124\040\102\122\040\122\157\157\164\040\103\101\040\061  
\040\062\060\062\060\060\036\027\015\062\060\060\062\061\061\060\071  
\071\064\065\060\060\132\027\015\063\065\060\062\061\061\060\071  
\064\064\065\071\132\060\110\061\013\060\011\006\003\125\004\006  
\023\002\104\105\061\025\060\023\006\003\125\004\012\023\014\104  
\055\124\162\165\163\164\040\107\155\142\110\061\042\060\040\006  
\003\125\004\003\023\031\104\055\124\122\125\123\124\040\102\122  
\040\122\157\157\164\040\103\101\040\061\040\062\060\062\060\060  
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201

\004\000\042\003\142\000\004\306\313\307\050\321\373\204\365\232  
\357\102\024\040\341\103\153\156\165\255\374\053\003\204\324\166  
\223\045\327\131\073\101\145\153\036\346\064\052\273\164\366\022  
\316\350\155\347\253\344\074\116\077\104\010\213\315\026\161\313  
\277\222\231\364\244\327\074\120\124\122\220\205\203\170\224\147  
\147\243\034\011\031\075\165\064\205\336\355\140\175\307\014\264  
\101\122\271\156\345\356\102\243\202\001\015\060\202\001\011\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\035\006\003\125\035\016\004\026\004\024\163\221\020\253\377  
\125\263\132\174\011\045\325\262\272\010\240\153\253\037\155\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060  
\201\306\006\003\125\035\037\004\201\276\060\201\273\060\076\240  
\074\240\072\206\070\150\164\164\160\072\057\057\143\162\154\056  
\144\055\164\162\165\163\164\056\156\145\164\057\143\162\154\057  
\144\055\164\162\165\163\164\137\142\162\137\162\157\157\164\137  
\143\141\137\061\137\062\060\062\060\056\143\162\154\060\171\240  
\167\240\165\206\163\154\144\141\160\072\057\057\144\151\162\145  
\143\164\157\162\171\056\144\055\164\162\165\163\164\056\156\145  
\164\057\103\116\075\104\055\124\122\125\123\124\045\062\060\102  
\122\045\062\060\122\157\157\164\045\062\060\103\101\045\062\060  
\061\045\062\060\062\060\062\060\054\117\075\104\055\124\162\165  
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143  
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141  
\164\151\157\156\154\151\163\164\060\012\006\010\052\206\110\316  
\075\004\003\003\003\151\000\060\146\002\061\000\224\220\055\023  
\372\341\143\370\141\143\350\255\205\170\124\221\234\270\223\070  
\076\032\101\332\100\026\123\102\010\312\057\216\361\076\201\126  
\300\252\330\355\030\304\260\256\364\076\372\046\002\061\000\363  
\050\342\306\333\053\231\373\267\121\270\044\243\244\224\172\032  
\077\346\066\342\003\127\063\212\060\313\202\307\326\024\021\325  
\165\143\133\024\225\234\037\001\317\330\325\162\247\017\073

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "D-TRUST BR Root CA 1 2020"

# Issuer: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE

# Serial Number:7c:c9:8f:2b:84:d7:df:ea:0f:c9:65:9a:d3:4b:4d:96

# Subject: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE

# Not Valid Before: Tue Feb 11 09:45:00 2020

# Not Valid After : Sun Feb 11 09:44:59 2035

# Fingerprint (SHA-256):

E5:9A:AA:81:60:09:C2:2B:FF:5B:25:BA:D3:7D:F3:06:F0:49:79:7C:1F:81:D8:5A:B0:89:E6:57:BD:8F:00:44

# Fingerprint (SHA1): 1F:5B:98:F0:E3:B5:F7:74:3C:ED:E6:B0:36:7D:32:CD:F4:09:41:67

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST BR Root CA 1 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\037\133\230\360\343\265\367\164\074\355\346\260\066\175\062\315
\364\011\101\147
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\265\252\113\325\355\367\343\125\056\217\162\012\363\165\270\355
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\102\122\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\174\311\217\053\204\327\337\352\017\311\145\232\323\113
\115\226
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "D-TRUST EV Root CA 1
2020"
#
Issuer: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
Serial Number:5f:02:41:d7:7a:87:7c:4c:03:a3:ac:96:8d:fb:ff:d0
Subject: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
Not Valid Before: Tue Feb 11 10:00:00 2020
Not Valid After : Sun Feb 11 09:59:59 2035
Fingerprint (SHA-256):
08:17:0D:1A:A3:64:53:90:1A:2F:95:92:45:E3:47:DB:0C:8D:37:AB:AA:BC:56:B8:1A:A1:00:DC:95:89:70:DB
Fingerprint (SHA1): 61:DB:8C:21:59:69:03:90:D8:7C:9C:12:86:54:CF:9D:3D:F4:DD:07
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST EV Root CA 1 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163

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\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\105\126\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\105\126\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\137\002\101\327\172\207\174\114\003\243\254\226\215\373
\377\320
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\333\060\202\002\140\240\003\002\001\002\002\020\137
\002\101\327\172\207\174\114\003\243\254\226\215\373\377\320\060
\012\006\010\052\206\110\316\075\004\003\003\060\110\061\013\060
\011\006\003\125\004\006\023\002\104\105\061\025\060\023\006\003
\125\004\012\023\014\104\055\124\162\165\163\164\040\107\155\142
\110\061\042\060\040\006\003\125\004\003\023\031\104\055\124\122
\125\123\124\040\105\126\040\122\157\157\164\040\103\101\040\061
\040\062\060\062\060\060\036\027\015\062\060\060\062\061\061\061
\060\060\060\060\060\132\027\015\063\065\060\062\061\061\060\071
\065\071\065\071\132\060\110\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\025\060\023\006\003\125\004\012\023\014\104
\055\124\162\165\163\164\040\107\155\142\110\061\042\060\040\006
\003\125\004\003\023\031\104\055\124\122\125\123\124\040\105\126
\040\122\157\157\164\040\103\101\040\061\040\062\060\062\060\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\361\013\335\206\103\040\031\337\227
\205\350\042\112\233\317\235\230\277\264\005\046\311\313\343\246
\322\217\305\236\170\173\061\211\251\211\255\047\074\145\020\202
\374\337\303\235\116\360\063\043\304\322\062\365\034\260\337\063
\027\135\305\360\261\212\371\357\271\267\024\312\051\112\302\017
\251\177\165\145\111\052\060\147\364\144\367\326\032\167\332\303
\302\227\141\102\173\111\255\243\202\001\015\060\202\001\011\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\177\020\001\026\067
\072\244\050\344\120\370\244\367\354\153\062\266\376\351\213\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\201\306\006\003\125\035\037\004\201\276\060\201\273\060\076\240
\074\240\072\206\070\150\164\164\160\072\057\057\143\162\154\056
\144\055\164\162\165\163\164\056\156\145\164\057\143\162\154\057
\144\055\164\162\165\163\164\137\145\166\137\162\157\157\164\137
```

```
\143\141\137\061\137\062\060\062\060\056\143\162\154\060\171\240
\167\240\165\206\163\154\144\141\160\072\057\057\144\151\162\145
\143\164\157\162\171\056\144\055\164\162\165\163\164\056\156\145
\164\057\103\116\075\104\055\124\122\125\123\124\045\062\060\105
\126\045\062\060\122\157\157\164\045\062\060\103\101\045\062\060
\061\045\062\060\062\060\062\060\054\117\075\104\055\124\162\165
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141
\164\151\157\156\154\151\163\164\060\012\006\010\052\206\110\316
\075\004\003\003\003\151\000\060\146\002\061\000\312\074\306\052
\165\302\136\165\142\071\066\000\140\132\213\301\223\231\314\331
\333\101\073\073\207\231\027\073\325\314\117\312\042\367\240\200
\313\371\264\261\033\126\365\162\322\374\031\321\002\061\000\221
\367\060\223\077\020\106\053\161\244\320\073\104\233\300\051\002
\005\262\101\167\121\363\171\132\236\216\024\240\116\102\322\133
\201\363\064\152\003\347\042\070\120\133\355\031\117\103\026
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "D-TRUST EV Root CA 1 2020"

# Issuer: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE

# Serial Number:5f:02:41:d7:7a:87:7c:4c:03:a3:ac:96:8d:fb:ff:d0

# Subject: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE

# Not Valid Before: Tue Feb 11 10:00:00 2020

# Not Valid After : Sun Feb 11 09:59:59 2035

# Fingerprint (SHA-256):

08:17:0D:1A:A3:64:53:90:1A:2F:95:92:45:E3:47:DB:0C:8D:37:AB:AA:BC:56:B8:1A:A1:00:DC:95:89:70:DB

#

Fingerprint (SHA1): 61:DB:8C:21:59:69:03:90:D8:7C:9C:12:86:54:CF:9D:3D:F4:DD:07

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "D-TRUST EV Root CA 1 2020"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\141\333\214\041\131\151\003\220\330\174\234\022\206\124\317\235
\075\364\335\007
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\214\055\235\160\237\110\231\021\006\021\373\351\313\060\300\156
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
```

```

\031\104\055\124\122\125\123\124\040\105\126\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\137\002\101\327\172\207\174\114\003\243\254\226\215\373
\377\320
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "DigiCert TLS ECC P384 Root G5"
#
Issuer: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US
Serial Number:09:e0:93:65:ac:f7:d9:c8:b9:3e:1c:0b:04:2a:2e:f3
Subject: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After : Sun Jan 14 23:59:59 2046
Fingerprint (SHA-256):
01:8E:13:F0:77:25:32:CF:80:9B:D1:B1:72:81:86:72:83:FC:48:C6:E1:3B:E9:C6:98:12:85:4A:49:0C:1B:05
Fingerprint (SHA1): 17:F3:DE:5E:9F:0F:19:E9:8E:F6:1F:32:26:6E:20:C4:07:AE:30:EE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert TLS ECC P384 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\046\060\044\006\003\125\004
\003\023\035\104\151\147\151\103\145\162\164\040\124\114\123\040
\105\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\046\060\044\006\003\125\004
\003\023\035\104\151\147\151\103\145\162\164\040\124\114\123\040
\105\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\011\340\223\145\254\367\331\310\271\076\034\013\004\052

```

\056\363

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\031\060\202\001\237\240\003\002\001\002\002\020\011  
\340\223\145\254\367\331\310\271\076\034\013\004\052\056\363\060  
\012\006\010\052\206\110\316\075\004\003\003\060\116\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003  
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111  
\156\143\056\061\046\060\044\006\003\125\004\003\023\035\104\151  
\147\151\103\145\162\164\040\124\114\123\040\105\103\103\040\120  
\063\070\064\040\122\157\157\164\040\107\065\060\036\027\015\062  
\061\060\061\061\065\060\060\060\060\060\060\132\027\015\064\066  
\060\061\061\064\062\063\065\071\065\071\132\060\116\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003  
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111  
\156\143\056\061\046\060\044\006\003\125\004\003\023\035\104\151  
\147\151\103\145\162\164\040\124\114\123\040\105\103\103\040\120  
\063\070\064\040\122\157\157\164\040\107\065\060\166\060\020\006  
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003  
\142\000\004\301\104\241\317\021\227\120\232\336\043\202\065\007  
\315\320\313\030\235\322\361\177\167\065\117\073\335\224\162\122  
\355\302\073\370\354\372\173\153\130\040\354\231\256\311\374\150  
\263\165\271\333\011\354\310\023\365\116\306\012\035\146\060\114  
\273\037\107\012\074\141\020\102\051\174\245\010\016\340\042\351  
\323\065\150\316\233\143\237\204\265\231\115\130\240\216\365\124  
\347\225\311\243\102\060\100\060\035\006\003\125\035\016\004\026  
\004\024\301\121\105\120\131\253\076\347\054\132\372\040\042\022  
\007\200\210\174\021\152\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\012\006\010\052\206\110\316\075  
\004\003\003\003\150\000\060\145\002\061\000\211\152\215\107\347  
\354\374\156\125\003\331\147\154\046\116\203\306\375\311\373\053  
\023\274\267\172\214\264\145\322\151\151\143\023\143\073\046\120  
\056\001\241\171\006\221\235\110\277\302\276\002\060\107\303\025  
\173\261\240\221\231\111\223\250\074\174\350\106\006\213\054\362  
\061\000\224\235\142\310\211\275\031\204\024\351\245\373\001\270  
\015\166\103\214\056\123\313\174\337\014\027\226\120

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert TLS ECC P384 Root G5"

# Issuer: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US

# Serial Number:09:e0:93:65:ac:f7:d9:c8:b9:3e:1c:0b:04:2a:2e:f3

# Subject: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US

# Not Valid Before: Fri Jan 15 00:00:00 2021

```
Not Valid After : Sun Jan 14 23:59:59 2046
Fingerprint (SHA-256):
01:8E:13:F0:77:25:32:CF:80:9B:D1:B1:72:81:86:72:83:FC:48:C6:E1:3B:E9:C6:98:12:85:4A:49:0C:1B:05
Fingerprint (SHA1): 17:F3:DE:5E:9F:0F:19:E9:8E:F6:1F:32:26:6E:20:C4:07:AE:30:EE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert TLS ECC P384 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\027\363\336\136\237\017\031\351\216\366\037\062\046\156\040\304
\007\256\060\356
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\323\161\004\152\103\034\333\246\131\341\250\243\252\305\161\355
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\046\060\044\006\003\125\004
\003\023\035\104\151\147\151\103\145\162\164\040\124\114\123\040
\105\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\011\340\223\145\254\367\331\310\271\076\034\013\004\052
\056\363
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
Certificate "DigiCert TLS RSA4096 Root G5"
#
Issuer: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US
Serial Number:08:f9:b4:78:a8:fa:7e:da:6a:33:37:89:de:7c:cf:8a
#
Subject: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After : Sun Jan 14 23:59:59 2046
Fingerprint (SHA-256):
37:1A:00:DC:05:33:B3:72:1A:7E:EB:40:E8:41:9E:70:79:9D:2B:0A:0F:2C:1D:80:69:31:65:F7:CE:C4:AD:75
Fingerprint (SHA1): A7:88:49:DC:5D:7C:75:8C:8C:DE:39:98:56:B3:AA:D0:B2:A5:71:35
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
```



```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert TLS RSA4096 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\124\114\123\040
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\124\114\123\040
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\010\371\264\170\250\372\176\332\152\063\067\211\336\174
\317\212
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\146\060\202\003\116\240\003\002\001\002\002\020\010
\371\264\170\250\372\176\332\152\063\067\211\336\174\317\212\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\115
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164
\054\040\111\156\143\056\061\045\060\043\006\003\125\004\003\023
\034\104\151\147\151\103\145\162\164\040\124\114\123\040\122\123
\101\064\060\071\066\040\122\157\157\164\040\107\065\060\036\027
\015\062\061\060\061\061\065\060\060\060\060\060\060\132\027\015
\064\066\060\061\061\064\062\063\065\071\065\071\132\060\115\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025
\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164\054
\040\111\156\143\056\061\045\060\043\006\003\125\004\003\023\034
\104\151\147\151\103\145\162\164\040\124\114\123\040\122\123\101
\064\060\071\066\040\122\157\157\164\040\107\065\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\263\320\364
\311\171\021\235\375\374\146\201\347\314\325\344\274\354\201\076
\152\065\216\056\267\347\336\257\371\007\115\317\060\235\352\011
\013\231\275\154\127\332\030\112\270\170\254\072\071\250\246\110
\254\056\162\345\275\353\361\032\315\347\244\003\251\077\021\264
\330\057\211\026\373\224\001\075\273\057\370\023\005\241\170\034
\216\050\340\105\340\203\364\131\033\225\263\256\176\003\105\345
\276\302\102\376\356\362\074\266\205\023\230\062\235\026\250\051
```

\302\013\034\070\334\237\061\167\134\277\047\243\374\047\254\267  
\053\275\164\233\027\055\362\201\332\135\260\341\043\027\076\210  
\112\022\043\320\352\317\235\336\003\027\261\102\112\240\026\114  
\244\155\223\351\077\072\356\072\174\235\130\235\364\116\217\374  
\073\043\310\155\270\342\005\332\314\353\354\303\061\364\327\247  
\051\124\200\317\104\133\114\157\060\236\363\314\335\037\224\103  
\235\115\177\160\160\015\324\072\321\067\360\154\235\233\300\024  
\223\130\357\315\101\070\165\274\023\003\225\174\177\343\134\351  
\325\015\325\342\174\020\142\252\153\360\075\166\363\077\243\350  
\260\301\375\357\252\127\115\254\206\247\030\264\051\301\054\016  
\277\144\276\051\214\330\002\055\315\134\057\362\177\357\025\364  
\014\025\254\012\260\361\323\015\117\152\115\167\227\001\240\361  
\146\267\267\316\357\316\354\354\245\165\312\254\343\341\143\367  
\270\241\004\310\274\173\077\135\055\026\042\126\355\110\111\376  
\247\057\171\060\045\233\272\153\055\077\235\073\304\027\347\035  
\056\373\362\317\246\374\343\024\054\226\230\041\214\264\221\351  
\031\140\203\362\060\053\006\163\120\325\230\073\006\351\307\212  
\014\140\214\050\370\122\233\156\341\366\115\273\006\044\233\327  
\053\046\077\375\052\057\161\365\326\044\276\177\061\236\017\155  
\350\217\117\115\243\077\377\065\352\337\111\136\101\217\206\371  
\361\167\171\113\033\264\243\136\057\373\106\002\320\146\023\136  
\136\205\117\316\330\160\210\173\316\001\265\226\227\327\315\175  
\375\202\370\302\044\301\312\001\071\117\215\242\301\024\100\037  
\234\146\325\014\011\106\326\362\320\321\110\166\126\072\103\313  
\266\012\021\071\272\214\023\154\006\265\236\317\353\002\003\001  
\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004  
\024\121\063\034\355\066\100\257\027\323\045\315\151\150\362\257  
\116\043\076\263\101\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\015\006\011\052\206\110\206\367\015  
\001\001\014\005\000\003\202\002\001\000\140\246\257\133\137\127  
\332\211\333\113\120\251\304\043\065\041\377\320\141\060\204\221  
\267\077\020\317\045\216\311\277\106\064\331\301\041\046\034\160  
\031\162\036\243\311\207\376\251\103\144\226\072\310\123\004\012  
\266\101\273\304\107\000\331\237\030\030\073\262\016\363\064\352  
\044\367\335\257\040\140\256\222\050\137\066\347\135\344\336\307  
\074\333\120\071\255\273\075\050\115\226\174\166\306\133\364\301  
\333\024\245\253\031\142\007\030\100\137\227\221\334\234\307\253  
\265\121\015\346\151\123\125\314\071\175\332\305\021\125\162\305  
\073\213\211\370\064\055\244\027\345\027\346\231\175\060\210\041  
\067\315\060\027\075\270\362\274\250\165\240\103\334\076\211\113  
\220\256\155\003\340\034\243\240\226\011\273\175\243\267\052\020  
\104\113\106\007\064\143\355\061\271\004\356\243\233\232\256\346  
\061\170\364\352\044\141\073\253\130\144\377\273\207\047\142\045  
\201\337\334\241\057\366\355\247\377\172\217\121\056\060\370\244  
\001\322\205\071\137\001\231\226\157\132\133\160\031\106\376\206  
\140\076\255\200\020\011\335\071\045\057\130\177\273\322\164\360  
\367\106\037\106\071\112\330\123\320\363\056\073\161\245\324\157

```
\374\363\147\344\007\217\335\046\031\341\215\133\372\243\223\021
\233\351\310\072\303\125\150\232\222\341\122\166\070\350\341\272
\275\373\117\325\357\263\347\110\203\061\360\202\041\343\266\276
\247\253\157\357\237\337\114\317\001\270\142\152\043\075\347\011
\115\200\033\173\060\244\303\335\007\177\064\276\244\046\262\366
\101\350\011\035\343\040\230\252\067\117\377\367\361\342\051\160
\061\107\077\164\320\024\026\372\041\212\002\325\212\011\224\167
\056\362\131\050\213\174\120\222\012\146\170\070\203\165\304\265
\132\250\021\306\345\301\235\146\125\317\123\304\257\327\165\205
\251\102\023\126\354\041\167\201\223\132\014\352\226\331\111\312
\241\010\362\227\073\155\233\004\030\044\104\216\174\001\362\334
\045\330\136\206\232\261\071\333\365\221\062\152\321\246\160\212
\242\367\336\244\105\205\046\250\036\214\135\051\133\310\113\330
\232\152\003\136\160\362\205\117\154\113\150\057\312\124\366\214
\332\062\376\303\153\203\077\070\306\176
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert TLS RSA4096 Root G5"

# Issuer: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US

# Serial Number:08:f9:b4:78:a8:fa:7e:da:6a:33:37:89:de:7c:cf:8a

# Subject: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US

# Not Valid Before: Fri Jan 15 00:00:00 2021

# Not Valid After : Sun Jan 14 23:59:59 2046

# Fingerprint (SHA-256):

37:1A:00:DC:05:33:B3:72:1A:7E:EB:40:E8:41:9E:70:79:9D:2B:0A:0F:2C:1D:80:69:31:65:F7:CE:C4:AD:75

# Fingerprint (SHA1): A7:88:49:DC:5D:7C:75:8C:8C:DE:39:98:56:B3:AA:D0:B2:A5:71:35

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert TLS RSA4096 Root G5"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\247\210\111\334\135\174\165\214\214\336\071\230\126\263\252\320
\262\245\161\065
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\254\376\367\064\226\251\362\263\264\022\113\344\047\101\157\341
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\124\114\123\040
```

```

\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\371\264\170\250\372\176\332\152\063\067\211\336\174
\317\212
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "DigiCert SMIME ECC P384 Root G5"
#
Issuer: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US
Serial Number:05:3f:6e:a0:06:01:72:7d:ed:3f:c3:a3:b6:a3:d6:ef
#
Subject: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After : Sun Jan 14 23:59:59 2046
Fingerprint (SHA-256):
E8:E8:17:65:36:A6:0C:C2:C4:E1:01:87:C3:BE:FC:A2:0E:F2:63:49:70:18:F5:66:D5:BE:A0:F9:4D:0C:11:1B
Fingerprint (SHA1): 1C:B8:A7:08:C9:0D:20:79:01:A0:B2:36:7F:F0:95:65:E4:53:24:FE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert SMIME ECC P384 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\003\023\037\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\105\103\103\040\120\063\070\064\040\122\157\157\164\040
\107\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\003\023\037\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\105\103\103\040\120\063\070\064\040\122\157\157\164\040
\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL

```

\002\020\005\077\156\240\006\001\162\175\355\077\303\243\266\243  
\326\357

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\034\060\202\001\243\240\003\002\001\002\002\020\005  
\077\156\240\006\001\162\175\355\077\303\243\266\243\326\357\060  
\012\006\010\052\206\110\316\075\004\003\003\060\120\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003  
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111  
\156\143\056\061\050\060\046\006\003\125\004\003\023\037\104\151  
\147\151\103\145\162\164\040\123\115\111\115\105\040\105\103\103  
\040\120\063\070\064\040\122\157\157\164\040\107\065\060\036\027  
\015\062\061\060\061\061\065\060\060\060\060\060\060\132\027\015  
\064\066\060\061\061\064\062\063\065\071\065\071\132\060\120\061  
\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025  
\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164\054  
\040\111\156\143\056\061\050\060\046\006\003\125\004\003\023\037  
\104\151\147\151\103\145\162\164\040\123\115\111\115\105\040\105  
\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065\060  
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201  
\004\000\042\003\142\000\004\026\235\125\345\266\324\373\373\147  
\153\032\324\241\252\322\167\225\076\210\345\007\237\266\160\146  
\040\050\244\210\354\160\065\257\263\062\377\067\023\112\236\274  
\001\003\336\204\301\270\306\346\145\107\211\362\023\125\277\315  
\245\036\010\140\177\255\177\350\141\222\051\317\011\107\136\013  
\034\300\037\244\277\362\133\274\230\357\231\114\314\160\153\266  
\272\320\050\035\277\276\004\243\102\060\100\060\035\006\003\125  
\035\016\004\026\004\024\163\172\153\226\333\102\007\213\122\146  
\302\144\062\027\376\340\147\220\056\255\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\012\006\010\052  
\206\110\316\075\004\003\003\003\147\000\060\144\002\060\067\104  
\365\062\200\343\161\353\364\155\317\174\314\221\232\303\156\161  
\330\322\043\135\222\115\202\102\155\134\141\225\366\221\365\247  
\010\366\152\227\351\234\224\055\230\160\375\063\266\011\002\060  
\007\074\057\271\130\202\136\017\243\142\250\223\147\360\040\303  
\151\277\003\054\073\120\247\073\257\101\070\311\122\110\221\326  
\016\373\274\140\060\174\144\077\022\036\105\177\121\076\364\246

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert SMIME ECC P384 Root G5"  
# Issuer: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US  
#

```
Serial Number:05:3f:6e:a0:06:01:72:7d:ed:3f:c3:a3:b6:a3:d6:ef
Subject: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After : Sun Jan 14 23:59:59 2046
Fingerprint (SHA-256):
E8:E8:17:65:36:A6:0C:C2:C4:E1:01:87:C3:BE:FC:A2:0E:F2:63:49:70:18:F5:66:D5:BE:A0:F9:4D:0C:11:1B
Fingerprint (SHA1): 1C:B8:A7:08:C9:0D:20:79:01:A0:B2:36:7F:F0:95:65:E4:53:24:FE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert SMIME ECC P384 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\034\270\247\010\311\015\040\171\001\240\262\066\177\360\225\145
\344\123\044\376
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\246\376\364\122\066\104\330\356\015\267\003\013\357\164\263\003
END
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\003\023\037\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\105\103\103\040\120\063\070\064\040\122\157\157\164\040
\107\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\005\077\156\240\006\001\162\175\355\077\303\243\266\243
\326\357
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "DigiCert SMIME RSA4096 Root G5"
#
Issuer: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
Serial Number:05:f6:ba:04:23:83:46:cb:7d:5c:e6:b9:5b:ba:1c:55
Subject: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After : Sun Jan 14 23:59:59 2046
Fingerprint (SHA-256):
90:37:0D:3E:FA:88:BF:58:C3:01:05:BA:25:10:4A:35:84:60:A7:FA:52:DF:C2:01:1D:F2:33:A0:F4:17:91:2A
Fingerprint
```

(SHA1): 5B:C5:AD:E2:9A:A7:54:DA:84:89:53:A5:FE:D7:5B:46:86:D0:57:08

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert SMIME RSA4096 Root G5"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145  
\162\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004  
\003\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115  
\105\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107  
\065

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145  
\162\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004  
\003\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115  
\105\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107  
\065

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\005\366\272\004\043\203\106\313\175\134\346\271\133\272  
\034\125

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\152\060\202\003\122\240\003\002\001\002\002\020\005  
\366\272\004\043\203\106\313\175\134\346\271\133\272\034\125\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\117  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060  
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164  
\054\040\111\156\143\056\061\047\060\045\006\003\125\004\003\023  
\036\104\151\147\151\103\145\162\164\040\123\115\111\115\105\040  
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065\060  
\036\027\015\062\061\060\061\061\065\060\060\060\060\060\132  
\027\015\064\066\060\061\061\064\062\063\065\071\065\071\132\060  
\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027  
\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162  
\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004\003  
\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115\105  
\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\340\152\133\331\370\371\175\354\265\173\357\137\335\134\064

\330\332\135\321\313\145\165\253\041\174\133\000\324\202\157\105  
\205\101\212\251\022\002\162\062\360\024\365\003\165\273\143\227  
\111\017\100\231\013\032\036\126\247\322\320\341\253\335\345\004  
\033\343\037\024\022\002\210\365\240\200\011\366\047\232\120\360  
\272\343\242\340\254\152\024\221\265\153\070\020\172\242\061\341  
\221\033\267\271\360\053\133\310\167\011\166\267\121\304\066\012  
\231\123\124\104\045\267\011\065\206\027\005\126\223\075\101\267  
\002\327\142\037\212\222\021\207\352\021\155\352\010\021\334\261  
\170\110\111\222\366\264\121\200\170\043\330\376\341\126\032\072  
\220\023\126\064\211\325\342\225\213\137\336\262\314\373\077\070  
\267\205\367\352\236\277\056\241\056\057\115\175\152\021\056\066  
\240\377\021\010\004\225\125\340\033\073\147\223\251\224\125\352  
\062\355\006\072\177\302\177\343\255\023\047\321\064\101\263\060  
\303\277\264\210\370\003\202\244\337\076\253\170\167\240\131\223  
\161\347\335\353\000\004\173\314\110\071\050\340\036\243\025\151  
\310\066\262\241\013\227\337\125\326\357\221\234\244\366\026\367  
\121\012\356\003\043\221\334\004\377\340\335\070\366\042\003\000  
\302\007\161\032\022\311\327\106\052\224\033\315\326\273\033\356  
\277\276\115\120\130\260\013\315\060\166\051\365\317\345\266\152  
\057\166\260\260\151\152\320\155\145\030\065\176\223\274\162\027  
\301\125\102\315\057\302\045\273\364\375\035\241\144\042\124\135  
\342\236\162\101\204\156\161\226\352\105\007\266\136\172\112\206  
\235\163\144\167\070\003\322\017\123\245\125\040\304\115\377\150  
\157\125\251\352\335\161\344\117\331\205\243\174\116\051\002\236  
\013\011\362\032\123\314\000\246\335\321\064\366\015\301\060\261  
\234\002\144\254\065\355\245\260\051\261\322\225\063\017\322\040  
\063\275\354\043\113\362\031\371\332\230\144\344\054\061\037\056  
\341\215\034\004\225\050\115\214\130\315\113\345\163\202\206\214  
\354\250\326\171\134\373\144\273\334\014\114\050\366\027\257\342  
\150\326\026\206\230\333\374\001\334\061\272\370\234\016\371\050  
\106\112\341\375\226\006\105\171\021\150\027\145\134\213\046\207  
\133\002\003\001\000\001\243\102\060\100\060\035\006\003\125\035  
\016\004\026\004\024\321\243\324\127\035\117\125\333\165\114\134  
\102\236\143\026\316\264\306\073\037\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\015\006\011\052\206  
\110\206\367\015\001\001\014\005\000\003\202\002\001\000\007\247  
\012\336\123\273\232\353\160\277\262\066\220\315\344\247\270\361  
\014\344\135\132\035\170\145\374\311\270\036\043\021\127\174\151  
\065\155\001\377\123\120\277\007\016\272\307\001\077\130\052\224  
\165\003\253\034\013\043\334\033\212\036\067\075\035\130\217\163  
\331\263\052\157\337\020\240\133\014\247\312\260\177\271\044\242  
\001\065\062\345\136\106\101\353\330\177\163\347\102\351\244\121  
\046\167\201\012\250\353\017\012\120\235\176\212\040\147\374\013  
\216\072\021\323\305\214\140\030\331\113\261\374\324\361\264\111  
\116\256\207\341\321\373\166\241\137\363\006\317\227\226\014\351  
\236\165\201\134\123\015\042\374\066\346\111\156\164\333\000\205  
\215\174\042\240\216\373\020\114\324\142\023\133\357\113\162\046



```
\213\374\116\212\217\376\227\020\123\305\170\213\102\144\033\137
\340\211\375\273\011\177\120\340\124\205\046\021\152\035\145\371
\111\051\334\174\066\337\373\075\367\322\254\356\062\215\156\246
\175\071\234\105\304\312\015\365\073\264\171\123\245\057\126\307
\121\305\212\114\144\135\220\103\043\216\153\114\027\170\314\350
\277\365\073\344\250\110\317\255\233\014\337\062\112\323\331\022
\216\043\170\015\055\257\237\257\236\074\011\302\227\000\355\072
\151\034\161\077\071\337\323\217\304\146\365\357\066\224\017\363
\335\222\266\226\137\220\246\335\163\252\246\040\224\224\045\152
\011\014\162\344\023\043\140\114\243\312\027\056\173\147\000\333
\320\315\352\172\037\071\046\127\211\060\167\313\116\345\225\105
\117\137\373\066\134\075\371\040\265\072\020\045\117\223\062\132
\356\301\226\350\351\126\004\260\111\141\115\354\170\250\235\030
\301\377\330\352\057\126\357\225\053\173\004\136\147\343\125\100
\355\071\004\371\013\171\365\152\214\134\017\211\232\220\307\315
\213\336\333\046\065\241\156\315\263\102\362\242\017\073\014\216
\223\377\024\317\374\367\223\367\344\101\010\156\031\122\021\017
\123\031\163\170\014\317\330\205\201\370\255\125\310\260\236\106
\143\257\234\122\356\134\277\360\300\133\067\036\011\040\322\076
\043\306\241\025\112\016\066\176\060\305\171\152\274\042\210\331
\014\122\100\037\335\116\017\147\046\026\322\255\027\034
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DigiCert SMIME

RSA4096 Root G5"

# Issuer: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US

# Serial Number:05:f6:ba:04:23:83:46:cb:7d:5c:e6:b9:5b:ba:1c:55

# Subject: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US

# Not Valid Before: Fri Jan 15 00:00:00 2021

# Not Valid After : Sun Jan 14 23:59:59 2046

# Fingerprint (SHA-256):

90:37:0D:3E:FA:88:BF:58:C3:01:05:BA:25:10:4A:35:84:60:A7:FA:52:DF:C2:01:1D:F2:33:A0:F4:17:91:2A

# Fingerprint (SHA1): 5B:C5:AD:E2:9A:A7:54:DA:84:89:53:A5:FE:D7:5B:46:86:D0:57:08

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert SMIME RSA4096 Root G5"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\133\305\255\342\232\247\124\332\204\211\123\245\376\327\133\106
```

```
\206\320\127\010
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\321\173\340\265\077\065\162\237\175\276\013\245\244\035\251\156
```

```

END
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004
\003\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107
\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\005\366\272\004\043\203\106\313\175\134\346\271\133\272
\034\125
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Certainly Root R1"
#
Issuer: CN=Certainly Root R1,O=Certainly,C=US
Serial Number:00:8e:0f:f9:4b:90:71:68:65:33:54:f4:d4:44:39:b7:e0
Subject: CN=Certainly Root R1,O=Certainly,C=US
Not Valid Before: Thu Apr 01 00:00:00 2021
Not Valid After : Sun Apr 01 00:00:00 2046
Fingerprint (SHA-256):
77:B8:2C:D8:64:4C:43:05:F7:AC:C5:CB:15:6B:45:67:50:04:03:3D:51:C6:0C:62:02:A8:E0:C3:34:67:D3:A0
#
Fingerprint (SHA1): A0:50:EE:0F:28:71:F4:27:B2:12:6D:6F:50:96:25:BA:CC:86:42:AF
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root R1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\122\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145

```

\162\164\141\151\156\154\171\040\122\157\157\164\040\122\061  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\021\000\216\017\371\113\220\161\150\145\063\124\364\324\104  
\071\267\340  
END  
CKA\_VALUE  
MULTILINE\_OCTAL  
\060\202\005\107\060\202\003\057\240\003\002\001\002\002\021\000  
\216\017\371\113\220\161\150\145\063\124\364\324\104\071\267\340  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022  
\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151\156  
\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145\162  
\164\141\151\156\154\171\040\122\157\157\164\040\122\061\060\036  
\027\015\062\061\060\064\060\061\060\060\060\060\060\132\027  
\015\064\066\060\064\060\061\060\060\060\060\060\132\060\075  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060  
\020\006\003\125\004\012\023\011\103\145\162\164\141\151\156\154  
\171\061\032\060\030\006\003\125\004\003\023\021\103\145\162\164  
\141\151\156\154\171\040\122\157\157\164\040\122\061\060\202\002  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\320\066  
\324\037\352\335\253\344\321\266\346\373\042\300\335\023\015\152  
\173\042\023\034\227\074\150\143\146\062\234\003\265\215\244\201  
\203\332\170\060\021\317\334\262\053\276\222\277\216\344\304\023  
\276\244\150\114\332\002\150\026\164\276\262\335\004\344\153\052  
\335\067\037\140\054\333\365\367\241\174\225\267\014\160\206\056  
\361\072\357\122\367\314\323\233\371\213\276\016\337\061\267\235  
\150\134\222\246\365\345\363\012\064\265\377\173\242\344\207\241  
\306\257\027\000\357\003\221\355\251\034\116\161\075\322\213\154  
\211\364\170\206\346\152\111\240\316\265\322\260\253\233\366\364  
\324\056\343\162\371\066\306\353\025\267\045\214\072\374\045\015  
\263\042\163\041\164\310\112\226\141\222\365\057\013\030\245\364  
\255\342\356\101\275\001\171\372\226\214\215\027\002\060\264\371  
\257\170\032\214\264\066\020\020\007\005\160\320\364\061\220\212  
\121\305\206\046\171\262\021\210\136\305\360\012\124\315\111\246  
\277\002\234\322\104\247\355\343\170\357\106\136\155\161\321\171  
\160\034\106\137\121\351\311\067\334\137\176\151\173\101\337\064  
\105\340\073\204\364\241\212\012\066\236\067\314\142\122\341\211  
\015\050\371\172\043\261\015\075\075\232\375\235\201\357\054\220  
\300\173\104\116\273\111\340\016\112\126\222\274\313\265\335\171  
\027\211\221\336\141\211\164\222\250\343\062\205\276\116\205\244  
\113\131\313\053\305\170\216\161\124\320\002\067\231\214\345\111  
\352\340\124\162\244\021\006\057\013\214\301\133\276\265\241\260  
\123\156\234\270\140\221\037\131\153\371\055\364\224\012\227\265  
\354\305\166\003\124\033\145\122\272\114\222\126\121\065\240\100  
\330\051\333\256\122\166\073\055\060\100\233\212\320\102\126\264

\267\210\001\244\207\073\123\226\315\243\026\217\363\146\252\027  
\261\307\140\340\301\103\005\014\356\233\133\140\157\006\134\207  
\133\047\371\100\021\236\234\063\301\267\345\065\127\005\177\047  
\316\027\040\214\034\374\361\373\332\061\051\111\355\365\013\204  
\247\117\301\366\116\302\050\234\372\356\340\257\007\373\063\021  
\172\041\117\013\041\020\266\100\072\253\042\072\004\234\213\233  
\204\206\162\232\322\247\245\304\264\165\221\251\053\043\002\003  
\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001  
\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004  
\026\004\024\340\252\077\045\215\237\104\134\301\072\350\056\256  
\167\114\204\076\147\014\364\060\015\006\011\052\206\110\206\367  
\015\001\001\013\005\000\003\202\002\001\000\271\127\257\270\022  
\332\127\203\217\150\013\063\035\003\123\125\364\225\160\344\053  
\075\260\071\353\372\211\142\375\367\326\030\004\057\041\064\335  
\361\150\360\325\226\132\336\302\200\243\301\215\306\152\367\131  
\167\256\025\144\317\133\171\005\167\146\352\214\323\153\015\335  
\361\131\054\301\063\245\060\200\025\105\007\105\032\061\042\266  
\222\000\253\231\115\072\217\167\257\251\042\312\057\143\312\025  
\326\307\306\360\075\154\374\034\015\230\020\141\236\021\242\042  
\327\012\362\221\172\153\071\016\057\060\303\066\111\237\340\351  
\017\002\104\120\067\224\125\175\352\237\366\073\272\224\245\114  
\351\274\076\121\264\350\312\222\066\124\155\134\045\050\332\335  
\255\024\375\323\356\342\042\005\353\320\362\267\150\022\327\132  
\212\101\032\306\222\245\132\073\143\105\117\277\341\072\167\042  
\057\134\277\106\371\132\003\205\023\102\137\312\336\123\327\142  
\265\246\065\004\302\107\377\231\375\204\337\134\316\351\136\200  
\050\101\362\175\347\036\220\330\117\166\076\202\074\015\374\245  
\003\372\173\032\331\105\036\140\332\304\216\371\374\053\311\173  
\225\305\052\377\252\211\337\202\061\017\162\377\014\047\327\012  
\036\126\000\120\036\014\220\301\226\265\330\024\205\273\247\015  
\026\301\370\007\044\033\272\205\241\032\005\011\200\272\225\143  
\311\072\354\045\237\177\235\272\244\107\025\233\104\160\361\152  
\113\326\070\136\103\363\030\176\120\156\351\132\050\346\145\346  
\167\033\072\375\035\276\003\046\243\333\324\341\273\176\226\047  
\053\035\356\244\373\332\045\124\023\003\336\071\306\303\037\115  
\220\354\217\033\112\322\034\355\205\225\070\120\171\106\326\301  
\220\120\061\251\134\232\156\035\365\063\126\213\247\231\322\362  
\310\054\063\223\222\060\307\116\214\145\063\020\144\027\375\044  
\027\226\321\215\302\072\152\053\353\023\213\104\362\041\363\112  
\032\267\167\137\327\355\210\244\162\345\071\037\225\235\276\147  
\301\160\021\075\273\364\370\111\267\343\046\227\072\237\322\137  
\174\373\300\231\174\071\051\340\173\035\277\015\247\217\322\051  
\064\156\044\025\313\336\220\136\277\032\304\146\352\302\346\272  
\071\137\212\231\251\101\131\007\260\054\257

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Certainly Root R1"
Issuer: CN=Certainly Root R1,O=Certainly,C=US
Serial Number:00:8e:0f:f9:4b:90:71:68:65:33:54:f4:d4:44:39:b7:e0
Subject: CN=Certainly Root R1,O=Certainly,C=US
Not Valid Before: Thu Apr 01 00:00:00 2021
Not Valid After : Sun Apr 01 00:00:00 2046
Fingerprint
(SHA-256):
77:B8:2C:D8:64:4C:43:05:F7:AC:C5:CB:15:6B:45:67:50:04:03:3D:51:C6:0C:62:02:A8:E0:C3:34:67:D3:A0
Fingerprint (SHA1): A0:50:EE:0F:28:71:F4:27:B2:12:6D:6F:50:96:25:BA:CC:86:42:AF
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root R1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\240\120\356\017\050\161\364\047\262\022\155\157\120\226\045\272
\314\206\102\257
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\007\160\324\076\202\207\240\372\063\066\023\364\372\063\347\022
END
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\216\017\371\113\220\161\150\145\063\124\364\324\104
\071\267\340
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Certainly Root E1"
#
Issuer: CN=Certainly Root E1,O=Certainly,C=US
Serial Number:06:25:33:b1:47:03:33:27:5c:f9:8d:9a:b9:bf:cc:f8
Subject: CN=Certainly Root E1,O=Certainly,C=US

```

```
Not Valid Before: Thu Apr 01 00:00:00 2021
Not Valid After : Sun Apr 01 00:00:00 2046
Fingerprint (SHA-256):
B4:58:5F:22:E4:AC:75:6A:4E:86:12:A1:36:1C:5D:9D:03:1A:93:FD:84:FE:BB:77:8F:A3:06:8B:0F:C4:2D:C2
Fingerprint (SHA1): F9:E1:6D:DC:01:89:CF:D5:82:45:63:3E:C5:37:7D:C2:EB:93:6F:2B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root E1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\105\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\105\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\006\045\063\261\107\003\063\047\134\371\215\232\271\277
\314\370
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\367\060\202\001\175\240\003\002\001\002\002\020\006
\045\063\261\107\003\063\047\134\371\215\232\271\277\314\370\060
\012\006\010\052\206\110\316\075\004\003\003\060\075\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\022\060\020\006\003
\125\004\012\023\011\103\145\162\164\141\151\156\154\171\061\032
\060\030\006\003\125\004\003\023\021\103\145\162\164\141\151\156
\154\171\040\122\157\157\164\040\105\061\060\036\027\015\062\061
\060\064\060\061\060\060\060\060\060\060\132\027\015\064\066\060
\064\060\061\060\060\060\060\060\132\060\075\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\022\060\020\006\003\125
\004\012\023\011\103\145\162\164\141\151\156\154\171\061\032\060
\030\006\003\125\004\003\023\021\103\145\162\164\141\151\156\154
\171\040\122\157\157\164\040\105\061\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\336\157\370\177\034\337\355\371\107\207\206\261\244\300\212
\370\202\227\200\352\217\310\112\136\052\175\210\150\247\001\142
\024\221\044\172\134\236\243\027\175\212\206\041\064\030\120\033
\020\336\320\067\113\046\307\031\140\200\351\064\275\140\031\066
```

```
\100\326\051\207\011\074\221\172\366\274\023\043\335\131\116\004
\136\317\310\002\034\030\123\301\061\330\332\040\351\104\215\344
\166\243\102\060\100\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\363\050\030\313\144\165\356\051\052\353\355\256\043\130\070
\205\353\310\042\007\060\012\006\010\052\206\110\316\075\004\003
\003\003\150\000\060\145\002\061\000\261\216\132\040\303\262\031
\142\115\336\260\117\337\156\322\160\212\361\237\176\152\214\346
\272\336\203\151\312\151\263\251\005\265\226\222\027\207\302\322
\352\320\173\316\330\101\133\174\256\002\060\106\336\352\313\135
\232\354\062\302\145\026\260\114\060\134\060\363\332\116\163\206
\006\330\316\211\004\110\067\067\370\335\063\121\235\160\257\173
\125\330\001\056\175\005\144\016\206\270\221
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Certainly Root E1"

# Issuer: CN=Certainly Root E1,O=Certainly,C=US

# Serial Number:06:25:33:b1:47:03:33:27:5c:f9:8d:9a:b9:bf:cc:f8

# Subject:

CN=Certainly Root E1,O=Certainly,C=US

# Not Valid Before: Thu Apr 01 00:00:00 2021

# Not Valid After : Sun Apr 01 00:00:00 2046

# Fingerprint (SHA-256):

B4:58:5F:22:E4:AC:75:6A:4E:86:12:A1:36:1C:5D:9D:03:1A:93:FD:84:FE:BB:77:8F:A3:06:8B:0F:C4:2D:C2

# Fingerprint (SHA1): F9:E1:6D:DC:01:89:CF:D5:82:45:63:3E:C5:37:7D:C2:EB:93:6F:2B

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certainly Root E1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\371\341\155\334\001\211\317\325\202\105\143\076\305\067\175\302
\353\223\157\053
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\012\236\312\315\076\122\120\306\066\363\113\243\355\247\123\351
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\105\061
```

END

```

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\006\045\063\261\107\003\063\047\134\371\215\232\271\277
\314\370
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "DIGITALSIGN GLOBAL ROOT RSA CA"
#
Issuer: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
Serial Number:5d:59:c8:ca:ab:09:57:f5:e6:b5:da:29:94:04:6a:ff:c5:d4:95:87
Subject: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
Not Valid Before: Thu Jan 21 10:50:34 2021
Not Valid After : Mon Jan 15 10:50:34 2046
Fingerprint (SHA-256):
82:BD:5D:85:1A:CF:7F:6E:1B:A7:BF:CB:C5:30:30:D0:E7:BC:3C:21:DF:77:2D:85:8C:AB:41:D1:99:BD:F5:95
Fingerprint (SHA1): B9:82:07:97:AE:52:A5:68:6F:46:07:DF:FD:03:72:3D:92:86:88:2D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL
CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT RSA CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\047\060\045\006
\003\125\004\003\014\036\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\122\123
\101\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\047\060\045\006
\003\125\004\003\014\036\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\122\123
\101\040\103\101
END
CKA_SERIAL_NUMBER

```



MULTILINE\_OCTAL

\002\024\135\131\310\312\253\011\127\365\346\265\332\051\224\004  
\152\377\305\324\225\207

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\265\060\202\003\235\240\003\002\001\002\002\024\135  
\131\310\312\253\011\127\365\346\265\332\051\224\004\152\377\305  
\324\225\207\060\015\006\011\052\206\110\206\367\015\001\001\015  
\005\000\060\142\061\013\060\011\006\003\125\004\006\023\002\120  
\124\061\052\060\050\006\003\125\004\012\014\041\104\151\147\151  
\164\141\154\123\151\147\156\040\103\145\162\164\151\146\151\143  
\141\144\157\162\141\040\104\151\147\151\164\141\154\061\047\060  
\045\006\003\125\004\003\014\036\104\111\107\111\124\101\114\123  
\111\107\116\040\107\114\117\102\101\114\040\122\117\117\124\040  
\122\123\101\040\103\101\060\036\027\015\062\061\060\061\062\061  
\061\060\065\060\063\064\132\027\015\064\066\060\061\061\065\061  
\060\065\060\063\064\132\060\142\061\013\060\011\006\003\125\004  
\006\023\002\120\124\061\052\060\050\006\003\125\004\012\014\041  
\104\151\147\151\164\141\154\123\151\147\156\040\103\145\162\164  
\151\146\151\143\141\144\157\162\141\040\104\151\147\151\164\141  
\154\061\047\060\045\006\003\125\004\003\014\036\104\111\107\111  
\124\101\114\123\111\107\116\040\107\114\117\102\101\114\040\122  
\117\117\124\040\122\123\101\040\103\101\060\202\002\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002  
\017\000\060\202\002\012\002\202\002\001\000\310\207\266\070\323  
\034\360\336\022\370\203\307\304\212\342\211\270\264\042\172\170  
\370\014\146\121\150\166\067\012\325\117\302\132\010\270\026\134  
\367\162\001\011\067\204\201\052\124\153\327\222\320\154\372\250  
\247\103\022\064\353\016\333\067\017\051\376\212\061\121\102\350  
\113\234\220\250\310\054\021\323\375\240\051\176\316\336\224\366  
\202\340\130\264\116\105\045\361\042\362\075\323\017\173\124\032  
\334\062\266\326\121\116\176\101\264\127\270\054\306\271\016\056  
\312\127\361\325\310\323\130\347\245\351\102\021\256\323\040\045  
\224\151\327\217\312\242\015\303\323\237\007\150\077\025\322\147  
\056\123\375\166\202\233\013\163\251\051\015\236\021\223\024\010  
\230\354\236\124\022\112\126\242\006\025\354\153\154\056\222\140  
\056\206\015\256\202\037\121\115\343\262\007\327\020\031\127\042  
\366\251\151\104\204\363\331\075\240\006\277\314\210\176\177\365  
\316\133\245\302\052\152\164\102\352\157\246\377\371\150\261\320  
\137\275\221\322\125\157\063\127\114\036\235\344\342\213\301\205  
\145\240\340\152\234\000\000\210\222\335\130\010\026\362\160\061  
\250\034\341\336\275\116\161\351\326\276\176\265\241\132\303\115  
\367\277\233\275\224\244\375\365\252\123\223\106\311\046\001\004  
\160\304\240\161\272\316\045\146\373\221\176\125\160\356\111\012  
\115\142\177\302\120\232\162\362\030\147\235\351\105\250\064\204  
\350\370\201\366\321\132\042\036\007\117\073\263\177\335\021\245  
\163\334\276\251\031\072\151\251\155\033\062\342\211\252\245\047  
\013\132\176\164\342\017\144\071\135\176\134\271\301\027\374\307

\215\136\311\354\044\355\322\362\077\172\204\105\067\002\276\076  
\153\131\304\346\133\026\155\300\252\236\252\265\131\056\054\160  
\125\234\314\231\226\230\044\124\321\216\332\312\264\021\264\267  
\160\103\037\157\220\013\040\240\250\166\023\145\333\333\043\132  
\165\113\241\013\061\167\012\356\175\150\141\032\023\214\352\121  
\176\134\126\243\127\114\135\241\353\023\145\277\124\024\314\363  
\356\334\327\354\074\227\362\170\126\270\337\162\134\160\374\316  
\006\335\237\322\007\061\357\347\122\221\236\315\272\327\300\030  
\104\007\061\145\111\062\151\023\112\353\217\002\003\001\000\001  
\243\143\060\141\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\037\006\003\125\035\043\004\030\060\026  
\200\024\265\066\274\074\214\032\253\054\366\131\031\055\203\024  
\332\223\045\025\326\206\060\035\006\003\125\035\016\004\026\004  
\024\265\066\274\074\214\032\253\054\366\131\031\055\203\024\332  
\223\045\025\326\206\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001  
\001\015\005\000\003\202\002\001\000\024\373\061\045\070\061\370  
\312\010\262\043\166\070\255\370\323\131\365\314\264\127\045\341  
\104\276\176\374\026\354\256\372\046\237\117\147\026\112\126\360  
\375\355\307\031\001\064\216\220\132\055\326\200\134\354\161\322  
\201\045\202\036\000\161\337\232\321\325\035\042\273\321\245\363  
\142\017\264\353\334\044\163\376\246\126\315\232\024\305\004\065  
\026\061\242\007\353\245\000\342\266\370\137\162\375\077\141\111  
\216\336\176\115\070\327\172\036\164\067\154\121\334\276\000\004  
\270\070\024\363\040\301\355\233\247\043\375\015\102\204\035\177  
\362\163\303\320\170\143\361\237\354\327\133\351\361\276\154\240  
\113\003\236\215\151\341\024\332\210\020\201\043\123\377\332\124  
\053\013\306\271\226\225\004\030\106\363\173\250\227\330\133\150  
\244\344\070\034\016\105\345\230\323\011\256\232\136\354\263\171  
\015\071\162\362\364\224\235\016\236\140\042\346\250\366\114\205  
\315\007\202\072\150\071\315\075\137\343\070\364\266\257\073\153  
\112\237\140\121\105\242\100\002\345\252\014\343\076\321\170\324  
\242\164\234\046\272\005\232\050\160\112\076\246\013\320\035\111  
\360\272\370\256\101\020\176\244\007\022\275\250\317\051\075\127  
\273\307\361\103\107\000\076\256\160\030\132\040\173\011\313\072  
\072\160\200\345\114\140\230\301\025\301\035\112\367\310\360\233  
\341\162\255\347\135\150\130\013\004\261\214\274\237\267\373\156  
\213\133\004\125\373\353\043\125\327\170\120\332\045\313\276\047  
\066\273\044\032\171\034\121\321\376\023\273\377\170\054\334\244  
\276\057\366\305\113\123\317\247\114\231\136\160\254\131\210\004  
\256\144\004\277\173\246\172\115\323\350\167\275\241\176\120\025  
\363\357\111\060\205\115\041\127\252\333\054\165\227\255\201\001  
\207\242\261\160\235\036\006\132\003\140\261\077\246\155\202\054  
\324\024\261\201\245\350\075\210\035\264\162\054\130\067\212\216  
\070\224\270\163\335\251\340\270\366\167\242\263\174\130\336\256  
\151\072\265\213\245\032\273\362\330\164\006\234\375\142\163\040  
\041\166\261\176\160\236\031\324\353\027\142\031\070\231\315\066  
\053\107\376\061\313\337\271\344\254\010\323\330\246\353\324\236

```

\176\113\144\244\125\135\053\027\311
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DIGITALSIGN GLOBAL ROOT RSA CA"
Issuer: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
Serial Number:5d:59:c8:ca:ab:09:57:f5:e6:b5:da:29:94:04:6a:ff:c5:d4:95:87
Subject: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
Not Valid Before: Thu Jan 21 10:50:34 2021
Not Valid After : Mon Jan 15 10:50:34 2046
Fingerprint (SHA-256):
82:BD:5D:85:1A:CF:7F:6E:1B:A7:BF:CB:C5:30:30:D0:E7:BC:3C:21:DF:77:2D:85:8C:AB:41:D1:99:BD:F5:95
Fingerprint (SHA1): B9:82:07:97:AE:52:A5:68:6F:46:07:DF:FD:03:72:3D:92:86:88:2D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT RSA CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\271\202\007\227\256\122\245\150\157\106\007\337\375\003\162\075
\222\206\210\055
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\032\275\032\171\306\333\264\355\263\207\314\251\323\116\170
END
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\047\060\045\006
\003\125\004\003\014\036\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\122\123
\101\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\135\131\310\312\253\011\127\365\346\265\332\051\224\004
\152\377\305\324\225\207
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

#
Certificate "DIGITALSIGN GLOBAL ROOT ECDSA CA"
#
Issuer: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT
Serial Number:36:2d:8f:72:88:a2:28:27:e4:00:ff:24:c6:2d:e4:eb:fa:9d:b6:e1
Subject: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT
Not Valid Before: Thu Jan 21 11:07:50 2021
Not Valid After : Mon Jan 15 11:07:50 2046
Fingerprint (SHA-256):
26:1D:71:14:AE:5F:8F:F2:D8:C7:20:9A:9D:E4:28:9E:6A:FC:9D:71:70:23:D8:54:50:90:91:99:F1:85:7C:FE
Fingerprint (SHA1): 67:A8:08:EB:8F:88:F5:80:6C:05:45:1B:17:F3:D7:00:2F:D2:4A:8A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT ECDSA CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\051\060\047\006
\003\125\004\003\014\040\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\105\103
\104\123\101\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\051\060\047\006
\003\125\004\003\014\040\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\105\103
\104\123\101\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\066\055\217\162\210\242\050\047\344\000\377\044\306\055
\344\353\372\235\266\341
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\152\060\202\001\360\240\003\002\001\002\002\024\066
\055\217\162\210\242\050\047\344\000\377\044\306\055\344\353\372
\235\266\341\060\012\006\010\052\206\110\316\075\004\003\003\060
\144\061\013\060\011\006\003\125\004\006\023\002\120\124\061\052
\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141\154
\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144\157

```

\162\141\040\104\151\147\151\164\141\154\061\051\060\047\006\003  
\125\004\003\014\040\104\111\107\111\124\101\114\123\111\107\116  
\040\107\114\117\102\101\114\040\122\117\117\124\040\105\103\104  
\123\101\040\103\101\060\036\027\015\062\061\060\061\062\061\061  
\061\060\067\065\060\132\027\015\064\066\060\061\061\065\061\061  
\060\067\065\060\132\060\144\061\013\060\011\006\003\125\004\006  
\023\002\120\124\061\052\060\050\006\003\125\004\012\014\041\104  
\151\147\151\164\141\154\123\151\147\156\040\103\145\162\164\151  
\146\151\143\141\144\157\162\141\040\104\151\147\151\164\141\154  
\061\051\060\047\006\003\125\004\003\014\040\104\111\107\111\124  
\101\114\123\111\107\116\040\107\114\117\102\101\114\040\122\117  
\117\124\040\105\103\104\123\101\040\103\101\060\166\060\020\006  
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003  
\142\000\004\156\013\243\253\063\115\034\352\112\350\374\004\215  
\024\240\175\360\010\054\137\203\253\223\321\322\173\272\327\111  
\175\217\354\022\120\137\324\271\313\345\360\371\063\143\037\311  
\127\354\100\330\021\013\227\350\122\026\314\051\216\364\006\206  
\036\070\334\075\127\304\356\252\275\310\124\004\046\132\047\023  
\121\107\075\037\037\032\216\250\225\244\063\320\314\107\314\155  
\270\374\110\243\143\060\141\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043\004  
\030\060\026\200\024\316\257\112\213\032\165\342\361\070\347\002  
\360\026\255\136\352\144\325\173\264\060\035\006\003\125\035\016  
\004\026\004\024\316\257\112\213\032\165\342\361\070\347\002\360  
\026\255\136\352\144\325\173\264\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\012\006\010\052\206\110\316  
\075\004\003\003\003\150\000\060\145\002\060\012\210\304\161\234  
\104\003\115\215\264\307\274\250\256\331\060\047\065\152\153\026  
\143\327\374\347\131\341\247\211\033\114\061\232\043\125\104\346  
\363\103\041\325\107\047\157\155\127\001\252\002\061\000\373\262  
\352\342\227\177\121\265\237\110\353\274\157\065\211\250\144\160  
\253\127\166\315\300\306\024\140\312\177\342\202\000\163\367\314  
\065\352\216\044\233\345\010\131\307\004\214\163\170\376

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "DIGITALSIGN GLOBAL ROOT ECDSA CA"

# Issuer: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT

# Serial Number:36:2d:8f:72:88:a2:28:27:e4:00:ff:24:c6:2d:e4:eb:fa:9d:b6:e1

# Subject: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT

# Not Valid Before: Thu Jan 21 11:07:50 2021

# Not

Valid After : Mon Jan 15 11:07:50 2046

# Fingerprint (SHA-256):

26:1D:71:14:AE:5F:8F:F2:D8:C7:20:9A:9D:E4:28:9E:6A:FC:9D:71:70:23:D8:54:50:90:91:99:F1:85:7C:FE

```

Fingerprint (SHA1): 67:A8:08:EB:8F:88:F5:80:6C:05:45:1B:17:F3:D7:00:2F:D2:4A:8A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT ECDSA CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\147\250\010\353\217\210\365\200\154\005\105\033\027\363\327\000
\057\322\112\212
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\252\055\241\316\377\041\302\210\313\132\036\214\341\311\222\217
END
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\051\060\047\006
\003\125\004\003\014\040\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\105\103
\104\123\101\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\066\055\217\162\210\242\050\047\344\000\377\044\306\055
\344\353\372\235\266\341
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Security Communication RootCA3"
#
Issuer: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
Serial Number:00:e1:7c:37:40:fd:1b:fe:67
Subject: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
Not Valid Before: Thu Jun 16 06:17:16 2016
Not Valid After : Mon Jan 18 06:17:16 2038
Fingerprint (SHA-256):
24:A5:5C:2A:B0:51:44:2D:06:17:76:65:41:23:9A:4A:D0:32:D7:C5:51:75:AA:34:FF:DE:2F:BC:4F:5C:52:94
Fingerprint (SHA1): C3:03:C8:22:74:92:E5:61:A2:9C:5F:79:91:2B:1E:44:13:91:30:3A
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

```
CKA_LABEL UTF8 "Security Communication RootCA3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\003\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\003\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\341\174\067\100\375\033\376\147
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\177\060\202\003\147\240\003\002\001\002\002\011\000
\341\174\067\100\375\033\376\147\060\015\006\011\052\206\110\206
\367\015\001\001\014\005\000\060\135\061\013\060\011\006\003\125
\004\006\023\002\112\120\061\045\060\043\006\003\125\004\012\023
\034\123\105\103\117\115\040\124\162\165\163\164\040\123\171\163
\164\145\155\163\040\103\117\056\054\114\124\104\056\061\047\060
\045\006\003\125\004\003\023\036\123\145\143\165\162\151\164\171
\040\103\157\155\155\165\156\151\143\141\164\151\157\156\040\122
\157\157\164\103\101\063\060\036\027\015\061\066\060\066\061\066
\060\066\061\067\061\066\132\027\015\063\070\060\061\061\070\060
\066\061\067\061\066\132\060\135\061\013\060\011\006\003\125\004
\006\023\002\112\120\061\045\060\043\006\003\125\004\012\023\034
\123\105\103\117\115\040\124\162\165\163\164\040\123\171\163\164
\145\155\163\040\103\117\056\054\114\124\104\056\061\047\060\045
\006\003\125\004\003\023\036\123\145\143\165\162\151\164\171\040
\103\157\155\155\165\156\151\143\141\164\151\157\156\040\122\157
\157\164\103\101\063\060\202\002\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002
\012\002\202\002\001\000\343\311\162\111\367\060\336\011\174\251
\100\201\130\323\264\072\335\272\141\017\223\120\156\151\074\065
\302\356\133\163\220\033\147\114\041\354\137\065\273\071\076\053
\012\140\357\273\155\053\206\373\161\242\310\254\344\126\224\371
\311\257\261\162\324\040\254\164\322\270\025\255\121\376\205\164
\241\271\020\376\005\200\371\122\223\263\100\075\165\020\254\300
```

\226\267\247\176\166\274\343\033\122\031\316\021\037\013\004\064  
\365\330\365\151\074\167\363\144\364\015\252\205\336\340\011\120  
\004\027\226\204\267\310\212\274\115\162\374\034\273\317\363\006  
\115\371\237\144\367\176\246\146\206\065\161\310\021\200\114\301  
\161\100\130\036\276\240\163\366\374\076\120\341\340\057\046\075  
\176\134\043\265\171\160\336\372\340\321\245\326\014\101\161\173  
\367\352\214\034\210\307\354\213\365\321\057\125\226\106\174\132  
\073\130\073\373\272\330\055\265\045\332\172\116\317\104\256\041  
\246\236\230\312\040\156\174\273\210\205\133\373\300\020\142\273  
\362\371\047\107\357\321\211\071\103\304\337\336\341\101\277\124  
\163\040\227\055\154\332\363\324\007\243\346\271\330\157\256\374  
\214\031\056\323\147\147\053\225\333\130\134\265\152\002\363\270  
\203\136\264\153\276\101\176\127\011\165\104\120\125\315\132\021  
\141\041\012\141\302\251\210\375\023\274\055\211\057\315\141\340  
\225\276\312\265\173\341\173\064\147\013\037\266\014\307\174\036  
\031\123\312\247\261\112\025\040\126\024\160\075\053\202\054\017  
\235\025\035\107\200\107\377\170\231\016\061\257\157\076\217\355  
\206\151\036\173\030\210\024\262\302\374\202\063\056\234\113\055  
\373\160\073\161\252\053\173\046\047\363\032\302\334\373\027\270  
\241\352\313\240\264\256\323\224\176\172\320\253\303\354\070\055  
\021\056\210\277\324\077\255\022\073\102\254\217\002\156\175\314  
\321\137\141\276\241\274\072\152\110\352\046\125\042\026\135\137  
\015\377\047\063\237\030\003\164\212\133\122\040\107\153\105\115  
\042\167\214\125\047\360\257\036\214\311\203\042\124\267\232\320  
\117\331\316\374\331\056\034\226\050\261\002\323\003\275\045\122  
\034\064\146\117\043\253\364\167\202\226\035\321\127\060\010\021  
\005\375\127\321\331\307\002\003\001\000\001\243\102\060\100\060  
\035\006\003\125\035\016\004\026\004\024\144\024\174\374\130\162  
\026\246\012\051\064\025\157\052\313\274\374\257\250\253\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003\202  
\002\001\000\334\002\043\010\342\357\041\072\307\015\267\046\322  
\142\223\247\245\043\162\007\040\202\140\337\030\327\124\255\151  
\045\222\236\331\024\317\231\271\122\201\317\256\154\212\073\132  
\071\310\154\001\103\302\042\155\002\360\142\315\116\143\103\300  
\024\332\364\143\360\352\364\161\356\116\207\343\161\251\364\311  
\127\345\056\137\034\171\273\043\252\207\104\127\351\275\065\115  
\101\273\113\050\243\230\262\033\331\013\027\007\345\367\352\235  
\365\166\327\277\304\266\201\130\377\310\377\144\151\142\171\255  
\156\016\037\177\356\035\151\345\267\162\161\263\376\245\001\065  
\224\124\053\300\122\155\217\125\304\311\322\270\313\312\064\010  
\121\205\240\365\274\264\027\130\352\012\134\172\275\143\306\072  
\057\377\226\111\031\204\352\147\330\004\261\141\364\000\133\112  
\267\234\161\067\031\205\171\277\201\260\307\023\016\166\161\076  
\072\200\006\256\006\026\247\215\265\302\304\313\377\100\245\134  
\215\245\311\072\355\162\201\312\134\230\074\322\064\003\167\010  
\375\360\051\131\135\041\010\307\140\277\244\161\173\270\331\036



```
\202\276\011\257\145\157\050\253\277\113\265\356\076\010\107\047
\240\017\157\017\213\077\254\225\030\363\271\016\334\147\125\156
\142\236\106\016\321\004\170\312\162\256\166\331\245\370\262\337
\210\011\141\213\357\044\116\321\131\077\132\324\075\311\223\074
\053\144\365\201\015\026\226\367\222\303\376\061\157\350\052\062
\164\016\364\114\230\112\030\016\060\124\325\305\353\274\305\025
\236\350\231\041\353\047\053\011\012\333\361\346\160\030\126\273
\014\344\276\371\350\020\244\023\222\270\034\340\333\147\035\123
\003\244\042\247\334\135\222\020\074\352\377\374\033\020\032\303
\330\320\234\235\145\313\320\053\047\061\003\036\066\341\075\166
\165\014\377\105\046\271\335\121\274\043\307\137\330\330\207\020
\100\022\015\075\070\067\347\104\074\030\300\123\011\144\217\377
\325\232\246\174\160\056\163\125\041\350\337\377\203\271\035\076
\062\036\326\246\175\054\361\146\351\134\035\247\243\316\136\045
\062\053\343\225\254\052\007\316\264\050\170\206\074\055\246\235
\115\322\164\060\335\144\121\025\333\203\203\121\327\257\375\063
\235\115\146
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL

CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Security Communication RootCA3"

# Issuer: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP

# Serial Number:00:e1:7c:37:40:fd:1b:fe:67

# Subject: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP

# Not Valid Before: Thu Jun 16 06:17:16 2016

# Not Valid After : Mon Jan 18 06:17:16 2038

# Fingerprint (SHA-256):

24:A5:5C:2A:B0:51:44:2D:06:17:76:65:41:23:9A:4A:D0:32:D7:C5:51:75:AA:34:FF:DE:2F:BC:4F:5C:52:94

# Fingerprint (SHA1): C3:03:C8:22:74:92:E5:61:A2:9C:5F:79:91:2B:1E:44:13:91:30:3A

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Security Communication RootCA3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\303\003\310\042\164\222\345\141\242\234\137\171\221\053\036\104
\023\221\060\072
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\034\232\026\377\236\134\340\115\212\024\001\364\065\135\051\046
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
```

```
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\003\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\063
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\011\000\341\174\067\100\375\033\376\147
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Security Communication ECC RootCA1"

#

# Issuer: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP

# Serial Number:00:d6:5d:9b:b3:78:81:2e:eb

# Subject: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP

#

Not Valid Before: Thu Jun 16 05:15:28 2016

# Not Valid After : Mon Jan 18 05:15:28 2038

# Fingerprint (SHA-256):

E7:4F:BD:A5:5B:D5:64:C4:73:A3:6B:44:1A:A7:99:C8:A6:8E:07:74:40:E8:28:8B:9F:A1:E5:0E:4B:BA:CA:11

# Fingerprint (SHA1): B8:0E:26:A9:BF:D2:B2:3B:C0:EF:46:C9:BA:C7:BB:F6:1D:0D:41:41

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Security Communication ECC RootCA1"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\141\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\053\060\051\006\003\125\004\003\023
\042\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\103\103\040\122\157\157\164
\103\101\061
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\141\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\053\060\051\006\003\125\004\003\023
\042\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
```

```
\151\143\141\164\151\157\156\040\105\103\103\040\122\157\157\164
\103\101\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\326\135\233\263\170\201\056\353
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\070\060\202\001\276\240\003\002\001\002\002\011\000
\326\135\233\263\170\201\056\353\060\012\006\010\052\206\110\316
\075\004\003\003\060\141\061\013\060\011\006\003\125\004\006\023
\002\112\120\061\045\060\043\006\003\125\004\012\023\034\123\105
\103\117\115\040\124\162\165\163\164\040\123\171\163\164\145\155
\163\040\103\117\056\054\114\124\104\056\061\053\060\051\006\003
\125\004\003\023\042\123\145\143\165\162\151\164\171\040\103\157
\155\155\165\156\151\143\141\164\151\157\156\040\105\103\103\040
\122\157\157\164\103\101\061\060\036\027\015\061\066\060\066\061
\066\060\065\061\065\062\070\132\027\015\063\070\060\061\061\070
\060\065\061\065\062\070\132\060\141\061\013\060\011\006\003\125
\004\006\023\002\112\120\061\045\060\043\006\003\125\004\012\023
\034\123\105\103\117\115\040\124\162\165\163\164\040\123\171\163
\164\145\155\163\040\103\117\056\054\114\124\104\056\061\053\060
\051\006\003\125\004\003\023\042\123\145\143\165\162\151\164\171
\040\103\157\155\155\165\156\151\143\141\164\151\157\156\040\105
\103\103\040\122\157\157\164\103\101\061\060\166\060\020\006\007
\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142
\000\004\244\245\157\140\003\003\303\275\061\364\323\027\234\053
\204\165\254\345\375\075\127\156\327\143\277\346\004\211\222\216
\201\234\343\351\107\156\312\220\022\310\023\340\247\235\367\145
\164\037\154\020\262\350\344\351\357\155\205\062\231\104\261\136
\375\314\166\020\330\133\275\242\306\371\326\102\344\127\166\334
\220\302\065\251\113\210\074\022\107\155\134\377\111\117\032\112
\120\261\243\102\060\100\060\035\006\003\125\035\016\004\026\004
\024\206\034\347\376\055\245\112\213\010\376\050\021\372\276\243
\146\370\140\131\057\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\012\006\010\052\206\110\316\075\004
\003\003\003\150\000\060\145\002\060\025\135\102\075\374\266\356
\367\073\261\066\350\236\366\304\106\050\111\063\320\130\103\052
\143\051\314\115\261\264\172\242\271\015\070\245\135\110\052\375
\313\262\163\135\243\210\010\307\014\002\061\000\300\253\055\016
\155\355\030\242\333\123\351\045\333\125\010\340\120\314\337\104
\141\026\202\253\111\260\262\201\354\163\207\170\264\114\262\142
\033\022\372\026\115\045\113\143\275\036\067\331
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
```

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust

for "Security Communication ECC RootCA1"

# Issuer: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP

# Serial Number:00:d6:5d:9b:b3:78:81:2e:eb

# Subject: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP

# Not Valid Before: Thu Jun 16 05:15:28 2016

# Not Valid After : Mon Jan 18 05:15:28 2038

# Fingerprint (SHA-256):

E7:4F:BD:A5:5B:D5:64:C4:73:A3:6B:44:1A:A7:99:C8:A6:8E:07:74:40:E8:28:8B:9F:A1:E5:0E:4B:BA:CA:11

# Fingerprint (SHA1): B8:0E:26:A9:BF:D2:B2:3B:C0:EF:46:C9:BA:C7:BB:F6:1D:0D:41:41

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Security Communication ECC RootCA1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\270\016\046\251\277\322\262\073\300\357\106\311\272\307\273\366

\035\015\101\101

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\176\103\260\222\150\354\005\103\114\230\253\135\065\056\176\206

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\141\061\013\060\011\006\003\125\004\006\023\002\112\120\061

\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040

\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117

\056\054\114\124\104\056\061\053\060\051\006\003\125\004\003\023

\042\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156

\151\143\141\164\151\157\156\040\105\103\103\040\122\157\157\164

\103\101\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\011\000\326\135\233\263\170\201\056\353

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "BJCA Global Root CA1"

#

# Issuer: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN

# Serial Number:55:6f:65:e3:b4:d9:90:6a:1b:09:d1:6c:3e:c0:6c:20

# Subject: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN

```
Not Valid Before: Thu Dec 19 03:16:17 2019
Not Valid
After : Mon Dec 12 03:16:17 2044
Fingerprint (SHA-256):
F3:89:6F:88:FE:7C:0A:88:27:66:A7:FA:6A:D2:74:9F:B5:7A:7F:3E:98:FB:76:9C:1F:A7:B0:9C:2C:44:D5:AE
Fingerprint (SHA1): D5:EC:8D:7B:4C:BA:79:F4:E7:E8:CB:9D:6B:AE:77:83:10:03:21:6A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BJCA Global Root CA1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\125\157\145\343\264\331\220\152\033\011\321\154\076\300
\154\040
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\164\060\202\003\134\240\003\002\001\002\002\020\125
\157\145\343\264\331\220\152\033\011\321\154\076\300\154\040\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\124
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\046\060
\044\006\003\125\004\012\014\035\102\105\111\112\111\116\107\040
\103\105\122\124\111\106\111\103\101\124\105\040\101\125\124\110
\117\122\111\124\131\061\035\060\033\006\003\125\004\003\014\024
\102\112\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101\061\060\036\027\015\061\071\061\062\061\071\060\063
\061\066\061\067\132\027\015\064\064\061\062\061\062\060\063\061
\066\061\067\132\060\124\061\013\060\011\006\003\125\004\006\023
\002\103\116\061\046\060\044\006\003\125\004\012\014\035\102\105
\111\112\111\116\107\040\103\105\122\124\111\106\111\103\101\124
```

\105\040\101\125\124\110\117\122\111\124\131\061\035\060\033\006  
\003\125\004\003\014\024\102\112\103\101\040\107\154\157\142\141  
\154\040\122\157\157\164\040\103\101\061\060\202\002\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002  
\017\000\060\202\002\012\002\202\002\001\000\361\146\010\275\331  
\305\025\141\313\204\004\101\245\151\067\167\035\301\260\173\372  
\303\167\110\220\023\162\144\321\270\174\220\065\235\030\171\210  
\343\227\001\074\107\201\362\016\242\230\015\236\077\067\340\031  
\262\220\362\106\034\222\261\072\141\316\372\267\106\236\003\206  
\327\063\156\355\367\105\214\166\067\336\156\226\221\367\327\176  
\053\207\027\325\213\065\356\204\221\162\127\334\140\303\303\271  
\347\307\147\044\043\117\143\012\143\366\146\175\113\125\247\077  
\170\144\111\151\022\227\340\114\015\323\011\240\062\060\072\372  
\237\300\362\234\305\022\052\056\034\265\004\063\332\244\070\021  
\152\336\306\030\366\107\072\042\101\207\042\374\304\211\050\124  
\330\214\245\060\012\370\027\026\312\254\067\375\171\247\221\027  
\170\070\231\255\130\355\262\336\314\211\175\003\234\263\211\145  
\347\343\073\261\042\206\217\006\155\170\007\375\221\022\177\260  
\153\034\211\015\371\270\313\164\133\007\302\310\364\065\321\144  
\143\172\351\156\232\050\326\060\275\346\033\335\025\257\204\352  
\234\307\312\365\016\352\362\135\051\207\217\151\163\071\276\056  
\044\157\105\041\254\305\324\151\045\006\203\255\172\110\205\023  
\054\015\006\270\154\171\126\374\243\147\062\201\365\127\245\312  
\127\102\151\351\134\044\141\357\342\060\030\116\104\230\125\157  
\172\302\223\330\031\266\336\174\107\212\021\116\111\107\333\050  
\224\002\013\224\112\054\371\022\320\117\350\061\176\154\172\277  
\246\077\233\071\075\002\026\243\030\263\147\254\133\077\054\203  
\053\147\071\201\134\271\176\224\325\144\335\236\217\156\256\350  
\174\133\264\327\152\107\110\327\176\263\324\055\216\126\166\116  
\317\151\361\156\104\154\324\044\352\215\044\241\030\277\275\127  
\376\251\231\065\265\333\020\167\270\075\110\272\326\301\347\361  
\043\076\327\337\205\235\047\074\324\100\275\012\014\275\365\347  
\215\045\326\201\164\207\106\324\051\165\242\102\154\367\163\211  
\347\175\277\172\112\037\323\042\311\025\125\317\337\157\174\125  
\320\244\213\007\021\067\137\203\246\046\127\246\001\133\176\376  
\130\150\007\251\351\172\331\271\350\377\120\037\253\302\264\300  
\316\350\352\375\017\275\215\115\270\274\161\002\003\001\000\001  
\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024\305  
\357\355\314\330\215\041\306\110\344\343\327\024\056\247\026\223  
\345\230\001\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001  
\013\005\000\003\202\002\001\000\122\202\254\041\064\037\043\362  
\242\330\371\270\257\067\066\040\211\321\067\003\326\151\237\270  
\141\020\272\242\061\230\131\107\350\321\015\045\036\025\101\014  
\340\052\125\325\127\122\313\370\344\307\151\243\035\115\161\002  
\136\137\041\105\140\110\134\011\216\111\020\301\004\334\251\142  
\153\002\360\103\310\116\235\070\111\164\311\062\160\124\155\301

\107\374\216\264\066\236\324\234\275\335\040\326\123\311\030\251  
\265\126\271\166\213\225\147\146\356\275\230\376\256\357\276\156  
\373\140\366\375\131\306\052\033\077\043\112\224\044\060\047\310  
\211\274\353\104\044\232\313\075\276\117\325\172\316\216\027\313  
\142\301\331\336\036\016\172\377\103\206\064\122\274\141\077\074  
\137\273\331\166\264\123\274\227\263\376\212\114\022\056\053\363  
\327\316\341\242\377\335\173\160\373\073\241\115\244\143\002\375  
\070\227\225\077\005\160\240\153\337\142\201\103\213\264\131\015  
\112\214\124\234\305\273\201\237\315\175\245\357\013\045\036\072  
\040\333\034\374\037\230\147\002\012\324\163\104\023\333\121\204  
\032\125\003\126\340\000\176\164\006\377\070\304\162\035\323\250  
\077\150\061\135\323\011\307\056\214\133\143\340\350\334\036\322  
\354\141\036\362\336\345\357\366\231\166\140\055\036\224\162\161  
\306\013\052\062\307\222\116\325\106\327\035\371\251\031\012\310  
\372\225\316\155\043\230\252\013\070\255\232\126\015\157\215\361  
\061\000\210\301\027\234\315\031\066\065\376\125\123\240\340\074  
\063\137\226\136\342\062\351\337\063\273\006\112\251\330\204\163  
\316\167\322\306\254\161\341\134\243\035\014\273\012\337\137\342  
\243\161\330\332\067\132\240\170\053\364\324\175\353\166\355\362  
\141\160\245\145\232\323\211\064\030\253\373\162\076\327\264\075  
\171\134\330\037\241\063\173\331\202\120\014\223\027\252\154\334  
\302\202\273\002\127\066\257\230\047\052\071\120\341\260\211\365  
\045\227\176\107\150\020\264\354\163\312\263\227\321\044\334\366  
\142\240\050\323\265\243\270\144\267\210\142\102\317\235\123\315  
\231\276\144\150\217\117\036\022\110\367\322\051\303\230\050\312  
\362\062\013\223\214\051\117\074\140\062\315\005\226\141\354\362  
\257\376\263\160\054\056\246\362

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "BJCA Global Root CA1"

# Issuer: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN

# Serial Number:55:6f:65:e3:b4:d9:90:6a:1b:09:d1:6c:3e:c0:6c:20

# Subject: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN

# Not Valid Before: Thu Dec 19 03:16:17 2019

# Not Valid After : Mon Dec 12 03:16:17 2044

# Fingerprint (SHA-256):

F3:89:6F:88:FE:7C:0A:88:27:66:A7:FA:6A:D2:74:9F:B5:7A:7F:3E:98:FB:76:9C:1F:A7:B0:9C:2C:44:D5:AE

# Fingerprint (SHA1): D5:EC:8D:7B:4C:BA:79:F4:E7:E8:CB:9D:6B:AE:77:83:10:03:21:6A

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "BJCA Global Root CA1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\325\354\215\173\114\272\171\364\347\350\313\235\153\256\167\203

\020\003\041\152

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

\102\062\231\166\103\063\066\044\065\007\202\233\050\371\320\220

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061

\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116

\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125

\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003

\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157

\157\164\040\103\101\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\125\157\145\343\264\331\220\152\033\011\321\154\076\300

\154\040

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "BJCA Global Root CA2"

#

# Issuer: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN

# Serial Number:2c:17:08:7d:64:2a:c0:fe:85:18:59:06:cf:b4:4a:eb

#

Subject: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN

# Not Valid Before: Thu Dec 19 03:18:21 2019

# Not Valid After : Mon Dec 12 03:18:21 2044

# Fingerprint (SHA-256):

57:4D:F6:93:1E:27:80:39:66:7B:72:0A:FD:C1:60:0F:C2:7E:B6:6D:D3:09:29:79:FB:73:85:64:87:21:28:82

# Fingerprint (SHA1): F4:27:86:EB:6E:B8:6D:88:31:67:02:FB:BA:66:A4:53:00:AA:7A:A6

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "BJCA Global Root CA2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061

\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116

\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125

\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003

\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157



\157\164\040\103\101\062

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061  
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116  
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125  
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003  
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157  
\157\164\040\103\101\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\054\027\010\175\144\052\300\376\205\030\131\006\317\264  
\112\353

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\045\060\202\001\253\240\003\002\001\002\002\020\054  
\027\010\175\144\052\300\376\205\030\131\006\317\264\112\353\060  
\012\006\010\052\206\110\316\075\004\003\003\060\124\061\013\060  
\011\006\003\125\004\006\023\002\103\116\061\046\060\044\006\003  
\125\004\012\014\035\102\105\111\112\111\116\107\040\103\105\122  
\124\111\106\111\103\101\124\105\040\101\125\124\110\117\122\111  
\124\131\061\035\060\033\006\003\125\004\003\014\024\102\112\103  
\101\040\107\154\157\142\141\154\040\122\157\157\164\040\103\101  
\062\060\036\027\015\061\071\061\062\061\071\060\063\061\070\062\061  
\132\027\015\064\064\061\062\061\062\060\063\061\070\062\061  
\132\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116  
\061\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111  
\116\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101  
\125\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004  
\003\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122  
\157\157\164\040\103\101\062\060\166\060\020\006\007\052\206\110  
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\235  
\313\200\221\215\123\147\265\271\120\261\003\370\345\111\037\101  
\042\011\260\121\122\130\326\053\064\217\305\022\106\024\305\213  
\057\054\204\377\054\156\250\325\361\011\343\003\041\024\304\103  
\075\174\301\054\304\113\152\112\315\351\207\340\175\366\042\276  
\372\112\121\270\060\212\375\341\336\030\022\012\366\107\267\347  
\027\277\047\212\324\101\114\226\074\140\226\301\375\025\034\243  
\102\060\100\060\035\006\003\125\035\016\004\026\004\024\322\112  
\261\121\177\006\360\321\202\037\116\156\137\253\203\374\110\324  
\260\221\060\017\006\003\125\035\023\001\001\377\004\005\060\003  
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\012\006\010\052\206\110\316\075\004\003\003\003  
\150\000\060\145\002\060\032\274\133\327\376\251\322\124\016\112  
\135\322\155\261\100\334\364\103\325\322\112\231\031\022\126\200  
\367\203\064\341\065\116\110\155\004\017\127\061\060\060\055\261

```

\252\235\003\070\333\006\002\061\000\313\314\207\123\313\172\337
\040\121\163\220\300\250\133\141\320\305\120\071\375\205\376\301
\343\170\370\246\326\113\275\233\207\217\017\345\326\123\226\253
\074\310\100\332\141\367\123\243\367
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "BJCA Global Root CA2"
Issuer: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE
AUTHORITY,C=CN
Serial Number:2c:17:08:7d:64:2a:c0:fe:85:18:59:06:cf:b4:4a:eb
Subject: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN
Not Valid Before: Thu Dec 19 03:18:21 2019
Not Valid After : Mon Dec 12 03:18:21 2044
Fingerprint (SHA-256):
57:4D:F6:93:1E:27:80:39:66:7B:72:0A:FD:C1:60:0F:C2:7E:B6:6D:D3:09:29:79:FB:73:85:64:87:21:28:82
Fingerprint (SHA1): F4:27:86:EB:6E:B8:6D:88:31:67:02:FB:BA:66:A4:53:00:AA:7A:A6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BJCA Global Root CA2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\364\047\206\353\156\270\155\210\061\147\002\373\272\146\244\123
\000\252\172\246
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\136\012\366\107\137\246\024\350\021\001\225\077\115\001\353\074
END
CKA_ISSUER MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\054\027\010\175\144\052\300\376\205\030\131\006\317\264
\112\353
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "LAWtrust Root CA2 (4096)"

#

# Issuer: CN=LAWtrust Root CA2 (4096),O=LAWtrust,C=ZA

# Serial Number: 1427795633 (0x551a6eb1)

# Subject: CN=LAWtrust Root CA2 (4096),O=LAWtrust,C=ZA

# Not Valid Before: Tue Feb 14 09:19:38 2023

# Not Valid After : Fri Feb 14 09:49:38 2053

# Fingerprint (SHA-256):

48:E1:CF:9E:43:B6:88:A5:10:44:16:0F:46:D7:73:B8:27:7F:E4:5B:EA:AD:0E:4D:F9:0D:19:74:38:2F:EA:99

# Fingerprint (SHA1): EC:A2:D5:30:A9:AB:2C:7D:0E:75:61:64:4E:0A:E0:16:A1:54:38:7D

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "LAWtrust Root CA2 (4096)"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\103\061\013\060\011\006\003\125\004\006\023\002\132\101\061  
\021\060\017\006\003\125\004\012\023\010\114\101\127\164\162\165  
\163\164\061\041\060\037\006\003\125\004\003\023\030\114\101\127  
\164\162\165\163\164\040\122\157\157\164\040\103\101\062\040\050  
\064\060\071\066\051

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\103\061\013\060\011\006\003\125\004\006\023\002\132\101\061  
\021\060\017\006\003\125\004\012\023\010\114\101\127\164\162\165  
\163\164\061\041\060\037\006\003\125\004\003\023\030\114\101\127  
\164\162\165\163\164\040\122\157\157\164\040\103\101\062\040\050  
\064\060\071\066\051

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\004\125\032\156\261

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\230\060\202\003\200\240\003\002\001\002\002\004\125  
\032\156\261\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\060\103\061\013\060\011\006\003\125\004\006\023\002\132  
\101\061\021\060\017\006\003\125\004\012\023\010\114\101\127\164  
\162\165\163\164\061\041\060\037\006\003\125\004\003\023\030\114  
\101\127\164\162\165\163\164\040\122\157\157\164\040\103\101\062  
\040\050\064\060\071\066\051\060\040\027\015\062\063\060\062\061  
\064\060\071\061\071\063\070\132\030\017\062\060\065\063\060\062  
\061\064\060\071\064\071\063\070\132\060\103\061\013\060\011\006

\003\125\004\006\023\002\132\101\061\021\060\017\006\003\125\004  
\012\023\010\114\101\127\164\162\165\163\164\061\041\060\037\006  
\003\125\004\003\023\030\114\101\127\164\162\165\163\164\040\122  
\157\157\164\040\103\101\062\040\050\064\060\071\066\051\060\202  
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\314  
\027\313\053\103\272\154\371\311\223\212\145\015\022\114\354\047  
\024\267\023\171\340\324\325\055\030\126\361\371\352\052\020\026  
\116\154\104\307\152\145\106\363\232\211\065\321\207\370\063\211  
\057\210\011\032\222\020\221\220\301\153\237\016\156\177\046\212  
\023\135\030\254\150\001\015\020\170\145\160\330\216\217\204\132  
\227\060\030\320\021\016\112\215\122\020\245\201\053\121\050\365  
\143\304\266\354\100\263\001\345\255\167\275\345\070\357\274\215  
\263\335\031\240\173\015\215\264\333\152\373\045\063\132\372\221  
\257\304\161\105\060\370\210\051\173\313\277\325\272\047\004\216  
\335\262\000\367\312\134\231\065\024\352\375\165\006\025\010\273  
\312\127\150\373\077\373\264\064\163\143\321\325\343\310\070\132  
\151\175\152\172\104\014\015\212\116\355\222\035\020\217\073\042  
\054\266\337\355\305\306\360\211\171\124\145\136\137\033\275\217  
\175\337\271\267\355\353\344\305\007\321\147\074\225\073\221\376  
\102\172\122\100\200\004\322\071\127\113\364\222\175\377\233\357  
\345\235\311\011\262\221\022\070\246\051\010\073\256\353\312\314  
\355\115\347\116\041\001\007\374\157\062\316\151\214\204\122\306  
\167\352\047\060\012\336\245\257\060\053\150\037\254\324\354\041  
\255\042\111\166\316\017\302\362\007\052\371\152\022\203\232\073  
\004\256\031\172\376\241\206\044\372\101\136\045\174\100\254\047  
\266\343\051\066\157\065\342\127\320\031\130\337\377\144\366\303  
\001\111\166\333\053\276\274\271\117\024\012\325\033\130\041\366  
\034\056\000\174\370\224\265\313\067\032\024\344\062\271\026\324  
\140\354\005\252\137\062\372\152\043\022\254\324\020\273\322\242  
\202\264\113\016\213\160\047\252\326\007\301\147\210\372\204\303  
\010\311\212\204\310\322\067\162\201\017\215\026\112\344\327\065  
\121\245\070\017\214\204\113\225\066\300\365\327\235\340\135\217  
\253\221\356\000\010\271\235\122\037\354\370\231\273\171\126\261  
\111\332\322\345\330\141\213\133\257\360\253\067\305\173\032\216  
\206\276\176\305\173\025\036\141\150\350\013\207\213\163\111\241  
\027\163\176\051\170\216\312\340\101\057\165\163\164\242\227\072  
\177\367\056\164\011\270\114\140\213\106\066\031\020\055\235\002  
\003\001\000\001\243\201\221\060\201\216\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\053\006\003\125  
\035\020\004\044\060\042\200\017\062\060\062\063\060\062\061\064  
\060\071\061\071\063\070\132\201\017\062\060\065\063\060\062\061  
\064\060\071\064\071\063\070\132\060\037\006\003\125\035\043\004  
\030\060\026\200\024\327\326\126\142\134\077\027\201\346\163\104  
\051\365\121\005\357\013\140\067\254\060\035\006\003\125\035\016  
\004\026\004\024\327\326\126\142\134\077\027\201\346\163\104\051  
\365\121\005\357\013\140\067\254\060\015\006\011\052\206\110\206

\367\015\001\001\013\005\000\003\202\002\001\000\111\234\051\376  
\075\354\236\105\177\253\076\074\376\043\157\067\076\167\247\123  
\377\170\237\374\111\104\200\127\146\234\156\332\171\377\315\105  
\255\114\223\277\265\131\306\351\020\267\345\370\214\373\207\305  
\036\213\330\263\077\002\226\012\273\212\216\357\327\264\300\203  
\040\070\227\131\105\144\374\366\167\023\362\011\327\241\310\070  
\164\010\352\371\110\114\372\037\004\234\264\377\354\156\126\066  
\162\223\154\225\076\054\137\336\017\013\253\311\314\025\076\026  
\217\146\374\262\020\270\241\321\264\336\300\143\031\314\357\123  
\252\165\066\042\213\045\037\277\233\310\327\301\137\354\246\067  
\011\252\173\142\274\366\042\055\361\326\130\335\214\273\122\364  
\013\247\166\251\172\173\032\215\334\255\232\201\142\056\206\005  
\220\162\107\057\241\311\147\204\260\015\154\260\270\233\026\267  
\320\231\024\057\234\022\233\043\250\215\246\103\036\351\345\055  
\345\170\247\037\144\224\144\266\167\262\250\134\373\011\253\051  
\353\036\155\165\321\366\320\305\245\303\035\237\036\363\032\055  
\262\310\037\345\050\012\156\363\137\375\332\346\043\241\166\220  
\134\113\230\001\202\054\356\107\055\002\032\137\177\064\305\151  
\265\162\255\076\363\317\236\155\370\051\350\021\047\053\340\131  
\013\033\141\353\112\312\151\245\244\325\315\121\033\224\216\171  
\315\337\366\256\164\135\261\054\033\206\123\376\321\060\006\101  
\064\007\142\202\114\364\176\307\207\164\016\260\041\036\011\040  
\200\301\263\025\075\106\155\323\361\006\222\077\357\240\225\212  
\034\156\167\061\266\353\170\051\014\173\356\202\245\117\176\244  
\051\136\236\252\055\370\216\300\363\374\015\006\205\233\116\334  
\367\342\011\174\320\024\121\036\172\263\043\257\372\321\141\052  
\145\265\001\331\270\343\007\312\044\166\322\360\112\276\357\206  
\004\200\102\025\160\021\150\176\327\307\273\376\347\116\233\234  
\225\245\034\112\244\311\320\011\214\252\316\110\322\036\222\227  
\327\021\351\355\146\314\067\334\365\327\033\164\233\246\352\102  
\254\135\062\340\130\364\201\107\377\322\022\342\176\034\334\111  
\166\226\303\035\237\113\312\134\052\067\133\075\212\321\070\233  
\041\332\343\277\105\103\323\340\130\167\037\050

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "LAWtrust

Root CA2 (4096)"

# Issuer: CN=LAWtrust Root CA2 (4096),O=LAWtrust,C=ZA

# Serial Number: 1427795633 (0x551a6eb1)

# Subject: CN=LAWtrust Root CA2 (4096),O=LAWtrust,C=ZA

# Not Valid Before: Tue Feb 14 09:19:38 2023

# Not Valid After : Fri Feb 14 09:49:38 2053

# Fingerprint (SHA-256):

48:E1:CF:9E:43:B6:88:A5:10:44:16:0F:46:D7:73:B8:27:7F:E4:5B:EA:AD:0E:4D:F9:0D:19:74:38:2F:EA:99

```

Fingerprint (SHA1): EC:A2:D5:30:A9:AB:2C:7D:0E:75:61:64:4E:0A:E0:16:A1:54:38:7D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LAWtrust Root CA2 (4096)"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\354\242\325\060\251\253\054\175\016\165\141\144\116\012\340\026
\241\124\070\175
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\257\035\306\323\105\305\353\365\246\141\043\060\075\056\021\261
END
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\132\101\061
\021\060\017\006\003\125\004\012\023\010\114\101\127\164\162\165
\163\164\061\041\060\037\006\003\125\004\003\023\030\114\101\127
\164\162\165\163\164\040\122\157\157\164\040\103\101\062\040\050
\064\060\071\066\051
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\125\032\156\261
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Sectigo Public Email Protection Root E46"
#
Issuer: CN=Sectigo Public Email Protection Root E46,O=Sectigo Limited,C=GB
Serial Number:6e:f5:d3:a7:41:8e:a0:59:40:a7:30:6b:d2:40:65:56
Subject: CN=Sectigo Public Email Protection Root E46,O=Sectigo Limited,C=GB
Not Valid Before: Mon Mar 22 00:00:00 2021
Not Valid After : Wed Mar 21 23:59:59 2046
Fingerprint (SHA-256):
22:D9:59:92:34:D6:0F:1D:4B:C7:C7:E9:6F:43:FA:55:5B:07:30:1F:D4:75:17:50:89:DA:FB:8C:25:E4:77:B3
Fingerprint (SHA1): 3A:C5:C3:78:34:5B:E1:82:92:46:ED:17:86:B3:93:91:7B:51:F2:14
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Email Protection Root E46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL

```

\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061  
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147  
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125  
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154  
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164  
\151\157\156\040\122\157\157\164\040\105\064\066

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061  
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147  
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125  
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154  
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164  
\151\157\156\040\122\157\157\164\040\105\064\066

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\156\365\323\247\101\216\240\131\100\247\060\153\322\100  
\145\126

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\061\060\202\001\267\240\003\002\001\002\002\020\156  
\365\323\247\101\216\240\131\100\247\060\153\322\100\145\126\060  
\012\006\010\052\206\110\316\075\004\003\003\060\132\061\013\060  
\011\006\003\125\004\006\023\002\107\102\061\030\060\026\006\003  
\125\004\012\023\017\123\145\143\164\151\147\157\040\114\151\155  
\151\164\145\144\061\061\060\057\006\003\125\004\003\023\050\123  
\145\143\164\151\147\157\040\120\165\142\154\151\143\040\105\155  
\141\151\154\040\120\162\157\164\145\143\164\151\157\156\040\122  
\157\157\164\040\105\064\066\060\036\027\015\062\061\060\063\062  
\062\060\060\060\060\060\060\132\027\015\064\066\060\063\062\061  
\062\063\065\071\065\071\132\060\132\061\013\060\011\006\003\125  
\004\006\023\002\107\102\061\030\060\026\006\003\125\004\012\023  
\017\123\145\143\164\151\147\157\040\114\151\155\151\164\145\144  
\061\061\060\057\006\003\125\004\003\023\050\123\145\143\164\151  
\147\157\040\120\165\142\154\151\143\040\105\155\141\151\154\040  
\120\162\157\164\145\143\164\151\157\156\040\122\157\157\164\040  
\105\064\066\060\166\060\020\006\007\052\206\110\316\075\002\001  
\006\005\053\201\004\000\042\003\142\000\004\270\247\122\224\365  
\076\005\260\033\366\037\261\323\176\271\344\005\146\124\200\316  
\154\245\150\175\344\123\122\333\202\372\304\206\337\103\170\367  
\310\255\026\274\077\170\062\313\153\323\111\326\104\345\263\176  
\237\173\246\306\054\362\342\266\323\211\260\232\074\113\316\211  
\113\306\306\313\072\111\140\017\106\274\155\116\172\234\311\233  
\205\173\012\266\260\107\302\210\343\324\321\243\102\060\100\060  
\035\006\003\125\035\016\004\026\004\024\055\116\214\247\302\043  
\262\127\251\006\153\076\153\053\211\363\303\136\107\316\060\016

```
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060\145
\002\061\000\222\235\032\131\143\105\130\216\033\026\344\175\172
\154\066\110\060\037\053\162\347\220\063\064\375\044\242\306\006
\214\157\073\062\127\132\370\376\306\111\022\123\232\331\020\262
\231\121\162\002\060\005\045\052\063\041\374\223\346\042\242\314
\160\125\050\065\126\242\007\304\041\204\043\032\114\114\231\120
\231\222\024\313\112\334\126\373\365\323\217\152\054\365\161\072
\370\213\073\003\236
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Sectigo Public Email Protection Root E46"

# Issuer: CN=Sectigo Public Email Protection Root E46,O=Sectigo Limited,C=GB

# Serial Number:6e:f5:d3:a7:41:8e:a0:59:40:a7:30:6b:d2:40:65:56

# Subject: CN=Sectigo Public Email Protection Root E46,O=Sectigo Limited,C=GB

# Not Valid Before: Mon Mar 22 00:00:00 2021

# Not

Valid After : Wed Mar 21 23:59:59 2046

# Fingerprint (SHA-256):

22:D9:59:92:34:D6:0F:1D:4B:C7:C7:E9:6F:43:FA:55:5B:07:30:1F:D4:75:17:50:89:DA:FB:8C:25:E4:77:B3

# Fingerprint (SHA1): 3A:C5:C3:78:34:5B:E1:82:92:46:ED:17:86:B3:93:91:7B:51:F2:14

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Sectigo Public Email Protection Root E46"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\072\305\303\170\064\133\341\202\222\106\355\027\206\263\223\221
```

```
\173\121\362\024
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\271\032\257\054\211\226\100\140\047\006\073\241\177\335\211\323
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061
```

```
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
```

```
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125
```

```
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154
```

```
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164
```

```
\151\157\156\040\122\157\157\164\040\105\064\066
```

END

CKA\_SERIAL\_NUMBER



```

MULTILINE_OCTAL
\002\020\156\365\323\247\101\216\240\131\100\247\060\153\322\100
\145\126
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Sectigo Public Email Protection Root R46"
#
Issuer: CN=Sectigo Public Email Protection Root R46,O=Sectigo Limited,C=GB
Serial Number:1d:44:9e:b9:0d:83:91:74:ae:dd:f2:eb:88:b7:a6:a3
Subject: CN=Sectigo Public Email Protection Root R46,O=Sectigo Limited,C=GB
Not Valid Before: Mon Mar 22 00:00:00 2021
Not Valid After : Wed Mar 21 23:59:59 2046
Fingerprint (SHA-256):
D5:91:7A:77:91:EB:7C:F2:0A:2E:57:EB:98:28:4A:67:B2:8A:57:E8:91:82:DA:53:D5:46:67:8C:9F:DE:2B:4F
Fingerprint (SHA1): D3:7B:8B:0A:E8:42:44:FB:6B:80:38:EE:AE:91:80:26:1A:48:70:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Email Protection Root R46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164
\151\157\156\040\122\157\157\164\040\122\064\066
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164
\151\157\156\040\122\157\157\164\040\122\064\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\035\104\236\271\015\203\221\164\256\335\362\353\210\267
\246\243

```

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\200\060\202\003\150\240\003\002\001\002\002\020\035  
\104\236\271\015\203\221\164\256\335\362\353\210\267\246\243\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\132  
\061\013\060\011\006\003\125\004\006\023\002\107\102\061\030\060  
\026\006\003\125\004\012\023\017\123\145\143\164\151\147\157\040  
\114\151\155\151\164\145\144\061\061\060\057\006\003\125\004\003  
\023\050\123\145\143\164\151\147\157\040\120\165\142\154\151\143  
\040\105\155\141\151\154\040\120\162\157\164\145\143\164\151\157  
\156\040\122\157\157\164\040\122\064\066\060\036\027\015\062\061  
\060\063\062\062\060\060\060\060\060\060\132\027\015\064\066\060  
\063\062\061\062\063\065\071\065\071\132\060\132\061\013\060\011  
\006\003\125\004\006\023\002\107\102\061\030\060\026\006\003\125  
\004\012\023\017\123\145\143\164\151\147\157\040\114\151\155\151  
\164\145\144\061\061\060\057\006\003\125\004\003\023\050\123\145  
\143\164\151\147\157\040\120\165\142\154\151\143\040\105\155\141  
\151\154\040\120\162\157\164\145\143\164\151\157\156\040\122\157  
\157\164\040\122\064\066\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202  
\002\012\002\202\002\001\000\221\345\033\372\252\155\067\053\165  
\307\056\137\024\245\333\054\227\266\054\106\217\151\331\354\226  
\055\363\035\132\276\323\035\043\346\150\011\377\112\021\163\032  
\256\147\237\166\232\322\347\354\270\331\137\053\371\046\126\121  
\257\166\235\251\374\027\357\062\012\320\043\074\272\054\117\107  
\203\354\235\005\150\102\136\006\340\325\350\053\150\110\227\262  
\372\363\244\161\065\175\064\233\027\213\177\115\015\333\334\117  
\005\114\224\142\277\065\372\057\310\247\034\146\331\161\137\345  
\346\132\125\312\253\364\270\167\031\105\120\105\116\112\253\333  
\236\146\301\031\267\067\102\310\126\245\100\022\371\063\350\070  
\105\072\306\204\243\002\216\057\044\260\303\101\205\007\111\234  
\317\334\321\362\046\157\355\063\034\063\147\052\105\067\331\205  
\145\042\032\261\265\020\122\011\153\003\306\037\160\075\221\304  
\175\220\075\355\146\370\220\377\045\340\355\222\242\213\061\051  
\255\234\022\146\170\143\235\127\354\373\013\336\216\334\213\313  
\072\251\167\364\272\345\354\070\214\213\346\023\146\247\151\130  
\303\202\032\032\315\361\237\330\123\222\116\111\175\251\105\347  
\361\103\041\132\267\076\100\315\143\211\317\331\277\307\120\013  
\341\274\347\210\226\255\236\324\027\332\135\317\340\221\375\246  
\020\324\271\003\201\233\151\254\373\204\250\201\065\353\033\353  
\150\154\174\140\076\303\337\311\264\256\164\035\110\255\335\156  
\021\206\341\052\152\066\026\256\310\316\274\333\130\374\100\223  
\100\330\216\123\227\302\254\042\070\345\210\061\263\056\241\357  
\354\340\102\015\352\377\223\126\112\006\244\233\114\002\150\144  
\217\126\120\301\201\005\375\313\333\305\327\025\362\153\265\166  
\303\243\371\062\316\312\265\112\251\033\175\031\334\177\307\152  
\176\225\354\266\270\215\375\225\112\234\243\053\155\213\361\160  
\345\107\053\000\134\344\271\236\324\370\331\130\051\320\313\340

\050\142\154\256\234\142\342\314\274\066\223\101\365\357\376\106  
\142\225\260\127\112\164\054\107\122\051\235\335\242\241\117\102  
\302\222\316\055\120\122\136\214\012\241\367\330\235\305\370\375  
\066\207\116\127\375\150\241\137\231\203\034\360\265\335\350\222  
\323\145\100\125\312\226\205\002\003\001\000\001\243\102\060\100  
\060\035\006\003\125\035\016\004\026\004\024\247\327\225\167\353  
\112\303\047\315\223\276\067\114\046\204\041\024\175\135\230\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003  
\202\002\001\000\064\322\361\025\363\223\001\324\162\213\360\253  
\010\037\023\074\163\264\260\253\350\170\331\154\272\232\257\046  
\354\020\200\345\015\123\061\335\343\372\214\121\042\044\063\067  
\270\030\176\072\372\130\350\064\345\214\340\241\037\011\101\322  
\067\077\314\313\011\065\102\210\351\374\021\327\317\102\252\244  
\160\266\161\301\123\275\305\164\257\304\042\044\143\317\142\202  
\175\311\313\121\301\210\220\155\133\134\276\373\231\250\272\266  
\206\260\351\146\013\345\033\153\257\352\053\206\247\337\250\043  
\114\226\077\117\127\102\030\025\203\103\361\206\046\267\052\003  
\316\013\235\350\245\150\036\214\157\275\205\343\033\121\217\347  
\027\057\053\320\326\170\302\055\335\162\210\324\145\236\372\231  
\324\176\347\227\012\222\001\232\245\251\204\072\014\052\164\075  
\063\030\310\207\367\350\244\365\206\102\071\375\153\165\051\374  
\000\006\254\242\245\032\124\216\351\120\111\027\146\257\113\004  
\055\233\224\200\245\124\253\214\127\027\104\237\017\326\150\144  
\162\264\113\036\001\307\331\233\224\331\203\231\257\022\005\021  
\243\230\042\322\362\127\312\044\371\272\070\025\022\110\272\143  
\073\374\213\225\170\326\162\007\126\314\315\374\235\034\320\305  
\144\073\143\064\317\004\231\212\267\060\171\172\266\362\306\325  
\331\124\172\207\013\176\116\367\204\354\024\363\210\026\022\361  
\325\256\012\032\011\356\206\255\345\253\375\256\303\051\171\164  
\303\001\137\021\233\337\165\231\306\112\367\233\217\154\111\354  
\041\057\264\002\131\263\055\320\162\220\272\013\024\164\170\113  
\317\301\137\125\162\216\124\053\023\316\372\130\014\323\273\054  
\331\251\221\141\370\370\361\266\173\336\274\251\314\222\004\314  
\113\153\137\163\200\266\041\355\120\117\327\166\207\156\316\337  
\322\267\275\142\241\175\130\142\150\105\122\266\077\336\022\333  
\355\004\151\236\166\210\252\001\155\332\206\307\140\033\303\122  
\254\067\354\120\161\200\162\052\041\105\012\123\107\074\031\353  
\215\322\131\004\336\045\260\353\037\065\157\140\175\327\265\306  
\273\013\047\215\340\115\124\345\317\035\046\001\156\073\065\310  
\040\022\211\203\360\322\355\130\073\064\235\273\061\365\062\375  
\061\363\126\032

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Trust for "Sectigo Public Email Protection Root R46"

# Issuer: CN=Sectigo Public Email Protection Root R46,O=Sectigo Limited,C=GB

# Serial Number:1d:44:9e:b9:0d:83:91:74:ae:dd:f2:eb:88:b7:a6:a3

# Subject: CN=Sectigo Public Email Protection Root R46,O=Sectigo Limited,C=GB

# Not Valid Before: Mon Mar 22 00:00:00 2021

# Not Valid After : Wed Mar 21 23:59:59 2046

# Fingerprint (SHA-256):

D5:91:7A:77:91:EB:7C:F2:0A:2E:57:EB:98:28:4A:67:B2:8A:57:E8:91:82:DA:53:D5:46:67:8C:9F:DE:2B:4F

# Fingerprint (SHA1): D3:7B:8B:0A:E8:42:44:FB:6B:80:38:EE:AE:91:80:26:1A:48:70:66

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Sectigo Public Email Protection Root R46"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\323\173\213\012\350\102\104\373\153\200\070\356\256\221\200\046  
\032\110\160\146

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\102\047\005\220\034\246\300\373\242\015\375\337\142\211\335\133

END

CKA\_ISSUER

MULTILINE\_OCTAL

\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061  
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147  
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125  
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154  
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164  
\151\157\156\040\122\157\157\164\040\122\064\066

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\035\104\236\271\015\203\221\164\256\335\362\353\210\267  
\246\243

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Sectigo Public Server Authentication Root E46"

#

# Issuer: CN=Sectigo Public Server Authentication Root E46,O=Sectigo Limited,C=GB

# Serial Number:42:f2:cc:da:1b:69:37:44:5f:15:fe:75:28:10:b8:f4

# Subject: CN=Sectigo

```
Public Server Authentication Root E46,O=Sectigo Limited,C=GB
Not Valid Before: Mon Mar 22 00:00:00 2021
Not Valid After : Wed Mar 21 23:59:59 2046
Fingerprint (SHA-256):
C9:0F:26:F0:FB:1B:40:18:B2:22:27:51:9B:5C:A2:B5:3E:2C:A5:B3:BE:5C:F1:8E:FE:1B:EF:47:38:0C:53:83
Fingerprint (SHA1): EC:8A:39:6C:40:F0:2E:BC:42:75:D4:9F:AB:1C:1A:5B:67:BE:D2:9A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Server Authentication Root E46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\105\064
\066
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\105\064
\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\102\362\314\332\033\151\067\104\137\025\376\165\050\020
\270\364
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\072\060\202\001\301\240\003\002\001\002\002\020\102
\362\314\332\033\151\067\104\137\025\376\165\050\020\270\364\060
\012\006\010\052\206\110\316\075\004\003\003\060\137\061\013\060
\011\006\003\125\004\006\023\002\107\102\061\030\060\026\006\003
\125\004\012\023\017\123\145\143\164\151\147\157\040\114\151\155
\151\164\145\144\061\066\060\064\006\003\125\004\003\023\055\123
\145\143\164\151\147\157\040\120\165\142\154\151\143\040\123\145
\162\166\145\162\040\101\165\164\150\145\156\164\151\143\141\164
\151\157\156\040\122\157\157\164\040\105\064\066\060\036\027\015
\062\061\060\063\062\062\060\060\060\060\060\060\132\027\015\064
\066\060\063\062\061\062\063\065\071\065\071\132\060\137\061\013
```

\060\011\006\003\125\004\006\023\002\107\102\061\030\060\026\006  
\003\125\004\012\023\017\123\145\143\164\151\147\157\040\114\151  
\155\151\164\145\144\061\066\060\064\006\003\125\004\003\023\055  
\123\145\143\164\151\147\157\040\120\165\142\154\151\143\040\123  
\145\162\166\145\162\040\101\165\164\150\145\156\164\151\143\141  
\164\151\157\156\040\122\157\157\164\040\105\064\066\060\166\060  
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000  
\042\003\142\000\004\166\372\231\251\156\040\355\371\327\167\343  
\007\073\250\333\075\137\070\350\253\125\246\126\117\326\110\352  
\354\177\055\252\303\262\305\171\354\231\141\177\020\171\307\002  
\132\371\004\067\365\064\065\053\167\316\177\040\217\122\243\000  
\211\354\325\247\242\155\133\343\113\222\223\240\200\365\001\224  
\334\360\150\007\036\315\356\376\045\122\265\040\103\034\033\376  
\353\031\316\103\243\243\102\060\100\060\035\006\003\125\035\016  
\004\026\004\024\321\042\332\114\131\361\113\137\046\070\252\235  
\326\356\353\015\303\373\251\141\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\012\006\010\052\206\110  
\316\075\004\003\003\003\147\000\060\144\002\060\047\356\244\132  
\250\041\273\351\107\227\224\211\245\164\040\155\171\117\310\275  
\223\136\130\030\373\055\032\000\152\311\270\075\320\244\117\104  
\107\224\001\126\242\370\063\045\014\102\337\252\002\060\035\352  
\341\056\210\056\341\371\247\035\002\062\116\362\237\154\125\164  
\343\256\256\373\245\032\356\355\322\374\302\003\021\353\105\134  
\140\020\075\134\177\231\003\133\155\124\110\001\212\163

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Sectigo Public Server Authentication Root E46"

# Issuer: CN=Sectigo Public Server Authentication Root E46,O=Sectigo Limited,C=GB

# Serial Number:42:f2:cc:da:1b:69:37:44:5f:15:fe:75:28:10:b8:f4

# Subject: CN=Sectigo Public Server Authentication Root E46,O=Sectigo Limited,C=GB

# Not Valid Before: Mon Mar 22 00:00:00 2021

# Not Valid After : Wed Mar 21 23:59:59 2046

# Fingerprint (SHA-256):

C9:0F:26:F0:FB:1B:40:18:B2:22:27:51:9B:5C:A2:B5:3E:2C:A5:B3:BE:5C:F1:8E:FE:1B:EF:47:38:0C:53:83

# Fingerprint (SHA1): EC:8A:39:6C:40:F0:2E:BC:42:75:D4:9F:AB:1C:1A:5B:67:BE:D2:9A

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Sectigo Public Server Authentication Root E46"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\354\212\071\154\100\360\056\274\102\165\324\237\253\034\032\133

```
\147\276\322\232
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\050\043\370\262\230\134\067\026\073\076\106\023\116\260\263\001
END
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\105\064
\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\102\362\314\332\033\151\067\104\137\025\376\165\050\020
\270\364
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Sectigo Public Server Authentication Root R46"
#
Issuer: CN=Sectigo Public Server Authentication Root R46,O=Sectigo Limited,C=GB
Serial
Number:75:8d:fd:8b:ae:7c:07:00:fa:a9:25:a7:e1:c7:ad:14
Subject: CN=Sectigo Public Server Authentication Root R46,O=Sectigo Limited,C=GB
Not Valid Before: Mon Mar 22 00:00:00 2021
Not Valid After : Wed Mar 21 23:59:59 2046
Fingerprint (SHA-256):
7B:B6:47:A6:2A:EE:AC:88:BF:25:7A:A5:22:D0:1F:FE:A3:95:E0:AB:45:C7:3F:93:F6:56:54:EC:38:F2:5A:06
Fingerprint (SHA1): AD:98:F9:F3:E4:7D:75:3B:65:D4:82:B3:A4:52:17:BB:6E:F5:E4:38
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Server Authentication Root R46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
```

\164\151\143\141\164\151\157\156\040\122\157\157\164\040\122\064  
\066  
END  
CKA\_ID  
UTF8 "0"  
CKA\_ISSUER MULTILINE\_OCTAL  
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061  
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147  
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125  
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154  
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156  
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\122\064  
\066  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\020\165\215\375\213\256\174\007\000\372\251\045\247\341\307  
\255\024  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\005\212\060\202\003\162\240\003\002\001\002\002\020\165  
\215\375\213\256\174\007\000\372\251\045\247\341\307\255\024\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\137  
\061\013\060\011\006\003\125\004\006\023\002\107\102\061\030\060  
\026\006\003\125\004\012\023\017\123\145\143\164\151\147\157\040  
\114\151\155\151\164\145\144\061\066\060\064\006\003\125\004\003  
\023\055\123\145\143\164\151\147\157\040\120\165\142\154\151\143  
\040\123\145\162\166\145\162\040\101\165\164\150\145\156\164\151  
\143\141\164\151\157\156\040\122\157\157\164\040\122\064\066\060  
\036\027\015\062\061\060\063\062\062\060\060\060\060\060\132  
\027\015\064\066\060\063\062\061\062\063\065\071\065\071\132\060  
\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061\030  
\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147\157  
\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125\004  
\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154\151  
\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156\164  
\151\143\141\164\151\157\156\040\122\157\157\164\040\122\064\066  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\223\276\325\066\122\165\330\001\043\240\034\107\102\111\356  
\143\266\267\041\375\304\225\325\110\053\046\174\024\123\020\332  
\171\375\053\267\055\244\324\054\372\352\062\335\111\302\271\275  
\017\110\075\173\132\230\124\257\236\135\061\164\117\007\374\120  
\041\335\244\317\150\117\033\022\143\155\045\231\114\052\231\363  
\110\060\141\372\201\174\036\247\010\112\334\076\053\034\037\030  
\114\161\252\065\214\255\370\156\350\073\112\331\345\224\002\326  
\211\204\023\252\155\310\117\063\314\120\226\067\222\063\334\137  
\210\347\237\124\331\110\360\230\103\326\146\375\237\027\070\103  
\305\001\121\013\327\343\043\017\024\135\133\024\347\113\276\335



\364\310\332\003\067\321\326\071\241\041\121\060\203\260\155\327  
\060\116\226\133\221\360\160\044\253\277\105\201\144\103\015\275  
\041\072\057\074\351\236\015\313\040\265\102\047\314\332\157\233  
\356\144\060\220\071\315\223\145\201\041\061\265\043\120\063\067  
\042\343\070\355\370\061\060\314\105\376\142\371\321\135\062\171  
\102\207\337\152\314\126\031\100\115\316\252\273\371\265\166\111  
\224\361\047\370\221\245\203\345\006\263\143\016\200\334\340\022  
\125\200\246\073\146\264\071\207\055\310\360\320\321\024\351\344  
\015\115\016\366\135\127\162\305\073\034\107\126\235\342\325\373  
\201\141\214\314\115\200\220\064\133\267\327\024\165\334\330\004  
\110\237\300\301\050\210\264\351\034\312\247\261\361\126\267\173  
\111\114\131\345\040\025\250\204\002\051\372\070\224\151\232\111  
\006\217\315\037\171\024\027\022\014\203\172\336\037\261\227\356  
\371\227\170\050\244\310\104\222\351\175\046\005\246\130\162\233  
\171\023\330\021\137\256\305\070\142\064\150\262\206\060\216\370  
\220\141\236\062\154\365\007\066\315\242\114\156\354\212\066\355  
\362\346\231\025\104\160\303\174\274\234\071\300\264\341\153\367  
\203\045\043\127\331\022\200\345\111\360\165\017\357\215\353\034  
\233\124\050\264\041\074\374\174\012\377\357\173\153\165\377\213  
\035\240\031\005\253\372\370\053\201\102\350\070\272\273\373\252  
\375\075\340\363\312\337\116\227\227\051\355\363\030\126\351\245  
\226\254\275\303\220\230\262\340\371\242\324\246\107\103\174\155  
\317\002\003\001\000\001\243\102\060\100\060\035\006\003\125\035  
\016\004\026\004\024\126\163\130\144\225\371\222\032\260\022\052  
\004\142\171\241\100\025\210\041\111\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\015\006\011\052\206  
\110\206\367\015\001\001\014\005\000\003\202\002\001\000\057\134  
\231\074\374\006\136\214\224\056\160\352\322\062\061\215\264\360  
\121\325\274\012\363\144\237\007\136\325\301\163\150\144\172\242  
\271\016\350\371\135\205\055\250\067\105\252\050\364\226\005\120  
\140\251\111\176\237\342\231\066\051\023\104\107\152\235\125\040  
\074\330\233\361\003\062\272\332\100\241\163\352\203\241\267\104  
\246\016\231\001\233\344\274\177\276\023\224\176\312\246\036\166  
\200\066\075\204\006\213\063\046\145\155\312\176\236\376\037\214  
\130\070\173\032\203\261\017\274\027\021\273\346\006\314\143\372  
\201\362\201\114\332\013\020\153\241\372\325\050\245\317\006\100  
\026\377\173\175\030\136\071\022\244\123\236\176\062\102\020\246  
\041\221\251\034\116\027\174\204\274\237\214\321\350\337\346\121  
\271\066\107\077\220\271\307\274\002\334\133\034\117\016\110\301  
\045\203\234\012\077\236\261\003\063\022\032\047\254\367\042\154  
\044\321\001\101\370\130\003\376\045\150\042\037\232\132\074\174  
\154\236\165\110\363\201\361\146\147\156\114\202\300\356\272\127  
\016\030\357\056\232\367\022\330\240\153\351\005\245\241\351\150  
\370\274\114\077\022\036\105\350\122\300\243\277\022\047\171\271  
\314\061\074\303\366\072\042\026\003\240\311\217\146\244\133\242  
\115\326\201\045\006\351\166\244\000\012\076\313\315\065\233\340  
\341\070\313\140\123\206\050\102\101\034\104\127\350\250\255\253

```
\105\343\045\020\274\333\076\145\101\373\033\246\227\017\353\271
\164\171\371\036\274\035\127\015\107\257\303\057\237\207\106\247
\353\046\132\017\126\143\265\142\140\156\000\373\343\047\021\042
\347\376\231\217\064\365\271\350\303\221\162\275\330\303\036\271
\056\362\221\104\121\320\127\315\014\064\325\110\041\277\333\023
\361\146\045\103\122\322\160\042\066\315\237\304\034\165\040\255
\143\162\143\006\017\016\047\316\322\152\015\274\265\071\032\351
\321\166\172\321\134\344\347\111\111\055\125\067\150\360\032\072
\230\076\124\027\207\124\351\246\047\120\211\173\040\057\077\377
\277\241\213\112\107\230\377\053\173\111\076\303\051\106\140\030
\102\253\063\051\272\300\051\271\023\211\323\210\212\071\101\073
\311\375\246\355\037\364\140\143\337\322\055\125\001\213
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Sectigo Public Server Authentication Root R46"

# Issuer: CN=Sectigo Public Server Authentication Root R46,O=Sectigo Limited,C=GB

# Serial Number:75:8d:fd:8b:ae:7c:07:00:fa:a9:25:a7:e1:c7:ad:14

# Subject: CN=Sectigo Public Server Authentication Root R46,O=Sectigo Limited,C=GB

# Not Valid Before: Mon Mar 22 00:00:00 2021

# Not Valid After : Wed Mar 21 23:59:59 2046

# Fingerprint

(SHA-256):

7B:B6:47:A6:2A:EE:AC:88:BF:25:7A:A5:22:D0:1F:FE:A3:95:E0:AB:45:C7:3F:93:F6:56:54:EC:38:F2:5A:06

# Fingerprint (SHA1): AD:98:F9:F3:E4:7D:75:3B:65:D4:82:B3:A4:52:17:BB:6E:F5:E4:38

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Sectigo Public Server Authentication Root R46"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\255\230\371\363\344\175\165\073\145\324\202\263\244\122\027\273
\156\365\344\070
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\062\020\011\122\000\325\176\154\103\337\025\300\261\026\223\345
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\122\064
\066
```

```

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\165\215\375\213\256\174\007\000\372\251\045\247\341\307
\255\024
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "SSL.com TLS RSA Root CA 2022"
#
Issuer: CN=SSL.com TLS RSA Root CA 2022,O=SSL Corporation,C=US
Serial Number:6f:be:da:ad:73:bd:08:40:e2:8b:4d:be:d4:f7:5b:91
Subject: CN=SSL.com TLS RSA Root CA 2022,O=SSL Corporation,C=US
Not Valid Before: Thu Aug 25 16:34:22 2022
Not Valid After : Sun Aug 19 16:34:21 2046
Fingerprint (SHA-256):
8F:AF:7D:2E:2C:B4:70:9B:B8:E0:B3:36:66:BF:75:A5:DD:45:B5:DE:48:0F:8E:A8:D4:BF:E6:BE:BC:17:F2:ED
Fingerprint (SHA1): EC:2C:83:40:72:AF:26:95:10:FF:0E:F2:03:EE:31:70:F6:78:9D:CA
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com TLS RSA Root CA 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\157\276\332\255\163\275\010\100\342\213\115\276\324\367
\133\221
END

```

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\211\060\202\003\161\240\003\002\001\002\002\020\157  
\276\332\255\163\275\010\100\342\213\115\276\324\367\133\221\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\116  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060  
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160  
\157\162\141\164\151\157\156\061\045\060\043\006\003\125\004\003  
\014\034\123\123\114\056\143\157\155\040\124\114\123\040\122\123  
\101\040\122\157\157\164\040\103\101\040\062\060\062\062\060\036  
\027\015\062\062\060\070\062\065\061\066\063\064\062\062\132\027  
\015\064\066\060\070\061\071\061\066\063\064\062\061\132\060\116  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060  
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160  
\157\162\141\164\151\157\156\061\045\060\043\006\003\125\004\003  
\014\034\123\123\114\056\143\157\155\040\124\114\123\040\122\123  
\101\040\122\157\157\164\040\103\101\040\062\060\062\062\060\202  
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\320  
\244\011\162\117\100\210\022\141\076\065\043\236\356\366\164\317  
\057\173\130\075\316\074\015\020\050\220\057\227\367\214\110\330  
\240\330\045\261\114\260\021\114\027\163\120\320\042\112\143\273  
\201\323\051\156\325\265\011\076\046\030\177\262\022\177\223\230  
\267\257\360\066\277\362\356\030\236\234\073\122\305\107\031\135  
\164\363\144\146\325\135\307\150\264\277\033\034\006\243\274\217  
\100\043\266\036\306\204\275\121\304\033\071\301\225\322\051\354  
\113\256\173\055\277\071\375\264\142\336\226\173\101\306\234\240  
\340\006\162\373\360\007\227\011\071\201\164\257\367\064\131\021  
\127\012\302\133\301\044\364\061\163\060\202\306\235\272\002\367  
\076\174\104\137\203\015\363\361\335\040\151\026\011\120\342\324  
\125\266\340\200\162\166\156\114\107\267\165\125\131\264\123\164  
\331\224\306\101\255\130\212\061\146\017\036\242\033\051\100\116  
\057\337\173\346\026\054\055\374\277\354\363\264\372\276\030\366  
\233\111\324\356\005\156\331\064\363\234\361\354\001\213\321\040  
\306\017\240\265\274\027\116\110\173\121\302\374\351\134\151\067  
\107\146\263\150\370\025\050\360\271\323\244\025\314\132\117\272  
\122\160\243\022\105\335\306\272\116\373\302\320\367\250\122\047  
\155\156\171\265\214\374\173\214\301\026\114\356\200\177\276\360  
\166\276\101\123\022\063\256\132\070\102\253\327\017\076\101\215  
\166\007\062\325\253\211\366\116\147\331\261\102\165\043\156\363  
\315\102\262\374\125\365\123\207\027\073\300\063\130\361\122\322  
\371\200\244\360\350\360\073\213\070\314\244\306\220\177\017\234  
\375\213\321\243\317\332\203\247\151\311\120\066\325\134\005\322  
\012\101\164\333\143\021\067\301\245\240\226\113\036\214\026\022  
\167\256\224\064\173\036\177\302\146\000\344\252\203\352\212\220  
\255\316\066\104\115\321\121\351\274\037\363\152\005\375\300\164  
\037\045\031\100\121\156\352\202\121\100\337\233\271\010\052\006  
\002\325\043\034\023\326\351\333\333\306\260\172\313\173\047\233  
\373\340\325\106\044\355\020\113\143\113\245\005\217\272\270\035

\053\246\372\221\342\222\122\275\354\353\147\227\155\232\055\237  
\201\062\005\147\062\373\110\010\077\331\045\270\004\045\057\002  
\003\001\000\001\243\143\060\141\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043  
\004\030\060\026\200\024\373\056\067\356\343\204\172\047\056\315  
\031\065\261\063\174\377\324\104\102\271\060\035\006\003\125\035  
\016\004\026\004\024\373\056\067\356\343\204\172\047\056\315\031  
\065\261\063\174\377\324\104\102\271\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206\110  
\206\367\015\001\001\013\005\000\003\202\002\001\000\215\211\155  
\204\105\030\361\117\263\240\357\150\244\300\035\254\060\274\147  
\146\260\232\315\266\253\042\031\146\323\073\101\265\020\235\020  
\272\162\156\051\044\040\034\001\231\142\323\226\340\342\373\014  
\102\327\341\132\304\226\115\124\315\217\312\103\123\375\052\270  
\352\370\145\312\001\302\255\140\150\006\237\071\032\121\331\340  
\215\046\371\013\116\245\123\045\172\043\244\034\316\010\033\337  
\107\210\262\255\076\340\047\207\213\111\214\037\251\107\130\173  
\226\362\210\035\030\256\263\321\246\012\224\372\333\323\345\070  
\012\153\171\022\063\373\112\131\067\026\100\016\273\336\365\211  
\014\361\154\323\367\121\153\136\065\365\333\300\046\352\022\163  
\116\251\221\220\246\027\303\154\057\070\324\243\162\224\103\054  
\142\341\116\134\062\075\275\114\175\031\107\242\303\111\347\226  
\077\217\232\323\073\344\021\330\213\003\334\366\266\140\125\030  
\246\201\121\363\341\250\025\152\353\340\013\360\024\061\326\271  
\214\105\072\250\020\330\360\271\047\353\367\313\172\357\005\162  
\226\265\304\217\226\163\304\350\126\163\234\274\151\121\143\274  
\357\147\034\103\032\137\167\031\037\030\370\034\045\051\371\111  
\231\051\266\222\075\242\203\067\261\040\221\250\233\060\351\152  
\154\264\043\223\145\004\253\021\363\016\035\123\044\111\123\035  
\241\077\235\110\222\021\342\175\015\117\365\327\275\242\130\076  
\170\235\036\037\053\376\041\273\032\023\266\261\050\144\375\260  
\002\000\307\154\200\242\275\026\120\040\017\162\201\137\314\224  
\377\273\231\346\272\220\313\352\371\306\014\302\256\305\031\316  
\063\241\153\134\273\176\174\064\127\027\255\360\077\256\315\352  
\257\231\354\054\124\176\214\316\056\022\126\110\357\027\073\077  
\112\136\140\322\334\164\066\274\245\103\143\313\017\133\243\002  
\126\011\236\044\054\341\206\201\214\376\253\027\054\372\310\342  
\062\032\072\377\205\010\311\203\237\362\112\110\020\124\167\067  
\355\242\274\100\276\344\020\164\367\344\133\273\271\363\211\371  
\217\101\330\307\344\120\220\065\200\076\034\270\115\220\323\324  
\367\303\260\241\176\204\312\167\222\061\054\270\220\261\202\172  
\164\116\233\023\046\264\325\120\146\124\170\256\140

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```

Trust for "SSL.com TLS RSA Root CA 2022"
Issuer: CN=SSL.com TLS RSA Root CA 2022,O=SSL
Corporation,C=US
Serial Number:6f:be:da:ad:73:bd:08:40:e2:8b:4d:be:d4:f7:5b:91
Subject: CN=SSL.com TLS RSA Root CA 2022,O=SSL Corporation,C=US
Not Valid Before: Thu Aug 25 16:34:22 2022
Not Valid After : Sun Aug 19 16:34:21 2046
Fingerprint (SHA-256):
8F:AF:7D:2E:2C:B4:70:9B:B8:E0:B3:36:66:BF:75:A5:DD:45:B5:DE:48:0F:8E:A8:D4:BF:E6:BE:BC:17:F2:ED
Fingerprint (SHA1): EC:2C:83:40:72:AF:26:95:10:FF:0E:F2:03:EE:31:70:F6:78:9D:CA
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com TLS RSA Root CA 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\354\054\203\100\162\257\046\225\020\377\016\362\003\356\061\160
\366\170\235\312
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\330\116\306\131\060\330\376\240\326\172\132\054\054\151\170\332
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\157\276\332\255\163\275\010\100\342\213\115\276\324\367
\133\221
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "SSL.com TLS ECC Root CA 2022"
#
Issuer: CN=SSL.com TLS ECC Root CA 2022,O=SSL Corporation,C=US
Serial Number:14:03:f5:ab:fb:37:8b:17:40:5b:e2:43:b2:a5:d1:c4
Subject: CN=SSL.com TLS ECC Root CA 2022,O=SSL Corporation,C=US
Not Valid Before: Thu Aug 25 16:33:48 2022
Not Valid After : Sun Aug 19 16:33:47 2046
Fingerprint (SHA-256):

```

C3:2F:FD:9F:46:F9:36:D1:6C:36:73:99:09:59:43:4B:9A:D6:0A:AF:BB:9E:7C:F3:36:54:F1:44:CC:1B:A1:43

# Fingerprint

(SHA1): 9F:5F:D9:1A:54:6D:F5:0C:71:F0:EE:7A:BD:17:49:98:84:73:E2:39

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSL.com TLS ECC Root CA 2022"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157  
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125  
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040  
\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062\062  
END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157  
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125  
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040  
\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062\062  
END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\024\003\365\253\373\067\213\027\100\133\342\103\262\245  
\321\304

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\072\060\202\001\300\240\003\002\001\002\002\020\024  
\003\365\253\373\067\213\027\100\133\342\103\262\245\321\304\060  
\012\006\010\052\206\110\316\075\004\003\003\060\116\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003  
\125\004\012\014\017\123\123\114\040\103\157\162\160\157\162\141  
\164\151\157\156\061\045\060\043\006\003\125\004\003\014\034\123  
\123\114\056\143\157\155\040\124\114\123\040\105\103\103\040\122  
\157\157\164\040\103\101\040\062\060\062\062\060\036\027\015\062  
\062\060\070\062\065\061\066\063\063\064\070\132\027\015\064\066  
\060\070\061\071\061\066\063\063\064\067\132\060\116\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003  
\125\004\012\014\017\123\123\114\040\103\157\162\160\157\162\141  
\164\151\157\156\061\045\060\043\006\003\125\004\003\014\034\123  
\123\114\056\143\157\155\040\124\114\123\040\105\103\103\040\122  
\157\157\164\040\103\101\040\062\060\062\062\060\166\060\020\006  
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003  
\142\000\004\105\051\065\163\372\302\270\043\316\024\175\250\261  
\115\240\133\066\356\052\054\123\303\140\011\065\262\044\146\046

```
\151\300\263\225\326\135\222\100\031\016\306\245\023\160\364\357
\022\121\050\135\347\314\275\371\074\205\301\317\224\220\311\053
\316\222\102\130\131\147\375\224\047\020\144\214\117\004\261\115
\111\344\173\117\233\365\347\010\370\003\210\367\247\303\222\113
\031\124\201\243\143\060\141\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043\004
\030\060\026\200\024\211\217\057\243\350\053\240\024\124\173\363
\126\270\046\137\147\070\013\234\320\060\035\006\003\125\035\016
\004\026\004\024\211\217\057\243\350\053\240\024\124\173\363\126
\270\046\137\147\070\013\234\320\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\206\060\012\006\010\052\206\110\316
\075\004\003\003\003\150\000\060\145\002\060\125\343\042\126\351
\327\222\044\130\117\036\224\062\017\014\002\066\302\375\254\164
\062\116\341\373\034\200\210\243\314\373\327\353\053\377\067\175
\360\355\327\236\165\152\065\166\122\105\340\002\061\000\307\215
\157\102\040\217\276\266\115\131\355\167\115\051\304\040\040\105
\144\206\072\120\306\304\255\055\223\365\030\175\162\355\251\317
\304\254\127\066\050\010\145\337\074\171\146\176\240\352
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "SSL.com TLS ECC Root CA 2022"

# Issuer: CN=SSL.com TLS ECC Root CA 2022,O=SSL Corporation,C=US

# Serial Number:14:03:f5:ab:fb:37:8b:17:40:5b:e2:43:b2:a5:d1:c4

# Subject: CN=SSL.com TLS ECC Root CA 2022,O=SSL Corporation,C=US

# Not Valid Before: Thu Aug 25 16:33:48 2022

# Not Valid After : Sun Aug 19 16:33:47 2046

# Fingerprint (SHA-256):

C3:2F:FD:9F:46:F9:36:D1:6C:36:73:99:09:59:43:4B:9A:D6:0A:AF:BB:9E:7C:F3:36:54:F1:44:CC:1B:A1:43

# Fingerprint (SHA1): 9F:5F:D9:1A:54:6D:F5:0C:71:F0:EE:7A:BD:17:49:98:84:73:E2:39

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSL.com TLS ECC Root CA 2022"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\237\137\331\032\124\155\365\014\161\360\356\172\275\027\111\230
\204\163\342\071
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\231\327\134\361\121\066\314\351\316\331\031\056\167\161\126\305
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
```



```
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062\062
END
```

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\020\024\003\365\253\373\067\213\027\100\133\342\103\262\245
\321\304
```

END

CKA\_TRUST\_SERVER\_AUTH

CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "SSL.com Client ECC Root CA 2022"

#

# Issuer: CN=SSL.com Client ECC Root CA 2022,O=SSL Corporation,C=US

# Serial Number:76:f8:48:1e:ae:f0:3c:70:1f:e0:3f:25:54:01:83:d5

# Subject: CN=SSL.com Client ECC Root CA 2022,O=SSL Corporation,C=US

# Not Valid Before: Thu Aug 25 16:30:32 2022

# Not Valid After : Sun Aug 19 16:30:31 2046

# Fingerprint (SHA-256):

AD:7D:D5:8D:03:AE:DB:22:A3:0B:50:84:39:49:20:CE:12:23:0C:2D:80:17:AD:9B:81:AB:04:07:9B:DD:02:6B

# Fingerprint (SHA1): 80:7B:1D:9D:65:72:3D:C7:56:F9:EC:C5:00:83:49:F6:F2:AC:F4:86

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSL.com Client ECC Root CA 2022"

CKA\_CERTIFICATE\_TYPE

CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\105\103\103\040\122\157\157\164\040\103\101\040\062
\060\062\062
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\105\103\103\040\122\157\157\164\040\103\101\040\062
\060\062\062
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\166\370\110\036\256\360\074\160\037\340\077\045\124\001  
\203\325

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\100\060\202\001\306\240\003\002\001\002\002\020\166  
\370\110\036\256\360\074\160\037\340\077\045\124\001\203\325\060  
\012\006\010\052\206\110\316\075\004\003\003\060\121\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003  
\125\004\012\014\017\123\123\114\040\103\157\162\160\157\162\141  
\164\151\157\156\061\050\060\046\006\003\125\004\003\014\037\123  
\123\114\056\143\157\155\040\103\154\151\145\156\164\040\105\103  
\103\040\122\157\157\164\040\103\101\040\062\060\062\062\060\036  
\027\015\062\062\060\070\062\065\061\066\063\060\063\062\132\027  
\015\064\066\060\070\061\071\061\066\063\060\063\061\132\060\121  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060  
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160  
\157\162\141\164\151\157\156\061\050\060\046\006\003\125\004\003  
\014\037\123\123\114\056\143\157\155\040\103\154\151\145\156\164  
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062  
\062\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005  
\053\201\004\000\042\003\142\000\004\055\123\176\237\213\076\263  
\066\272\120\342\314\353\334\272\046\212\323\214\006\077\147\017  
\357\365\027\345\324\256\232\106\052\101\001\007\151\347\147\161  
\361\302\003\066\306\360\053\122\216\317\024\222\150\244\076\160  
\121\022\151\215\170\242\202\312\051\024\300\344\224\042\262\104  
\222\140\157\310\004\244\147\325\242\320\363\320\327\352\216\074  
\017\272\322\100\107\220\064\356\175\243\143\060\141\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\037  
\006\003\125\035\043\004\030\060\026\200\024\267\376\055\142\305  
\201\123\315\122\032\057\135\140\240\303\135\373\262\034\034\060  
\035\006\003\125\035\016\004\026\004\024\267\376\055\142\305\201  
\123\315\122\032\057\135\140\240\303\135\373\262\034\034\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\012  
\006\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002  
\060\115\007\021\055\021\373\271\046\303\041\335\162\341\027\374  
\301\317\024\352\111\316\161\207\216\326\123\334\021\315\135\124  
\212\257\331\055\364\214\121\352\274\146\107\342\177\225\203\140  
\145\002\061\000\214\041\114\117\273\345\260\120\337\220\142\111  
\346\314\221\333\370\077\135\161\221\010\216\117\222\311\177\246  
\134\352\023\176\355\155\304\350\303\052\157\134\021\341\245\363  
\152\132\232\115

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```

Trust for "SSL.com Client ECC Root CA 2022"
Issuer: CN=SSL.com Client ECC Root CA 2022,O=SSL Corporation,C=US
Serial Number:76:f8:48:1e:ae:f0:3c:70:1f:e0:3f:25:54:01:83:d5
Subject: CN=SSL.com Client ECC Root CA 2022,O=SSL Corporation,C=US
Not Valid Before: Thu Aug 25 16:30:32 2022
Not Valid After : Sun Aug 19 16:30:31 2046
Fingerprint (SHA-256):
AD:7D:D5:8D:03:AE:DB:22:A3:0B:50:84:39:49:20:CE:12:23:0C:2D:80:17:AD:9B:81:AB:04:07:9B:DD:02:6B
Fingerprint (SHA1): 80:7B:1D:9D:65:72:3D:C7:56:F9:EC:C5:00:83:49:F6:F2:AC:F4:86
CKA_CLASS CK_OBJECT_CLASS
CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Client ECC Root CA 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\200\173\035\235\145\162\075\307\126\371\354\305\000\203\111\366
\362\254\364\206
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\063\271\151\231\022\166\125\274\337\257\101\334\042\213\167\200
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\105\103\103\040\122\157\157\164\040\103\101\040\062
\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\370\110\036\256\360\074\160\037\340\077\045\124\001
\203\325
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "SSL.com Client RSA Root CA 2022"
#
Issuer: CN=SSL.com Client RSA Root CA 2022,O=SSL Corporation,C=US
Serial Number:76:af:ee:88:93:15:45:b6:50:53:9b:80:9c:a4:df:9a
Subject: CN=SSL.com Client RSA Root CA 2022,O=SSL Corporation,C=US
Not Valid Before: Thu Aug 25 16:31:07 2022

```

# Not Valid After : Sun Aug 19 16:31:06 2046

# Fingerprint (SHA-256):

1D:4C:A4:A2:AB:21:D0:09:36:59:80:4F:C0:EB:21:75:A6:17:27:9B:56:A2:47:52:45:C9:51:7A:FE:B5:91:53

# Fingerprint (SHA1): AA:59:70:E5:20:32:9F:CB:D0:D5:79:9F:FB:1B:82:1D:FD:1F:79:65

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSL.com Client RSA Root CA 2022"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157  
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125  
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145  
\156\164\040\122\123\101\040\122\157\157\164\040\103\101\040\062  
\060\062\062

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157  
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125  
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145  
\156\164\040\122\123\101\040\122\157\157\164\040\103\101\040\062  
\060\062\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\166\257\356\210\223\025\105\266\120\123\233\200\234\244  
\337\232

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\217\060\202\003\167\240\003\002\001\002\002\020\166  
\257\356\210\223\025\105\266\120\123\233\200\234\244\337\232\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\121  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060  
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160  
\157\162\141\164\151\157\156\061\050\060\046\006\003\125\004\003  
\014\037\123\123\114\056\143\157\155\040\103\154\151\145\156\164  
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062  
\062\060\036\027\015\062\062\060\070\062\065\061\066\063\061\060  
\067\132\027\015\064\066\060\070\061\071\061\066\063\061\060\066  
\132\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103  
\157\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003  
\125\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151  
\145\156\164\040\122\123\101\040\122\157\157\164\040\103\101\040

\062\060\062\062\060\202\002\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012  
\002\202\002\001\000\270\130\333\106\060\373\311\077\343\310\360  
\001\063\064\342\332\110\250\030\351\040\156\232\327\001\341\325  
\051\217\060\264\043\152\344\313\142\260\276\342\237\040\275\076  
\124\240\071\150\307\206\067\146\164\006\006\357\164\053\332\334  
\237\204\251\122\057\220\322\356\176\174\373\245\042\255\157\160  
\106\147\226\075\051\324\243\273\126\173\024\004\131\301\041\143  
\104\036\262\037\022\134\220\207\145\015\210\366\036\210\042\342  
\143\124\273\363\066\370\326\177\334\332\377\051\065\251\306\156  
\016\151\133\077\330\276\202\207\025\160\135\260\307\134\022\017  
\143\246\070\315\317\163\271\303\016\211\046\067\033\077\142\034  
\062\151\321\233\331\377\125\220\061\336\261\143\335\317\305\164  
\167\374\357\210\041\123\277\000\061\032\046\054\000\060\245\137  
\154\343\344\366\000\212\312\230\207\234\164\003\172\213\146\354  
\176\375\243\217\065\045\134\170\245\263\244\373\075\155\251\212  
\360\154\210\202\213\375\112\320\157\344\327\243\264\216\064\111  
\070\276\316\105\345\322\034\312\136\302\067\024\213\315\146\126  
\063\067\235\345\153\354\103\222\144\240\102\332\165\157\300\025  
\354\371\151\275\064\271\212\173\372\026\373\125\376\122\040\350  
\004\004\126\126\145\365\067\104\230\310\212\106\351\267\254\270  
\350\276\142\216\124\066\133\367\073\160\277\135\356\055\272\137  
\336\102\031\206\360\177\213\353\010\313\330\276\352\016\102\102  
\240\066\163\127\027\355\062\352\320\215\350\007\033\233\231\350  
\304\232\142\004\016\110\367\074\022\272\367\130\301\232\214\351  
\307\260\043\066\126\064\035\313\154\332\272\007\204\035\375\321  
\254\237\346\302\211\357\303\271\154\030\263\151\207\127\137\265  
\014\070\133\247\041\044\052\073\247\064\221\236\264\124\352\050  
\117\323\301\243\213\344\346\053\325\362\235\277\233\141\000\042  
\335\326\113\104\037\077\135\126\376\336\234\170\314\231\133\252  
\344\275\272\333\103\113\255\114\046\114\243\115\064\212\154\164  
\066\023\333\142\374\233\262\005\201\377\256\077\014\315\366\033  
\242\364\071\347\312\365\114\134\373\124\167\065\200\132\300\022  
\241\023\001\063\147\075\235\201\241\251\365\205\044\130\210\170  
\347\364\343\150\125\002\003\001\000\001\243\143\060\141\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\037\006\003\125\035\043\004\030\060\026\200\024\360\070\102\224  
\064\251\074\000\177\122\356\071\245\367\113\015\274\152\175\043  
\060\035\006\003\125\035\016\004\026\004\024\360\070\102\224\064  
\251\074\000\177\122\356\071\245\367\113\015\274\152\175\043\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202  
\002\001\000\231\117\333\360\352\326\021\372\052\375\310\253\155  
\344\016\163\142\322\102\237\025\376\174\160\122\077\144\207\202  
\061\077\105\100\056\341\042\237\006\146\051\374\226\323\055\215  
\266\070\307\331\363\047\301\131\051\240\214\366\163\044\017\050  
\042\327\116\141\335\023\335\333\237\062\122\223\373\117\314\352  
\070\074\230\152\003\253\026\257\041\321\102\256\175\105\053\352

\304\317\212\131\237\202\160\166\072\370\142\046\311\020\227\130  
\100\044\244\055\271\057\051\200\047\341\211\153\162\312\111\010  
\161\067\123\005\361\200\316\323\102\002\322\374\302\321\224\006  
\356\007\342\366\203\342\177\237\347\273\126\303\133\277\335\225  
\223\011\036\044\301\317\046\315\255\244\256\302\264\151\347\252  
\265\355\067\224\351\335\321\143\205\153\232\172\112\126\166\334  
\031\205\050\324\344\306\244\330\270\226\101\167\320\264\131\361  
\106\005\207\207\002\037\151\271\202\030\320\103\331\046\332\032  
\147\250\326\165\166\352\362\155\016\102\377\210\046\242\156\204  
\376\176\142\033\360\306\075\355\300\034\152\307\221\326\270\000  
\067\111\233\271\204\005\241\315\156\061\326\104\352\123\213\272  
\123\230\035\241\220\212\351\205\370\033\362\223\130\303\310\334  
\232\046\117\076\040\317\117\103\363\020\214\177\020\141\172\066  
\312\252\013\175\314\237\107\104\131\256\245\225\306\231\123\343  
\007\153\075\111\020\260\030\377\135\016\205\103\024\113\347\153  
\323\112\265\262\140\141\334\151\111\002\043\135\350\222\161\303  
\234\237\105\147\171\036\334\062\206\272\252\125\074\144\157\062  
\265\020\100\025\336\162\100\170\340\156\160\273\156\353\011\350  
\071\331\254\272\222\165\335\103\312\272\001\225\255\032\201\053  
\072\360\343\305\057\014\030\115\020\306\256\300\355\376\005\122  
\177\031\005\313\251\257\065\010\014\070\042\344\376\126\345\123  
\076\277\344\326\263\331\010\303\075\325\063\062\201\044\305\251  
\341\145\021\270\062\063\060\161\030\111\035\032\105\306\232\024  
\212\130\071\050\156\363\313\121\271\111\046\144\170\003\307\221  
\021\203\251\271\220\064\266\157\252\005\236\205\050\127\231\276  
\177\047\006\111\142\115\241\374\011\341\053\106\011\114\024\233  
\126\217\105

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "SSL.com Client RSA Root CA 2022"

# Issuer: CN=SSL.com Client RSA Root CA 2022,O=SSL Corporation,C=US

# Serial Number: 76:af:ee:88:93:15:45:b6:50:53:9b:80:9c:a4:df:9a

# Subject: CN=SSL.com Client RSA Root CA 2022,O=SSL Corporation,C=US

# Not Valid Before: Thu Aug 25 16:31:07 2022

# Not Valid

After : Sun Aug 19 16:31:06 2046

# Fingerprint (SHA-256):

1D:4C:A4:A2:AB:21:D0:09:36:59:80:4F:C0:EB:21:75:A6:17:27:9B:56:A2:47:52:45:C9:51:7A:FE:B5:91:53

# Fingerprint (SHA1): AA:59:70:E5:20:32:9F:CB:D0:D5:79:9F:FB:1B:82:1D:FD:1F:79:65

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSL.com Client RSA Root CA 2022"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\252\131\160\345\040\062\237\313\320\325\171\237\373\033\202\035
\375\037\171\145
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\011\215\322\312\256\154\024\276\276\014\224\157\067\027\040\316
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\122\123\101\040\122\157\157\164\040\103\101\040\062
\060\062\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\166\257\356\210\223\025\105\266\120\123\233\200\234\244
\337\232
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Atos TrustedRoot Root CA ECC G2 2020"
#
Issuer: CN=Atos TrustedRoot Root CA ECC G2 2020,O=Atos,C=DE
Serial Number:0b:73:28:11:18:74:30:1c:ef:6f:08:84
Subject: CN=Atos TrustedRoot Root CA ECC G2 2020,O=Atos,C=DE
Not Valid Before: Tue Dec 15 08:39:10 2020
Not Valid After : Mon Dec 10 08:39:09 2040
Fingerprint (SHA-256):
E3:86:55:F4:B0:19:0C:84:D3:B3:89:3D:84:0A:68:7E:19:0A:25:6D:98:05:2F:15:9E:6D:4A:39:F5:89:A6:EB
Fingerprint (SHA1): 61:25:56:DA:62:94:E5:AE:B3:3C:F8:11:BD:B1:DC:F8:A5:D8:B3:E4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "Atos TrustedRoot Root CA ECC G2 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103

```

\101\040\105\103\103\040\107\062\040\062\060\062\060

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055  
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162  
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103  
\101\040\105\103\103\040\107\062\040\062\060\062\060

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\014\013\163\050\021\030\164\060\034\357\157\010\204

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\061\060\202\001\266\240\003\002\001\002\002\014\013  
\163\050\021\030\164\060\034\357\157\010\204\060\012\006\010\052  
\206\110\316\075\004\003\003\060\113\061\013\060\011\006\003\125  
\004\006\023\002\104\105\061\015\060\013\006\003\125\004\012\014  
\004\101\164\157\163\061\055\060\053\006\003\125\004\003\014\044  
\101\164\157\163\040\124\162\165\163\164\145\144\122\157\157\164  
\040\122\157\157\164\040\103\101\040\105\103\103\040\107\062\040  
\062\060\062\060\060\036\027\015\062\060\061\062\061\065\060\070  
\063\071\061\060\132\027\015\064\060\061\062\061\060\060\070\063  
\071\060\071\132\060\113\061\013\060\011\006\003\125\004\006\023  
\002\104\105\061\015\060\013\006\003\125\004\012\014\004\101\164  
\157\163\061\055\060\053\006\003\125\004\003\014\044\101\164\157  
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157  
\157\164\040\103\101\040\105\103\103\040\107\062\040\062\060\062  
\060\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005  
\053\201\004\000\042\003\142\000\004\310\134\200\312\116\302\050  
\037\127\277\070\346\141\043\374\320\251\133\226\026\026\303\014  
\136\025\245\220\011\377\070\050\264\172\036\012\326\123\052\301  
\273\220\100\164\067\351\201\350\215\057\150\001\065\174\122\056  
\330\364\130\263\021\034\133\331\207\030\223\221\055\354\235\332  
\154\236\155\204\110\374\302\211\005\353\230\023\002\001\154\123  
\036\016\111\143\130\107\261\257\302\243\143\060\141\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\037  
\006\003\125\035\043\004\030\060\026\200\024\133\037\304\161\154  
\262\033\237\276\134\037\214\375\263\266\373\263\016\011\207\060  
\035\006\003\125\035\016\004\026\004\024\133\037\304\161\154\262  
\033\237\276\134\037\214\375\263\266\373\263\016\011\207\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\012  
\006\010\052\206\110\316\075\004\003\003\003\151\000\060\146\002  
\061\000\354\340\231\375\335\344\124\301\313\037\350\076\050\327  
\025\131\112\202\312\123\060\354\353\066\245\271\310\316\223\107  
\126\310\141\246\341\155\222\123\225\217\366\343\125\123\360\335  
\172\347\002\061\000\260\207\325\033\263\140\374\221\215\200\312  
\242\033\121\113\070\124\313\252\036\173\327\345\104\225\026\057



\074\104\170\056\045\272\352\220\344\354\122\356\127\354\003\204  
\363\136\333\026\015

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Atos TrustedRoot Root CA ECC G2 2020"

# Issuer: CN=Atos TrustedRoot Root CA ECC G2 2020,O=Atos,C=DE

# Serial Number:0b:73:28:11:18:74:30:1c:ef:6f:08:84

# Subject: CN=Atos TrustedRoot Root CA ECC G2 2020,O=Atos,C=DE

# Not Valid Before: Tue Dec 15 08:39:10 2020

# Not Valid After : Mon Dec 10 08:39:09 2040

# Fingerprint (SHA-256):

E3:86:55:F4:B0:19:0C:84:D3:B3:89:3D:84:0A:68:7E:19:0A:25:6D:98:05:2F:15:9E:6D:4A:39:F5:89:A6:EB

# Fingerprint (SHA1): 61:25:56:DA:62:94:E5:AE:B3:3C:F8:11:BD:B1:DC:F8:A5:D8:B3:E4

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE

CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Atos TrustedRoot Root CA ECC G2 2020"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\141\045\126\332\142\224\345\256\263\074\370\021\275\261\334\370  
\245\330\263\344

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\225\320\233\116\332\275\252\035\225\265\242\302\135\337\210\214

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055  
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162  
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103  
\101\040\105\103\103\040\107\062\040\062\060\062\060

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\014\013\163\050\021\030\164\060\034\357\157\010\204

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "Atos TrustedRoot"

```
Root CA RSA G2 2020"
#
Issuer: CN=Atos TrustedRoot Root CA RSA G2 2020,O=Atos,C=DE
Serial Number:47:ba:29:46:55:3e:16:92:97:b0:ab:40
Subject: CN=Atos TrustedRoot Root CA RSA G2 2020,O=Atos,C=DE
Not Valid Before: Tue Dec 15 08:41:23 2020
Not Valid After : Mon Dec 10 08:41:22 2040
Fingerprint (SHA-256):
78:83:3A:78:3B:B2:98:6C:25:4B:93:70:D3:C2:0E:5E:BA:8F:A7:84:0C:BF:63:FE:17:29:7A:0B:01:19:68:5E
Fingerprint (SHA1): 32:D1:27:FA:93:B1:C1:4C:99:E2:4A:40:BC:7F:94:41:1B:5A:AC:A4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA RSA G2 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\122\123\101\040\107\062\040\062\060\062\060
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\122\123\101\040\107\062\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\107\272\051\106\125\076\026\222\227\260\253\100
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\177\060\202\003\147\240\003\002\001\002\002\014\107
\272\051\106\125\076\026\222\227\260\253\100\060\015\006\011\052
\206\110\206\367\015\001\001\014\005\000\060\113\061\013\060\011
\006\003\125\004\006\023\002\104\105\061\015\060\013\006\003\125
\004\012\014\004\101\164\157\163\061\055\060\053\006\003\125\004
\003\014\044\101\164\157\163\040\124\162\165\163\164\145\144\122
\157\157\164\040\122\157\157\164\040\103\101\040\122\123\101\040
\107\062\040\062\060\062\060\060\036\027\015\062\060\061\062\061
\065\060\070\064\061\062\063\132\027\015\064\060\061\062\061\060
\060\070\064\061\062\062\132\060\113\061\013\060\011\006\003\125
\004\006\023\002\104\105\061\015\060\013\006\003\125\004\012\014
\004\101\164\157\163\061\055\060\053\006\003\125\004\003\014\044
```

\101\164\157\163\040\124\162\165\163\164\145\144\122\157\157\164  
\040\122\157\157\164\040\103\101\040\122\123\101\040\107\062\040  
\062\060\062\060\060\202\002\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012  
\002\202\002\001\000\226\061\205\112\252\017\062\376\171\341\103  
\207\234\373\043\267\216\177\015\124\275\307\142\223\167\344\034  
\065\004\166\243\003\213\042\356\304\204\335\245\223\156\156\262  
\216\011\003\353\121\026\061\027\252\151\025\030\016\147\164\043  
\136\352\232\175\265\071\076\075\202\251\153\341\376\251\034\260  
\255\132\115\114\170\203\101\213\317\362\035\142\232\230\004\234  
\143\351\253\145\376\110\035\044\145\007\107\076\271\221\056\351  
\235\233\177\032\065\251\064\260\267\345\160\063\357\112\162\121  
\266\007\277\140\077\052\237\235\124\337\363\327\224\111\121\003  
\132\100\251\150\335\021\131\134\370\166\246\274\120\122\020\355  
\254\354\225\340\324\203\153\111\332\012\117\231\203\336\062\203  
\110\203\147\225\262\176\347\201\205\075\315\202\367\312\002\355  
\155\210\135\010\215\270\065\277\052\151\060\231\273\113\321\101  
\333\105\240\223\231\121\201\220\066\010\252\212\266\350\217\263  
\313\356\345\106\015\162\165\365\111\154\341\242\177\057\274\355  
\204\246\067\356\336\302\117\071\116\366\236\360\311\321\233\060  
\235\111\155\341\332\377\022\020\214\326\345\231\173\005\266\175  
\260\011\307\244\370\262\034\071\225\071\063\364\065\316\045\142  
\173\260\137\040\363\313\155\370\154\122\024\144\104\217\323\310  
\251\166\007\345\257\161\231\055\055\004\045\110\166\257\303\347  
\314\103\362\007\274\112\044\044\067\335\372\156\224\011\157\114  
\136\001\264\376\124\354\043\226\245\136\335\206\377\351\106\052  
\361\350\334\354\245\075\257\157\252\016\017\264\165\372\076\010  
\271\046\105\117\146\206\114\274\031\270\341\325\065\356\202\204  
\310\323\253\022\347\315\163\063\142\167\364\027\313\275\064\166  
\052\005\316\225\345\170\171\113\236\260\215\371\074\130\070\221  
\352\136\207\070\300\267\102\375\252\114\207\043\255\004\040\261  
\176\166\102\332\273\266\026\272\127\310\216\023\372\165\325\010  
\114\257\070\221\252\357\217\372\237\111\056\124\174\012\126\261  
\172\372\304\116\057\324\243\372\026\212\320\225\345\227\246\377  
\303\374\174\016\107\130\363\177\007\173\022\334\127\077\055\343  
\241\115\133\122\114\063\207\231\250\011\173\154\176\016\362\317  
\126\102\236\353\005\002\003\001\000\001\243\143\060\141\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\037\006\003\125\035\043\004\030\060\026\200\024\040\045\363\007  
\375\247\157\361\226\356\221\020\151\314\232\357\175\310\150\170  
\060\035\006\003\125\035\016\004\026\004\024\040\045\363\007\375  
\247\157\361\226\356\221\020\151\314\232\357\175\310\150\170\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003\202  
\002\001\000\044\053\116\230\362\035\027\355\331\166\046\266\060  
\063\350\151\105\241\121\113\122\330\172\072\060\266\344\022\352  
\277\237\114\340\004\244\366\065\306\376\241\060\367\123\205\222  
\255\124\005\127\137\222\345\052\336\066\047\236\173\023\107\311

\152\165\257\374\363\067\347\014\365\075\001\163\265\151\121\370  
\275\131\321\272\013\370\272\272\144\047\103\263\174\203\225\212  
\347\236\023\226\327\157\112\226\101\111\213\016\040\255\026\306  
\367\246\207\133\210\022\211\213\211\312\022\322\126\257\042\001  
\041\106\351\253\230\077\247\210\336\344\313\052\232\165\031\372  
\071\136\011\005\327\003\062\032\270\027\121\010\307\000\100\175  
\364\276\370\014\131\364\151\166\156\323\244\130\133\136\046\163  
\344\102\125\006\136\170\100\017\323\070\237\357\046\121\160\164  
\221\361\167\142\001\350\331\313\353\241\337\071\062\035\273\153  
\375\161\376\353\317\245\346\024\375\000\200\023\306\232\000\110  
\260\231\005\351\256\200\110\373\011\077\121\024\265\271\347\140  
\115\115\312\057\201\041\356\122\014\145\172\334\365\211\111\114  
\060\222\064\130\200\062\131\261\015\377\044\141\017\347\012\102  
\320\173\274\370\216\047\107\077\160\235\047\331\266\006\075\245  
\273\313\136\217\256\016\123\307\234\152\157\073\114\017\243\100  
\160\250\232\007\316\324\156\133\007\242\322\342\124\266\275\157  
\063\162\143\255\121\230\341\217\166\361\152\007\070\045\376\366  
\142\316\137\333\143\302\156\231\357\006\334\271\336\031\032\350  
\124\075\175\322\166\165\331\136\076\062\110\247\214\362\236\162  
\014\370\270\130\270\027\043\245\024\207\165\130\172\000\201\007  
\042\071\152\114\224\240\265\242\333\247\054\301\260\361\243\233  
\300\114\367\155\160\352\061\237\361\256\175\076\163\050\331\241  
\337\372\223\360\233\260\360\342\315\045\040\165\357\342\175\062  
\005\311\233\166\356\313\275\061\036\371\224\230\113\044\130\126  
\110\300\336\006\114\275\246\064\135\355\026\141\143\163\373\031  
\342\372\133\330\227\165\324\155\236\140\071\136\224\213\002\054  
\353\231\316\140\052\156\033\214\247\113\274\375\066\346\230\037  
\145\362\177\361\343\217\114\200\106\066\130\266\241\145\313\316  
\034\104\165

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Atos TrustedRoot Root CA RSA G2 2020"

# Issuer: CN=Atos TrustedRoot Root CA RSA G2 2020,O=Atos,C=DE

# Serial Number:47:ba:29:46:55:3e:16:92:97:b0:ab:40

# Subject: CN=Atos TrustedRoot Root CA RSA G2 2020,O=Atos,C=DE

# Not Valid Before: Tue Dec 15 08:41:23 2020

# Not Valid After : Mon Dec 10 08:41:22 2040

# Fingerprint (SHA-256):

78:83:3A:78:3B:B2:98:6C:25:4B:93:70:D3:C2:0E:5E:BA:8F:A7:84:0C:BF:63:FE:17:29:7A:0B:01:19:68:5E

# Fingerprint (SHA1): 32:D1:27:FA:93:B1:C1:4C:99:E2:4A:40:BC:7F:94:41:1B:5A:AC:A4

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA RSA G2 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\062\321\047\372\223\261\301\114\231\342\112\100\274\177\224\101
\033\132\254\244
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\333\077\351\043\365\264\214\335\350\263\076\250\265\137\146\066
END
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\122\123\101\040\107\062\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\107\272\051\106\125\076\026\222\227\260\253\100
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
Certificate "Atos TrustedRoot Root CA ECC TLS 2021"
#
Issuer: C=DE,O=Atos,CN=Atos TrustedRoot Root CA ECC TLS 2021
Serial Number:3d:98:3b:a6:66:3d:90:63:f7:7e:26:57:38:04:ef:00
Subject: C=DE,O=Atos,CN=Atos TrustedRoot Root CA ECC TLS 2021
Not Valid Before: Thu Apr 22 09:26:23 2021
Not Valid After : Wed Apr 17 09:26:22 2041
Fingerprint (SHA-256):
B2:FA:E5:3E:14:CC:D7:AB:92:12:06:47:01:AE:27:9C:1D:89:88:FA:CB:77:5F:A8:A0:08:91:4E:66:39:88:A8
Fingerprint (SHA1): 9E:BC:75:10:42:B3:02:F3:81:F4:F7:30:62:D4:8F:C3:A7:51:B2:DD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA ECC TLS 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\105\103\103\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105

```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157  
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157  
\157\164\040\103\101\040\105\103\103\040\124\114\123\040\062\060  
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157  
\163\061\013\060\011\006\003\125\004\006\023\002\104\105

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\075\230\073\246\146\075\220\143\367\176\046\127\070\004  
\357\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\025\060\202\001\233\240\003\002\001\002\002\020\075  
\230\073\246\146\075\220\143\367\176\046\127\070\004\357\000\060  
\012\006\010\052\206\110\316\075\004\003\003\060\114\061\056\060  
\054\006\003\125\004\003\014\045\101\164\157\163\040\124\162\165  
\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103\101  
\040\105\103\103\040\124\114\123\040\062\060\062\061\061\015\060  
\013\006\003\125\004\012\014\004\101\164\157\163\061\013\060\011  
\006\003\125\004\006\023\002\104\105\060\036\027\015\062\061\060  
\064\062\062\060\071\062\066\062\063\132\027\015\064\061\060\064  
\061\067\060\071\062\066\062\062\132\060\114\061\056\060\054\006  
\003\125\004\003\014\045\101\164\157\163\040\124\162\165\163\164  
\145\144\122\157\157\164\040\122\157\157\164\040\103\101\040\105  
\103\103\040\124\114\123\040\062\060\062\061\061\015\060\013\006  
\003\125\004\012\014\004\101\164\157\163\061\013\060\011\006\003  
\125\004\006\023\002\104\105\060\166\060\020\006\007\052\206\110  
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\226  
\206\130\050\067\012\147\320\240\336\044\031\031\341\344\005\007  
\037\227\355\350\144\202\271\366\304\161\120\316\212\014\377\327  
\265\166\273\241\154\223\154\203\242\150\156\245\331\276\054\210  
\225\101\315\135\335\261\312\203\143\203\314\300\276\164\331\340  
\235\244\356\112\116\126\340\230\051\101\223\122\020\325\044\070  
\002\062\147\361\224\022\157\357\327\305\336\056\375\031\200\243  
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\166  
\050\045\326\175\340\146\232\172\011\262\152\073\216\063\327\066  
\323\117\242\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\206\060\012\006\010\052\206\110\316\075\004\003\003\003  
\150\000\060\145\002\060\133\231\051\363\234\061\266\211\153\154  
\326\275\167\341\174\347\121\176\270\072\315\243\066\137\174\367  
\074\167\076\344\120\255\250\347\322\131\014\046\216\060\073\156  
\010\052\302\247\132\310\002\061\000\231\343\014\347\243\303\257  
\323\111\056\106\202\043\146\135\311\000\024\022\375\070\364\341  
\230\153\167\051\172\333\044\317\145\100\277\322\334\214\021\350

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\364\175\177\040\204\251\102\344\050
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Atos TrustedRoot
Root CA ECC TLS 2021"
Issuer: C=DE,O=Atos,CN=Atos TrustedRoot Root CA ECC TLS 2021
Serial Number:3d:98:3b:a6:66:3d:90:63:f7:7e:26:57:38:04:ef:00
Subject: C=DE,O=Atos,CN=Atos TrustedRoot Root CA ECC TLS 2021
Not Valid Before: Thu Apr 22 09:26:23 2021
Not Valid After : Wed Apr 17 09:26:22 2041
Fingerprint (SHA-256):
B2:FA:E5:3E:14:CC:D7:AB:92:12:06:47:01:AE:27:9C:1D:89:88:FA:CB:77:5F:A8:A0:08:91:4E:66:39:88:A8
Fingerprint (SHA1): 9E:BC:75:10:42:B3:02:F3:81:F4:F7:30:62:D4:8F:C3:A7:51:B2:DD
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA ECC TLS 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\236\274\165\020\102\263\002\363\201\364\367\060\142\324\217\303
\247\121\262\335
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\026\237\255\361\160\255\171\326\355\051\264\321\305\171\160\250
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\105\103\103\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\075\230\073\246\146\075\220\143\367\176\046\127\070\004
\357\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Atos TrustedRoot Root CA RSA TLS 2021"

```

```
#
Issuer: C=DE,O=Atos,CN=Atos TrustedRoot Root CA RSA TLS 2021
Serial Number:53:d5:cf:e6:19:93:0b:fb:2b:05:12:d8:c2:2a:a2:a4
Subject: C=DE,O=Atos,CN=Atos TrustedRoot Root CA RSA TLS 2021
Not Valid Before: Thu Apr 22 09:21:10 2021
Not Valid After : Wed Apr 17 09:21:09 2041
Fingerprint (SHA-256):
81:A9:08:8E:A5:9F:B3:64:C5:48:A6:F8:55:59:09:9B:6F:04:05:EF:BF:18:E5:32:4E:C9:F4:57:BA:00:11:2F
#
Fingerprint (SHA1): 18:52:3B:0D:06:37:E4:D6:3A:DF:23:E4:98:FB:5B:16:FB:86:74:48
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA RSA TLS 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\122\123\101\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\122\123\101\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\123\325\317\346\031\223\013\373\053\005\022\330\302\052
\242\244
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\144\060\202\003\114\240\003\002\001\002\002\020\123
\325\317\346\031\223\013\373\053\005\022\330\302\052\242\244\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\114
\061\056\060\054\006\003\125\004\003\014\045\101\164\157\163\040
\124\162\165\163\164\145\144\122\157\157\164\040\122\157\157\164
\040\103\101\040\122\123\101\040\124\114\123\040\062\060\062\061
\061\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061
\013\060\011\006\003\125\004\006\023\002\104\105\060\036\027\015
\062\061\060\064\062\062\060\071\062\061\061\060\132\027\015\064
\061\060\064\061\067\060\071\062\061\060\071\132\060\114\061\056
\060\054\006\003\125\004\003\014\045\101\164\157\163\040\124\162
```



\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103  
\101\040\122\123\101\040\124\114\123\040\062\060\062\061\061\015  
\060\013\006\003\125\004\012\014\004\101\164\157\163\061\013\060  
\011\006\003\125\004\006\023\002\104\105\060\202\002\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002  
\017\000\060\202\002\012\002\202\002\001\000\266\200\016\304\171  
\275\005\214\175\260\243\235\115\042\115\313\360\101\227\115\131  
\340\321\376\126\214\227\362\327\275\217\154\267\043\217\137\325  
\304\330\101\313\362\002\036\161\345\351\366\136\313\010\052\136  
\060\362\055\146\307\204\033\144\127\070\235\165\055\126\306\057  
\141\357\226\374\040\106\275\353\324\173\077\077\174\107\070\004  
\251\033\252\122\337\023\067\323\025\025\116\275\137\174\257\255  
\143\307\171\334\010\173\325\240\345\367\133\165\254\200\125\231  
\222\141\233\315\052\027\175\333\217\364\265\152\352\027\112\144  
\050\146\025\051\154\002\361\153\325\272\243\063\334\132\147\247  
\005\342\277\145\266\026\260\020\355\315\120\063\311\160\120\354  
\031\216\260\307\362\164\133\153\104\306\175\226\271\230\010\131  
\146\336\051\001\233\364\052\155\323\025\072\220\152\147\361\264  
\153\146\331\041\353\312\331\142\174\106\020\134\336\165\111\147  
\236\102\371\376\165\251\243\255\377\166\012\147\100\343\305\367  
\215\307\205\232\131\236\142\232\152\355\105\207\230\147\262\325  
\112\074\327\264\073\000\015\300\217\037\341\100\304\256\154\041  
\334\111\176\176\312\262\215\155\266\277\223\057\241\134\076\217  
\312\355\200\216\130\341\333\127\317\205\066\070\262\161\244\011  
\214\222\211\010\210\110\361\100\143\030\262\133\214\132\343\303  
\323\027\252\253\031\243\054\033\344\325\306\342\146\172\327\202  
\031\246\073\026\054\057\161\207\137\105\236\225\163\223\302\102  
\201\041\023\226\327\235\273\223\150\025\372\235\244\035\214\362  
\201\340\130\006\275\311\266\343\366\211\135\211\371\254\104\241  
\313\153\372\026\361\307\120\075\044\332\367\303\344\207\325\126  
\361\117\220\060\372\105\011\131\332\064\316\340\023\034\004\174  
\000\324\233\206\244\100\274\331\334\114\127\176\256\267\063\266  
\136\166\341\145\213\146\337\215\312\327\230\257\316\066\230\214  
\234\203\231\003\160\363\257\164\355\306\016\066\347\275\354\301  
\163\247\224\132\313\222\144\202\246\000\301\160\241\156\054\051  
\341\130\127\354\132\174\231\153\045\244\220\072\200\364\040\235  
\232\316\307\055\371\262\113\051\225\203\351\065\215\247\111\110  
\247\017\114\031\221\320\365\277\020\340\161\002\003\001\000\001  
\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024  
\164\111\231\321\377\264\172\150\105\165\303\176\264\334\314\316  
\071\063\332\010\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\206\060\015\006\011\052\206\110\206\367\015\001\001  
\014\005\000\003\202\002\001\000\043\103\123\044\142\134\155\375  
\076\302\317\125\000\154\305\126\210\271\016\335\072\342\045\015  
\225\112\227\312\200\211\356\052\315\145\370\333\026\340\011\222  
\340\030\307\170\230\273\363\354\102\122\373\251\244\202\327\115  
\330\212\374\344\116\375\253\220\304\070\165\062\204\237\377\263

\260\053\002\063\066\300\020\220\157\035\234\257\341\151\223\354  
\243\105\057\024\237\365\114\052\145\103\162\014\367\303\370\225  
\213\024\363\205\040\142\335\124\123\335\054\334\030\225\151\117  
\203\107\160\100\063\130\167\022\014\242\353\122\061\036\114\311  
\250\316\305\357\303\321\255\340\153\003\000\064\046\264\124\041  
\065\227\001\334\137\033\361\174\347\125\372\055\150\167\173\323  
\151\314\323\016\153\272\115\166\104\326\302\025\232\046\354\260  
\305\365\273\321\172\164\302\154\315\305\265\136\366\114\346\133  
\055\201\333\263\267\072\227\236\355\317\106\262\120\075\204\140  
\231\161\265\063\265\127\105\346\102\107\165\152\016\260\010\014  
\256\275\336\367\273\017\130\075\217\003\061\350\075\202\120\312  
\057\136\014\135\264\227\276\040\064\007\364\304\022\341\356\327  
\260\331\131\055\151\367\061\004\364\362\371\253\371\023\061\370  
\001\167\016\075\102\043\046\314\232\162\147\121\041\172\314\074  
\205\250\352\041\152\073\333\132\074\245\064\236\232\300\054\337  
\200\234\051\340\337\167\224\321\242\200\102\377\152\114\133\021  
\320\365\315\242\276\256\314\121\134\303\325\124\173\014\256\326  
\271\006\167\200\342\357\007\032\150\314\131\121\255\176\134\147  
\153\271\333\342\007\102\133\270\001\005\130\071\115\344\273\230  
\243\261\062\354\331\243\326\157\224\043\377\073\267\051\145\346  
\007\351\357\266\031\352\347\302\070\035\062\210\220\074\023\053  
\156\314\357\253\167\006\064\167\204\117\162\344\201\204\371\271  
\164\064\336\166\117\222\052\123\261\045\071\333\074\377\345\076  
\246\016\345\153\236\377\333\354\057\164\203\337\216\264\263\251  
\336\024\115\377\061\243\105\163\044\372\225\051\314\022\227\004  
\242\070\266\215\260\360\067\374\310\041\177\077\263\044\033\075  
\213\156\314\115\260\026\015\226\035\203\037\106\300\233\275\103  
\231\347\304\226\056\316\137\311

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

#

Trust for "Atos TrustedRoot Root CA RSA TLS 2021"

# Issuer: C=DE,O=Atos,CN=Atos TrustedRoot Root CA RSA TLS 2021

# Serial Number:53:d5:cf:e6:19:93:0b:fb:2b:05:12:d8:c2:2a:a2:a4

# Subject: C=DE,O=Atos,CN=Atos TrustedRoot Root CA RSA TLS 2021

# Not Valid Before: Thu Apr 22 09:21:10 2021

# Not Valid After : Wed Apr 17 09:21:09 2041

# Fingerprint (SHA-256):

81:A9:08:8E:A5:9F:B3:64:C5:48:A6:F8:55:59:09:9B:6F:04:05:EF:BF:18:E5:32:4E:C9:F4:57:BA:00:11:2F

# Fingerprint (SHA1): 18:52:3B:0D:06:37:E4:D6:3A:DF:23:E4:98:FB:5B:16:FB:86:74:48

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

```

CKA_LABEL UTF8 "Atos TrustedRoot Root CA RSA TLS 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\030\122\073\015\006\067\344\326\072\337\043\344\230\373\133\026
\373\206\164\110
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\324\323\106\270\232\300\234\166\135\236\072\303\271\231\061\322
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\122\123\101\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\123\325\317\346\031\223\013\373\053\005\022\330\302\052
\242\244
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "TrustAsia Global Root CA G3"
#
Issuer: CN=TrustAsia Global Root CA G3,O="TrustAsia Technologies, Inc.",C=CN
Serial Number:64:f6:0e:65:77:61:6a:ab:3b:b4:ea:85:84:bb:b1:89:b8:71:93:0f
Subject: CN=TrustAsia Global Root CA G3,O="TrustAsia Technologies, Inc.",C=CN
Not Valid Before: Thu May 20 02:10:19 2021
Not Valid After : Sat May 19 02:10:19
2046
Fingerprint (SHA-256):
E0:D3:22:6A:EB:11:63:C2:E4:8F:F9:BE:3B:50:B4:C6:43:1B:E7:BB:1E:AC:C5:C3:6B:5D:5E:C5:09:03:9A:08
Fingerprint (SHA1): 63:CF:B6:C1:27:2B:56:E4:88:8E:1C:23:9A:B6:2E:81:47:24:C3:C7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustAsia Global Root CA G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014

```

```
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\144\366\016\145\167\141\152\253\073\264\352\205\204\273
\261\211\270\161\223\017
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\245\060\202\003\215\240\003\002\001\002\002\024\144
\366\016\145\167\141\152\253\073\264\352\205\204\273\261\211\270
\161\223\017\060\015\006\011\052\206\110\206\367\015\001\001\014
\005\000\060\132\061\013\060\011\006\003\125\004\006\023\002\103
\116\061\045\060\043\006\003\125\004\012\014\034\124\162\165\163
\164\101\163\151\141\040\124\145\143\150\156\157\154\157\147\151
\145\163\054\040\111\156\143\056\061\044\060\042\006\003\125\004
\003\014\033\124\162\165\163\164\101\163\151\141\040\107\154\157
\142\141\154\040\122\157\157\164\040\103\101\040\107\063\060\036
\027\015\062\061\060\065\062\060\060\062\061\060\061\071\132\027
\015\064\066\060\065\061\071\060\062\061\060\061\071\132\060\132
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\045\060
\043\006\003\125\004\012\014\034\124\162\165\163\164\101\163\151
\141\040\124\145\143\150\156\157\154\157\147\151\145\163\054\040
\111\156\143\056\061\044\060\042\006\003\125\004\003\014\033\124
\162\165\163\164\101\163\151\141\040\107\154\157\142\141\154\040
\122\157\157\164\040\103\101\040\107\063\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\300\061\202\141\222
\344\224\033\012\052\145\320\276\006\251\207\073\121\022\352\160
\101\256\342\373\164\352\012\215\271\263\114\334\217\267\023\122
\117\124\030\341\054\163\225\221\305\146\073\152\317\254\143\155
\207\123\360\367\361\071\267\240\103\143\260\304\003\135\127\251
\347\104\316\304\241\203\145\366\120\076\261\176\026\270\072\212
\002\320\226\037\000\315\005\041\357\006\155\335\041\234\031\103
\105\241\305\350\200\312\302\255\100\142\027\006\306\252\274\363
\326\346\374\120\176\146\102\037\074\213\246\171\171\206\100\065
\237\040\357\077\353\213\107\037\217\216\305\324\216\266\054\311
\104\004\343\324\103\165\077\325\077\257\034\314\176\106\137\254
\337\144\020\212\357\106\360\220\360\017\055\364\210\013\261\051
```

\252\257\205\252\111\130\250\277\143\240\070\221\346\263\346\167  
\150\304\371\052\031\204\273\016\341\365\257\211\354\245\057\120  
\040\164\036\022\101\163\036\044\331\312\316\054\241\131\065\300  
\310\035\106\047\141\132\217\371\115\323\162\171\146\036\237\025  
\220\041\055\375\355\213\126\160\003\112\111\076\177\151\061\022  
\151\307\036\134\312\172\023\213\350\346\365\140\017\314\223\054  
\204\177\361\374\152\374\233\107\235\333\255\210\075\363\166\165  
\063\327\113\244\310\213\371\365\103\130\117\313\310\003\124\217  
\245\205\170\004\032\363\163\362\327\207\035\101\237\347\330\027  
\316\032\234\017\112\374\334\104\150\124\150\342\101\074\376\054  
\204\206\067\074\315\077\057\242\333\347\367\124\003\137\131\323  
\367\221\170\307\213\167\152\026\345\111\205\220\105\162\160\057  
\221\135\370\076\145\100\013\031\231\311\046\040\132\150\301\065  
\277\117\247\121\361\330\021\053\133\340\232\236\050\073\012\072  
\012\037\301\201\345\056\360\246\271\151\245\210\224\346\153\023  
\177\321\144\077\075\234\160\106\345\242\205\173\130\204\047\334  
\304\200\076\147\232\232\307\232\061\016\060\354\346\027\100\225  
\331\105\355\001\226\252\277\014\363\113\321\143\367\023\130\300  
\270\363\372\147\335\233\175\155\112\377\062\114\265\045\073\377  
\034\147\017\205\042\131\005\221\221\101\167\201\320\205\114\207  
\020\161\377\236\103\033\256\225\165\055\201\002\003\001\000\001  
\243\143\060\141\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\037\006\003\125\035\043\004\030\060\026  
\200\024\100\344\344\362\043\357\070\312\260\256\127\177\362\041  
\060\026\064\333\274\222\060\035\006\003\125\035\016\004\026\004  
\024\100\344\344\362\043\357\070\312\260\256\127\177\362\041\060  
\026\064\333\274\222\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001  
\001\014\005\000\003\202\002\001\000\046\073\121\341\115\070\363  
\062\030\264\264\136\341\145\136\304\224\117\324\247\141\243\370  
\300\317\063\001\002\351\303\252\065\017\361\224\023\167\167\065  
\236\055\126\121\104\156\341\306\056\050\036\377\332\354\107\315  
\227\104\027\367\340\114\302\341\174\174\062\172\146\310\132\266  
\134\123\105\127\132\105\324\005\231\057\056\043\125\356\143\150  
\337\323\033\170\247\022\224\006\000\165\015\162\204\351\056\274  
\132\152\325\336\057\131\307\243\354\322\207\146\333\267\124\265  
\044\253\364\103\170\333\113\004\304\157\335\346\076\146\076\051  
\362\113\150\161\042\207\240\370\261\063\143\166\343\015\205\162  
\104\042\125\077\034\174\351\374\270\025\350\122\372\252\076\243  
\041\071\065\164\211\246\152\302\071\372\170\317\266\254\347\347  
\326\126\377\043\222\056\120\013\251\265\007\063\364\070\137\244  
\111\246\313\145\160\166\350\012\205\200\113\066\075\063\367\225  
\124\165\045\332\254\304\163\202\145\351\122\365\134\375\070\225  
\002\152\151\060\305\034\012\127\007\256\042\244\054\371\305\101  
\267\270\354\237\117\110\000\371\001\004\125\314\254\371\062\061  
\304\165\225\006\240\177\321\215\047\335\263\251\244\162\207\376  
\131\213\232\172\164\026\335\026\245\142\051\353\072\226\334\213  
\247\150\131\323\353\167\221\071\370\327\313\331\217\137\132\047

```
\001\175\135\150\031\142\330\310\315\364\267\162\107\276\133\227
\316\362\255\242\231\223\255\224\313\223\366\022\011\225\266\253
\327\073\320\077\021\313\060\026\056\171\200\344\147\201\055\135
\355\160\170\266\140\131\254\341\135\105\143\217\310\337\162\150
\133\352\035\270\001\361\176\373\347\212\263\343\124\240\070\011
\340\074\336\102\362\302\355\056\233\363\037\065\266\066\330\343
\200\241\213\315\231\144\017\302\252\253\261\312\365\157\236\103
\215\204\124\231\263\156\300\022\146\330\160\020\361\006\065\063
\103\250\234\056\272\024\061\316\020\177\034\206\343\217\322\325
\370\167\354\233\253\361\057\143\331\102\137\340\147\201\144\221
\361\227\057\374\156\046\366\063\370\323\265\370\304\142\253\061
\121\045\002\172\370\335\153\145\325\155\115\060\310\145\272\150
\024\145\254\047\013\164\212\362\207
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "TrustAsia Global Root CA G3"

# Issuer: CN=TrustAsia Global Root CA G3,O="TrustAsia Technologies, Inc.",C=CN

# Serial Number:64:f6:0e:65:77:61:6a:ab:3b:b4:ea:85:84:bb:b1:89:b8:71:93:0f

# Subject: CN=TrustAsia Global Root CA G3,O="TrustAsia Technologies, Inc.",C=CN

# Not Valid Before: Thu May 20 02:10:19 2021

# Not Valid After : Sat May 19 02:10:19 2046

# Fingerprint (SHA-256):

E0:D3:22:6A:EB:11:63:C2:E4:8F:F9:BE:3B:50:B4:C6:43:1B:E7:BB:1E:AC:C5:C3:6B:5D:5E:C5:09:03:9A:08

# Fingerprint (SHA1): 63:CF:B6:C1:27:2B:56:E4:88:8E:1C:23:9A:B6:2E:81:47:24:C3:C7

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "TrustAsia Global Root CA G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\143\317\266\301\047\053\126\344\210\216\034\043\232\266\056\201
\107\044\303\307
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\060\102\033\267\273\201\165\065\344\026\117\123\322\224\336\004
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\063
```

```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\144\366\016\145\167\141\152\253\073\264\352\205\204\273
\261\211\270\161\223\017
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "TrustAsia Global Root CA G4"
#
Issuer: CN=TrustAsia Global Root CA G4,O="TrustAsia Technologies, Inc.",C=CN
Serial Number:4f:23:64:b8:8e:97:63:9e:c6:53:81:c1:76:4e:cb:2a:74:15:d6:d7
Subject: CN=TrustAsia Global Root CA G4,O="TrustAsia Technologies, Inc.",C=CN
Not Valid Before: Thu May 20 02:10:22 2021
Not Valid After : Sat May 19 02:10:22 2046
Fingerprint (SHA-256):
BE:4B:56:CB:50:56:C0:13:6A:52:6D:F4:44:50:8D:AA:36:A0:B5:4F:42:E4:AC:38:F7:2A:F4:70:E4:79:65:4C
Fingerprint (SHA1): 57:73:A5:61:5D:80:B2:E6:AC:38:82:FC:68:07:31:AC:9F:B5:92:5A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustAsia Global Root CA G4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\064
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\117\043\144\270\216\227\143\236\306\123\201\301\166\116

```

\313\052\164\025\326\327

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\125\060\202\001\334\240\003\002\001\002\002\024\117  
\043\144\270\216\227\143\236\306\123\201\301\166\116\313\052\164  
\025\326\327\060\012\006\010\052\206\110\316\075\004\003\003\060  
\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061\045  
\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101\163  
\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163\054  
\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014\033  
\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141\154  
\040\122\157\157\164\040\103\101\040\107\064\060\036\027\015\062  
\061\060\065\062\060\060\062\061\060\062\062\132\027\015\064\066  
\060\065\061\071\060\062\061\060\062\062\132\060\132\061\013\060  
\011\006\003\125\004\006\023\002\103\116\061\045\060\043\006\003  
\125\004\012\014\034\124\162\165\163\164\101\163\151\141\040\124  
\145\143\150\156\157\154\157\147\151\145\163\054\040\111\156\143  
\056\061\044\060\042\006\003\125\004\003\014\033\124\162\165\163  
\164\101\163\151\141\040\107\154\157\142\141\154\040\122\157\157  
\164\040\103\101\040\107\064\060\166\060\020\006\007\052\206\110  
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\361  
\263\315\070\344\045\103\345\336\031\011\273\201\171\242\025\137  
\025\143\001\336\302\253\335\263\246\033\147\113\200\203\257\231  
\313\254\027\333\053\226\312\174\122\125\342\032\341\075\126\360  
\057\026\010\372\025\274\233\273\107\346\077\356\250\341\114\214  
\365\323\066\371\070\135\253\160\232\107\015\342\201\101\006\353  
\111\371\260\051\335\063\354\120\245\177\171\051\270\040\230\243  
\143\060\141\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\037\006\003\125\035\043\004\030\060\026\200  
\024\245\273\112\227\316\263\053\177\244\061\336\227\203\131\203  
\246\157\161\313\336\060\035\006\003\125\035\016\004\026\004\024  
\245\273\112\227\316\263\053\177\244\061\336\227\203\131\203\246  
\157\161\313\336\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\012\006\010\052\206\110\316\075\004\003\003  
\003\147\000\060\144\002\060\136\362\353\006\314\111\061\237\100  
\000\155\267\176\066\360\115\021\117\363\313\211\072\054\170\221  
\120\243\133\300\312\165\046\362\277\220\135\013\202\214\140\050  
\237\306\160\232\150\344\361\002\060\134\130\016\126\166\317\130  
\303\327\020\214\272\216\256\343\274\144\165\107\305\125\220\343  
\375\272\125\353\007\304\123\253\067\251\356\041\262\041\133\140  
\217\075\062\361\325\043\224\326\130

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "TrustAsia Global Root CA G4"



```

Issuer: CN=TrustAsia Global Root CA G4,O="TrustAsia Technologies, Inc.",C=CN
Serial Number:4f:23:64:b8:8e:97:63:9e:c6:53:81:c1:76:4e:cb:2a:74:15:d6:d7
Subject: CN=TrustAsia Global Root CA G4,O="TrustAsia Technologies, Inc.",C=CN
Not Valid Before: Thu May 20 02:10:22 2021
Not Valid After : Sat May 19 02:10:22 2046
Fingerprint (SHA-256):
BE:4B:56:CB:50:56:C0:13:6A:52:6D:F4:44:50:8D:AA:36:A0:B5:4F:42:E4:AC:38:F7:2A:F4:70:E4:79:65:4C
#
Fingerprint (SHA1): 57:73:A5:61:5D:80:B2:E6:AC:38:82:FC:68:07:31:AC:9F:B5:92:5A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustAsia Global Root CA G4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\127\163\245\141\135\200\262\346\254\070\202\374\150\007\061\254
\237\265\222\132
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\124\335\262\327\137\330\076\355\174\340\013\056\314\355\353\353
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\117\043\144\270\216\227\143\236\306\123\201\301\166\116
\313\052\164\025\326\327
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "CommScope Public Trust ECC Root-01"
#
Issuer: CN=CommScope Public Trust ECC Root-01,O=CommScope,C=US
Serial Number:43:70:82:77:cf:4d:5d:34:f1:ca:ae:32:2f:37:f7:f4:7f:75:a0:9e
Subject: CN=CommScope Public Trust ECC Root-01,O=CommScope,C=US
Not Valid Before: Wed Apr 28 17:35:43 2021
Not Valid After : Sat Apr 28 17:35:42 2046
Fingerprint (SHA-256):

```

11:43:7C:DA:7B:B4:5E:41:36:5F:45:B3:9A:38:98:6B:0D:E0:0D:EF:34:8E:0C:7B:B0:87:36:33:80:0B:C3:8B

# Fingerprint (SHA1): 07:86:C0:D8:DD:8E:C0:80:98:06:98:D0:58:7A:EF:DE:A6:CC:A2:5D

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CommScope Public Trust ECC Root-01"

CKA\_CERTIFICATE\_TYPE

CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143  
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157  
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124  
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061  
END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143  
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157  
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124  
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061  
END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\024\103\160\202\167\317\115\135\064\361\312\256\062\057\067  
\367\364\177\165\240\236

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\035\060\202\001\243\240\003\002\001\002\002\024\103  
\160\202\167\317\115\135\064\361\312\256\062\057\067\367\364\177  
\165\240\236\060\012\006\010\052\206\110\316\075\004\003\003\060  
\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022  
\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143\157  
\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157\155  
\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124\162  
\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061\060  
\036\027\015\062\061\060\064\062\070\061\067\063\065\064\063\132  
\027\015\064\066\060\064\062\070\061\067\063\065\064\062\132\060  
\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022  
\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143\157  
\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157\155  
\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124\162  
\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061\060  
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201  
\004\000\042\003\142\000\004\113\066\351\256\127\136\250\160\327  
\320\217\164\142\167\303\136\172\252\345\266\242\361\170\375\002  
\176\127\335\221\171\234\154\271\122\210\124\274\057\004\276\270

```
\315\366\020\321\051\354\265\320\240\303\360\211\160\031\273\121
\145\305\103\234\303\233\143\235\040\203\076\006\013\246\102\104
\205\021\247\112\072\055\351\326\150\057\110\116\123\053\007\077
\115\275\271\254\167\071\127\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\216\007\142\300\120\335\306\031\006
\000\106\164\004\367\363\256\175\165\115\060\060\012\006\010\052
\206\110\316\075\004\003\003\003\150\000\060\145\002\061\000\234
\063\337\101\343\043\250\102\066\046\227\065\134\173\353\333\113
\370\252\213\163\125\025\134\254\170\051\017\272\041\330\304\240
\330\321\003\335\155\321\071\075\304\223\140\322\343\162\262\002
\060\174\305\176\210\323\120\365\036\045\350\372\116\165\346\130
\226\244\065\137\033\145\352\141\232\160\043\265\015\243\233\222
\122\157\151\240\214\215\112\320\356\213\016\313\107\216\320\215
\021
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "CommScope Public Trust ECC Root-01"

# Issuer: CN=CommScope Public Trust ECC Root-01,O=CommScope,C=US

# Serial Number:43:70:82:77:cf:4d:5d:34:f1:ca:ae:32:2f:37:f7:f4:7f:75:a0:9e

# Subject: CN=CommScope Public Trust ECC Root-01,O=CommScope,C=US

# Not Valid Before: Wed Apr 28 17:35:43 2021

# Not Valid After : Sat Apr 28 17:35:42 2046

# Fingerprint (SHA-256):

11:43:7C:DA:7B:B4:5E:41:36:5F:45:B3:9A:38:98:6B:0D:E0:0D:EF:34:8E:0C:7B:B0:87:36:33:80:0B:C3:8B

# Fingerprint (SHA1): 07:86:C0:D8:DD:8E:C0:80:98:06:98:D0:58:7A:EF:DE:A6:CC:A2:5D

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CommScope

Public Trust ECC Root-01"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\007\206\300\330\335\216\300\200\230\006\230\320\130\172\357\336
\246\314\242\135
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\072\100\247\374\003\214\234\070\171\057\072\242\154\266\012\026
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
```

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\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\103\160\202\167\317\115\135\064\361\312\256\062\057\067
\367\364\177\165\240\236
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "CommScope Public Trust
ECC Root-02"
#
Issuer: CN=CommScope Public Trust ECC Root-02,O=CommScope,C=US
Serial Number:28:fd:99:60:41:47:a6:01:3a:ca:14:7b:1f:ef:f9:68:08:83:5d:7d
Subject: CN=CommScope Public Trust ECC Root-02,O=CommScope,C=US
Not Valid Before: Wed Apr 28 17:44:54 2021
Not Valid After : Sat Apr 28 17:44:53 2046
Fingerprint (SHA-256):
2F:FB:7F:81:3B:BB:B3:C8:9A:B4:E8:16:2D:0F:16:D7:15:09:A8:30:CC:9D:73:C2:62:E5:14:08:75:D1:AD:4A
Fingerprint (SHA1): 3C:3F:EF:57:0F:FE:65:93:86:9E:A0:FE:B0:F6:ED:8E:D1:13:C7:E5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust ECC Root-02"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\050\375\231\140\101\107\246\001\072\312\024\173\037\357

```

\371\150\010\203\135\175

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\034\060\202\001\243\240\003\002\001\002\002\024\050  
\375\231\140\101\107\246\001\072\312\024\173\037\357\371\150\010  
\203\135\175\060\012\006\010\052\206\110\316\075\004\003\003\060  
\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022  
\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143\157  
\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157\155  
\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124\162  
\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062\060  
\036\027\015\062\061\060\064\062\070\061\067\064\064\065\064\132  
\027\015\064\066\060\064\062\070\061\067\064\064\065\063\132\060  
\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022  
\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143\157  
\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157\155  
\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124\162  
\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062\060  
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201  
\004\000\042\003\142\000\004\170\060\201\350\143\036\345\353\161  
\121\017\367\007\007\312\071\231\174\116\325\017\314\060\060\013  
\217\146\223\076\317\275\305\206\275\371\261\267\264\076\264\007  
\310\363\226\061\363\355\244\117\370\243\116\215\051\025\130\270  
\325\157\177\356\154\042\265\260\257\110\105\012\275\250\111\224  
\277\204\103\260\333\204\112\003\043\031\147\152\157\301\156\274  
\006\071\067\321\210\042\367\243\102\060\100\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003  
\125\035\016\004\026\004\024\346\030\165\377\357\140\336\204\244  
\365\106\307\336\112\125\343\062\066\171\365\060\012\006\010\052  
\206\110\316\075\004\003\003\003\147\000\060\144\002\060\046\163  
\111\172\266\253\346\111\364\175\122\077\324\101\004\256\200\103  
\203\145\165\271\205\200\070\073\326\157\344\223\206\253\217\347  
\211\310\177\233\176\153\012\022\125\141\252\021\340\171\002\060  
\167\350\061\161\254\074\161\003\326\204\046\036\024\270\363\073  
\073\336\355\131\374\153\114\060\177\131\316\105\351\163\140\025  
\232\114\360\346\136\045\042\025\155\302\207\131\320\262\216\152

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for

"CommScope Public Trust ECC Root-02"

# Issuer: CN=CommScope Public Trust ECC Root-02,O=CommScope,C=US

# Serial Number:28:fd:99:60:41:47:a6:01:3a:ca:14:7b:1f:ef:f9:68:08:83:5d:7d

# Subject: CN=CommScope Public Trust ECC Root-02,O=CommScope,C=US

```

Not Valid Before: Wed Apr 28 17:44:54 2021
Not Valid After : Sat Apr 28 17:44:53 2046
Fingerprint (SHA-256):
2F:FB:7F:81:3B:BB:B3:C8:9A:B4:E8:16:2D:0F:16:D7:15:09:A8:30:CC:9D:73:C2:62:E5:14:08:75:D1:AD:4A
Fingerprint (SHA1): 3C:3F:EF:57:0F:FE:65:93:86:9E:A0:FE:B0:F6:ED:8E:D1:13:C7:E5
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust ECC Root-02"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\074\077\357\127\017\376\145\223\206\236\240\376\260\366\355\216
\321\023\307\345
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\131\260\104\325\145\115\270\134\125\031\222\002\266\321\224\262
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\050\375\231\140\101\107\246\001\072\312\024\173\037\357
\371\150\010\203\135\175
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "CommScope Public Trust RSA Root-01"
#
Issuer: CN=CommScope Public Trust RSA Root-01,O=CommScope,C=US
Serial Number:3e:03:49:81:75:16:74:31:8e:4c:ab:d5:c5:90:29:96:c5:39:10:dd
Subject: CN=CommScope Public Trust RSA Root-01,O=CommScope,C=US
Not Valid Before: Wed Apr 28 16:45:54 2021
Not Valid After : Sat Apr 28 16:45:53 2046
#
Fingerprint (SHA-256):
02:BD:F9:6E:2A:45:DD:9B:F1:8F:C7:E1:DB:DF:21:A0:37:9B:A3:C9:C2:61:03:44:CF:D8:D6:06:FE:C1:ED:81
Fingerprint (SHA1): 6D:0A:5F:F7:B4:23:06:B4:85:B3:B7:97:64:FC:AC:75:F5:33:F2:93
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust RSA Root-01"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\076\003\111\201\165\026\164\061\216\114\253\325\305\220
\051\226\305\071\020\335
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\154\060\202\003\124\240\003\002\001\002\002\024\076
\003\111\201\165\026\164\061\216\114\253\325\305\220\051\226\305
\071\020\335\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\116\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\022\060\020\006\003\125\004\012\014\011\103\157\155\155
\123\143\157\160\145\061\053\060\051\006\003\125\004\003\014\042
\103\157\155\155\123\143\157\160\145\040\120\165\142\154\151\143
\040\124\162\165\163\164\040\122\123\101\040\122\157\157\164\055
\060\061\060\036\027\015\062\061\060\064\062\070\061\066\064\065
\065\064\132\027\015\064\066\060\064\062\070\061\066\064\065\065
\063\132\060\116\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\022\060\020\006\003\125\004\012\014\011\103\157\155\155
\123\143\157\160\145\061\053\060\051\006\003\125\004\003\014\042
\103\157\155\155\123\143\157\160\145\040\120\165\142\154\151\143
\040\124\162\165\163\164\040\122\123\101\040\122\157\157\164\055
\060\061\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\260\110\145\243\015\035\102\343\221\155\235\204\244
\141\226\022\302\355\303\332\043\064\031\166\366\352\375\125\132
\366\125\001\123\017\362\314\214\227\117\271\120\313\263\001\104
\126\226\375\233\050\354\173\164\013\347\102\153\125\316\311\141
\262\350\255\100\074\272\271\101\012\005\117\033\046\205\217\103
\265\100\265\205\321\324\161\334\203\101\363\366\105\307\200\242
```

\204\120\227\106\316\240\014\304\140\126\004\035\007\133\106\245  
\016\262\113\244\016\245\174\356\370\324\142\003\271\223\152\212  
\024\270\160\370\056\202\106\070\043\016\164\307\153\101\267\320  
\051\243\235\200\260\176\167\223\143\102\373\064\203\073\163\243  
\132\041\066\353\107\372\030\027\331\272\146\302\223\244\217\374  
\135\244\255\374\120\152\225\254\274\044\063\321\275\210\177\206  
\365\365\262\163\052\217\174\257\010\362\032\230\077\251\201\145  
\077\301\214\211\305\226\060\232\012\317\364\324\310\064\355\235  
\057\274\215\070\206\123\356\227\237\251\262\143\224\027\215\017  
\334\146\052\174\122\121\165\313\231\216\350\075\134\277\236\073  
\050\215\203\002\017\251\237\162\342\054\053\263\334\146\227\000  
\100\320\244\124\216\233\135\173\105\066\046\326\162\103\353\317  
\300\352\015\334\316\022\346\175\070\237\005\047\250\227\076\351  
\121\306\154\005\050\301\002\017\351\030\155\354\275\234\006\324  
\247\111\364\124\005\153\154\060\361\353\003\325\352\075\152\166  
\302\313\032\050\111\115\177\144\340\372\053\332\163\203\201\377  
\221\003\275\224\273\344\270\216\234\062\143\315\237\273\150\201  
\261\204\133\257\066\277\167\356\035\177\367\111\233\122\354\322  
\167\132\175\221\235\115\302\071\055\344\272\202\370\157\362\116  
\036\017\116\346\077\131\245\043\334\075\207\250\050\130\050\321  
\361\033\066\333\117\304\377\341\214\133\162\214\307\046\003\047  
\243\071\012\001\252\300\262\061\140\203\042\241\117\022\011\001  
\021\257\064\324\317\327\256\142\323\005\007\264\061\165\340\015  
\155\127\117\151\207\371\127\251\272\025\366\310\122\155\241\313  
\234\037\345\374\170\250\065\232\237\101\024\316\245\264\316\224  
\010\034\011\255\126\345\332\266\111\232\112\352\143\030\123\234  
\054\056\303\002\003\001\000\001\243\102\060\100\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006  
\003\125\035\016\004\026\004\024\067\135\246\232\164\062\302\302  
\371\307\246\025\020\131\270\344\375\345\270\155\060\015\006\011  
\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000  
\257\247\317\336\377\340\275\102\215\115\345\042\226\337\150\352  
\175\115\052\175\320\255\075\026\134\103\347\175\300\206\350\172  
\065\143\361\314\201\310\306\013\350\056\122\065\244\246\111\220  
\143\121\254\064\254\005\073\127\000\351\323\142\323\331\051\325  
\124\276\034\020\221\234\262\155\376\131\375\171\367\352\126\320  
\236\150\124\102\217\046\122\342\114\337\057\227\246\057\322\007  
\230\250\363\140\135\113\232\130\127\210\357\202\345\372\257\154  
\201\113\222\217\100\232\223\106\131\313\137\170\026\261\147\076  
\102\013\337\050\331\260\255\230\040\276\103\174\321\136\032\011  
\027\044\215\173\135\225\351\253\301\140\253\133\030\144\200\373  
\255\340\006\175\035\312\131\270\363\170\051\147\306\126\035\257  
\266\265\164\052\166\241\077\373\165\060\237\224\136\073\245\140  
\363\313\134\014\342\016\311\140\370\311\037\026\212\046\335\347  
\047\177\353\045\246\212\275\270\055\066\020\232\261\130\115\232  
\150\117\140\124\345\366\106\023\216\210\254\274\041\102\022\255  
\306\112\211\175\233\301\330\055\351\226\003\364\242\164\014\274



```
\000\035\277\326\067\045\147\264\162\213\257\205\275\352\052\003
\217\314\373\074\104\044\202\342\001\245\013\131\266\064\215\062
\013\022\015\353\047\302\375\101\327\100\074\162\106\051\300\214
\352\272\017\361\006\223\056\367\234\250\364\140\076\243\361\070
\136\216\023\301\263\072\227\207\077\222\312\170\251\034\257\320
\260\033\046\036\276\160\354\172\365\063\230\352\134\377\053\013
\004\116\103\335\143\176\016\247\116\170\003\225\076\324\055\060
\225\021\020\050\056\277\240\002\076\377\136\131\323\005\016\225
\137\123\105\357\153\207\325\110\315\026\246\226\203\341\337\263
\006\363\301\024\333\247\354\034\213\135\220\220\015\162\121\347
\141\371\024\312\257\203\217\277\257\261\012\131\135\334\134\327
\344\226\255\133\140\035\332\256\227\262\071\331\006\365\166\000
\023\370\150\114\041\260\065\304\334\125\262\311\301\101\132\034
\211\300\214\157\164\240\153\063\115\265\001\050\375\255\255\211
\027\073\246\232\204\274\353\214\352\304\161\044\250\272\051\371
\010\262\047\126\065\062\137\352\071\373\061\232\325\031\314\360
END
```

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "CommScope Public Trust RSA Root-01"

# Issuer: CN=CommScope Public Trust RSA Root-01,O=CommScope,C=US

# Serial Number:3e:03:49:81:75:16:74:31:8e:4c:ab:d5:c5:90:29:96:c5:39:10:dd

# Subject: CN=CommScope Public Trust RSA Root-01,O=CommScope,C=US

# Not Valid Before: Wed Apr 28 16:45:54 2021

# Not Valid After : Sat Apr 28 16:45:53 2046

# Fingerprint (SHA-256):

02:BD:F9:6E:2A:45:DD:9B:F1:8F:C7:E1:DB:DF:21:A0:37:9B:A3:C9:C2:61:03:44:CF:D8:D6:06:FE:C1:ED:81

# Fingerprint (SHA1): 6D:0A:5F:F7:B4:23:06:B4:85:B3:B7:97:64:FC:AC:75:F5:33:F2:93

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CommScope Public Trust RSA Root-01"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\155\012\137\367\264\043\006\264\205\263\267\227\144\374\254\165
\365\063\362\223
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\016\264\025\274\207\143\135\135\002\163\324\046\070\150\163\330
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
```

```

\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\076\003\111\201\165\026\164\061\216\114\253\325\305\220
\051\226\305\071\020\335
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "CommScope Public Trust RSA Root-02"
#
Issuer: CN=CommScope Public Trust RSA Root-02,O=CommScope,C=US
Serial Number:54:16:bf:3b:7e:39:95:71:8d:d1:aa:00:a5:86:0d:2b:8f:7a:05:4e
Subject: CN=CommScope
Public Trust RSA Root-02,O=CommScope,C=US
Not Valid Before: Wed Apr 28 17:16:43 2021
Not Valid After : Sat Apr 28 17:16:42 2046
Fingerprint (SHA-256):
FF:E9:43:D7:93:42:4B:4F:7C:44:0C:1C:3D:64:8D:53:63:F3:4B:82:DC:87:AA:7A:9F:11:8F:C5:DE:E1:01:F1
Fingerprint (SHA1): EA:B0:E2:52:1B:89:93:4C:11:68:F2:D8:9A:AC:22:4C:A3:8A:57:AE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust RSA Root-02"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\124\026\277\073\176\071\225\161\215\321\252\000\245\206

```

\015\053\217\172\005\116

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\154\060\202\003\124\240\003\002\001\002\002\024\124  
\026\277\073\176\071\225\161\215\321\252\000\245\206\015\053\217  
\172\005\116\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\060\116\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\022\060\020\006\003\125\004\012\014\011\103\157\155\155  
\123\143\157\160\145\061\053\060\051\006\003\125\004\003\014\042  
\103\157\155\155\123\143\157\160\145\040\120\165\142\154\151\143  
\040\124\162\165\163\164\040\122\123\101\040\122\157\157\164\055  
\060\062\060\036\027\015\062\061\060\064\062\070\061\067\061\066  
\064\063\132\027\015\064\066\060\064\062\070\061\067\061\066\064  
\062\132\060\116\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\022\060\020\006\003\125\004\012\014\011\103\157\155\155  
\123\143\157\160\145\061\053\060\051\006\003\125\004\003\014\042  
\103\157\155\155\123\143\157\160\145\040\120\165\142\154\151\143  
\040\124\162\165\163\164\040\122\123\101\040\122\157\157\164\055  
\060\062\060\202\002\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202  
\002\001\000\341\372\016\373\150\000\022\310\115\325\254\042\304  
\065\001\073\305\124\345\131\166\143\245\177\353\301\304\152\230  
\275\062\215\027\200\353\135\272\321\142\075\045\043\031\065\024  
\351\177\211\247\033\142\074\326\120\347\064\225\003\062\261\264  
\223\042\075\247\342\261\355\346\173\116\056\207\233\015\063\165  
\012\336\252\065\347\176\345\066\230\242\256\045\236\225\263\062  
\226\244\053\130\036\357\077\376\142\064\110\121\321\264\215\102  
\255\140\332\111\152\225\160\335\322\000\342\314\127\143\002\173  
\226\335\111\227\133\222\116\225\323\371\313\051\037\030\112\370  
\001\052\322\143\011\156\044\351\211\322\345\307\042\114\334\163  
\206\107\000\252\015\210\216\256\205\175\112\351\273\063\117\016  
\122\160\235\225\343\174\155\226\133\055\075\137\241\203\106\135  
\266\343\045\270\174\247\031\200\034\352\145\103\334\221\171\066  
\054\164\174\362\147\006\311\211\311\333\277\332\150\277\043\355  
\334\153\255\050\203\171\057\354\070\245\015\067\001\147\047\232  
\351\063\331\063\137\067\241\305\360\253\075\372\170\260\347\054  
\237\366\076\237\140\340\357\110\351\220\105\036\005\121\170\032  
\054\022\054\134\050\254\015\242\043\236\064\217\005\346\242\063  
\316\021\167\023\324\016\244\036\102\037\206\315\160\376\331\056  
\025\075\035\273\270\362\123\127\333\314\306\164\051\234\030\263  
\066\165\070\056\017\124\241\370\222\037\211\226\117\273\324\356  
\235\351\073\066\102\265\012\073\052\324\144\171\066\020\341\371  
\221\003\053\173\040\124\315\015\031\032\310\101\062\064\321\260  
\231\341\220\036\001\100\066\265\267\372\251\345\167\165\244\042  
\201\135\260\213\344\047\022\017\124\210\306\333\205\164\346\267  
\300\327\246\051\372\333\336\363\223\227\047\004\125\057\012\157  
\067\305\075\023\257\012\000\251\054\213\034\201\050\327\357\206  
\061\251\256\362\156\270\312\152\054\124\107\330\052\210\056\257

\301\007\020\170\254\021\242\057\102\360\067\305\362\270\126\335  
\016\142\055\316\055\126\176\125\362\247\104\366\053\062\364\043  
\250\107\350\324\052\001\170\317\152\303\067\250\236\145\322\054  
\345\372\272\063\301\006\104\366\346\317\245\015\247\146\010\064  
\212\054\363\002\003\001\000\001\243\102\060\100\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006  
\003\125\035\016\004\026\004\024\107\320\347\261\042\377\235\054  
\365\331\127\140\263\261\261\160\225\357\141\172\060\015\006\011  
\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000  
\206\151\261\115\057\351\237\117\042\223\150\216\344\041\231\243  
\316\105\123\033\163\104\123\000\201\141\315\061\343\010\272\201  
\050\050\172\222\271\266\250\310\103\236\307\023\046\115\302\330  
\345\125\234\222\135\120\330\302\053\333\376\346\250\227\317\122  
\072\044\303\145\144\134\107\061\243\145\065\023\303\223\271\367  
\371\121\227\273\244\360\142\207\305\326\006\323\227\203\040\251  
\176\273\266\041\302\245\015\204\000\341\362\047\020\203\272\335  
\003\201\325\335\150\303\146\020\310\321\166\264\263\157\051\236  
\000\371\302\051\365\261\223\031\122\151\032\054\114\240\213\340  
\025\232\061\057\323\210\225\131\156\345\304\263\120\310\024\010  
\112\233\213\023\203\261\244\162\262\073\166\063\101\334\334\252  
\246\007\157\035\044\022\237\310\166\275\057\331\216\364\054\356  
\267\322\070\020\044\066\121\057\343\134\135\201\041\247\332\273  
\116\377\346\007\250\376\271\015\047\154\273\160\132\125\172\023  
\351\361\052\111\151\307\137\207\127\114\103\171\155\072\145\351  
\060\134\101\356\353\167\245\163\022\210\350\277\175\256\345\304  
\250\037\015\216\034\155\120\002\117\046\030\103\336\217\125\205  
\261\013\067\005\140\311\125\071\022\004\241\052\317\161\026\237  
\066\121\111\277\160\073\236\147\234\373\173\171\311\071\034\170  
\254\167\221\124\232\270\165\012\201\122\227\343\146\141\153\355  
\076\070\036\226\141\125\341\221\124\214\355\214\044\037\201\311  
\020\232\163\231\053\026\116\162\000\077\124\033\370\215\272\213  
\347\024\326\266\105\117\140\354\226\256\303\057\002\116\135\235  
\226\111\162\000\262\253\165\134\017\150\133\035\145\302\137\063  
\017\036\017\360\073\206\365\260\116\273\234\367\352\045\005\334  
\255\242\233\113\027\001\276\102\337\065\041\035\255\253\256\364  
\277\256\037\033\323\342\073\374\263\162\163\034\233\050\220\211  
\023\075\035\301\000\107\011\226\232\070\033\335\261\317\015\302  
\264\104\363\226\225\316\062\072\217\064\234\340\027\307\136\316  
\256\015\333\207\070\345\077\133\375\233\031\341\061\101\172\160  
\252\043\153\001\341\105\114\315\224\316\073\236\055\347\210\002  
\042\364\156\350\310\354\326\074\363\271\262\327\167\172\254\173  
END  
CKA\_NSS\_MOZILLA\_CA\_POLICY  
CK\_BBOOL CK\_TRUE  
CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE  
CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```

Trust for "CommScope Public Trust RSA Root-02"
Issuer: CN=CommScope Public Trust RSA Root-02,O=CommScope,C=US
Serial Number:54:16:bf:3b:7e:39:95:71:8d:d1:aa:00:a5:86:0d:2b:8f:7a:05:4e
Subject: CN=CommScope Public Trust RSA Root-02,O=CommScope,C=US
Not Valid Before: Wed Apr 28 17:16:43 2021
Not Valid After : Sat Apr 28 17:16:42 2046
Fingerprint (SHA-256):
FF:E9:43:D7:93:42:4B:4F:7C:44:0C:1C:3D:64:8D:53:63:F3:4B:82:DC:87:AA:7A:9F:11:8F:C5:DE:E1:01:F1
Fingerprint (SHA1): EA:B0:E2:52:1B:89:93:4C:11:68:F2:D8:9A:AC:22:4C:A3:8A:57:AE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust RSA Root-02"
CKA_CERT_SHA1_HASH
MULTILINE_OCTAL
\352\260\342\122\033\211\223\114\021\150\362\330\232\254\042\114
\243\212\127\256
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\341\051\371\142\173\166\342\226\155\363\324\327\017\256\037\252
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\124\026\277\073\176\071\225\161\215\321\252\000\245\206
\015\053\217\172\005\116
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "D-Trust SBR Root CA 1 2022"
#
Issuer: CN=D-Trust SBR Root CA 1 2022,O=D-Trust
GmbH,C=DE
Serial Number:52:cf:e4:8c:6d:a0:4a:f7:3f:82:97:0c:80:09:8c:95
Subject: CN=D-Trust SBR Root CA 1 2022,O=D-Trust GmbH,C=DE
Not Valid Before: Wed Jul 06 11:30:00 2022
Not Valid After : Mon Jul 06 11:29:59 2037
Fingerprint (SHA-256):

```

D9:2C:17:1F:5C:F8:90:BA:42:80:19:29:29:27:FE:22:F3:20:7F:D2:B5:44:49:CB:6F:67:5A:F4:92:21:46:E2  
# Fingerprint (SHA1): 0F:52:3A:6B:4E:7D:1D:18:05:A5:48:F9:4D:CD:E4:C3:1E:1B:E9:E6  
CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "D-Trust SBR Root CA 1 2022"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509  
CKA\_SUBJECT MULTILINE\_OCTAL  
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163  
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023  
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157  
\164\040\103\101\040\061\040\062\060\062\062  
END  
CKA\_ID  
UTF8 "0"  
CKA\_ISSUER MULTILINE\_OCTAL  
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163  
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023  
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157  
\164\040\103\101\040\061\040\062\060\062\062  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\020\122\317\344\214\155\240\112\367\077\202\227\014\200\011  
\214\225  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\002\136\060\202\001\343\240\003\002\001\002\002\020\122  
\317\344\214\155\240\112\367\077\202\227\014\200\011\214\225\060  
\012\006\010\052\206\110\316\075\004\003\003\060\111\061\013\060  
\011\006\003\125\004\006\023\002\104\105\061\025\060\023\006\003  
\125\004\012\023\014\104\055\124\162\165\163\164\040\107\155\142  
\110\061\043\060\041\006\003\125\004\003\023\032\104\055\124\162  
\165\163\164\040\123\102\122\040\122\157\157\164\040\103\101\040  
\061\040\062\060\062\062\060\036\027\015\062\062\060\067\060\066  
\061\061\063\060\060\060\132\027\015\063\067\060\067\060\066\061  
\061\062\071\065\071\132\060\111\061\013\060\011\006\003\125\004  
\006\023\002\104\105\061\025\060\023\006\003\125\004\012\023\014  
\104\055\124\162\165\163\164\040\107\155\142\110\061\043\060\041  
\006\003\125\004\003\023\032\104\055\124\162\165\163\164\040\123  
\102\122\040\122\157\157\164\040\103\101\040\061\040\062\060\062  
\062\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005  
\053\201\004\000\042\003\142\000\004\131\223\071\366\214\111\146  
\050\327\141\014\310\253\177\014\243\055\337\242\244\174\222\053  
\150\325\056\176\036\100\313\264\150\111\177\022\241\253\177\127  
\237\031\056\143\056\133\376\146\161\014\063\017\271\336\153\304

```
\210\303\261\357\354\071\100\343\226\253\333\345\173\256\037\334
\371\257\106\232\152\106\006\057\307\067\144\213\027\142\376\226
\303\242\356\204\340\260\227\071\274\243\201\217\060\201\214\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\361\051\243\036\001
\022\035\075\165\126\115\307\120\174\305\031\252\017\030\267\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\112\006\003\125\035\037\004\103\060\101\060\077\240\075\240\073
\206\071\150\164\164\160\072\057\057\143\162\154\056\144\055\164
\162\165\163\164\056\156\145\164\057\143\162\154\057\144\055\164
\162\165\163\164\137\163\142\162\137\162\157\157\164\137\143\141
\137\061\137\062\060\062\062\056\143\162\154\060\012\006\010\052
\206\110\316\075\004\003\003\003\151\000\060\146\002\061\000\227
\371\336\256\113\217\230\265\036\100\177\062\175\115\124\103\332
\211\315\302\252\222\074\321\202\036\163\317\372\114\222\040\373
\143\047\305\365\163\075\011\075\367\247\141\206\214\363\152\002
\061\000\347\057\174\270\365\045\214\073\071\037\066\253\215\365
\206\242\056\341\172\144\332\147\071\002\376\376\063\077\331\163
\266\130\133\072\374\262\244\331\140\170\167\314\171\247\246\256
\125\275
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "D-Trust SBR Root CA 1 2022"

# Issuer: CN=D-Trust SBR Root CA 1 2022,O=D-Trust GmbH,C=DE

# Serial Number:52:cf:e4:8c:6d:a0:4a:f7:3f:82:97:0c:80:09:8c:95

# Subject: CN=D-Trust SBR Root CA 1 2022,O=D-Trust GmbH,C=DE

# Not Valid Before: Wed Jul 06 11:30:00 2022

# Not Valid After : Mon Jul 06 11:29:59 2037

# Fingerprint (SHA-256):

D9:2C:17:1F:5C:F8:90:BA:42:80:19:29:29:27:FE:22:F3:20:7F:D2:B5:44:49:CB:6F:67:5A:F4:92:21:46:E2

# Fingerprint (SHA1): 0F:52:3A:6B:4E:7D:1D:18:05:A5:48:F9:4D:CD:E4:C3:1E:1B:E9:E6

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "D-Trust SBR Root CA 1 2022"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\017\122\072\153\116\175\035\030\005\245\110\371\115\315\344\303
\036\033\351\346
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\023\074\033\202\352\156\352\355\144\142\351\132\171\005\151\004
```

END

CKA\_ISSUER

```

MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\061\040\062\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\122\317\344\214\155\240\112\367\077\202\227\014\200\011
\214\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "D-Trust SBR Root CA 2 2022"
#
Issuer: CN=D-Trust SBR Root CA 2 2022,O=D-Trust GmbH,C=DE
Serial Number:54:d5:a3:95:1e:3d:95:ba:72:1b:9a:d0:31:21:4a:ba
Subject: CN=D-Trust SBR Root CA 2 2022,O=D-Trust GmbH,C=DE
Not Valid Before: Thu Jul 07 07:30:00 2022
Not Valid After
: Tue Jul 07 07:29:59 2037
Fingerprint (SHA-256):
DB:A8:4D:D7:EF:62:2D:48:54:63:A9:01:37:EA:4D:57:4D:F8:55:09:28:F6:AF:A0:3B:4D:8B:11:41:E6:36:CC
Fingerprint (SHA1): 27:FF:63:B9:EF:34:29:31:03:38:1A:D8:60:60:DA:CC:60:28:35:E1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-Trust SBR Root CA 2 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\062\040\062\060\062\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\062\040\062\060\062\062

```



END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\124\325\243\225\036\075\225\272\162\033\232\320\061\041  
\112\272

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\254\060\202\003\224\240\003\002\001\002\002\020\124  
\325\243\225\036\075\225\272\162\033\232\320\061\041\112\272\060  
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060\111  
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\025\060  
\023\006\003\125\004\012\023\014\104\055\124\162\165\163\164\040  
\107\155\142\110\061\043\060\041\006\003\125\004\003\023\032\104  
\055\124\162\165\163\164\040\123\102\122\040\122\157\157\164\040  
\103\101\040\062\040\062\060\062\062\060\036\027\015\062\062\060  
\067\060\067\060\067\063\060\060\060\132\027\015\063\067\060\067  
\060\067\060\067\062\071\065\071\132\060\111\061\013\060\011\006  
\003\125\004\006\023\002\104\105\061\025\060\023\006\003\125\004  
\012\023\014\104\055\124\162\165\163\164\040\107\155\142\110\061  
\043\060\041\006\003\125\004\003\023\032\104\055\124\162\165\163  
\164\040\123\102\122\040\122\157\157\164\040\103\101\040\062\040  
\062\060\062\062\060\202\002\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012  
\002\202\002\001\000\257\054\274\216\066\214\353\144\257\121\152  
\326\156\074\136\221\072\352\232\303\312\154\373\252\047\236\144  
\042\251\100\337\271\050\105\132\354\123\141\026\050\230\302\212  
\244\165\170\120\204\335\372\040\110\222\007\145\101\065\146\121  
\022\164\141\235\007\006\205\071\061\127\173\050\077\325\234\245  
\354\132\351\034\113\047\237\316\047\006\363\067\365\122\330\021  
\063\026\101\072\037\365\143\170\145\143\206\311\277\310\001\004  
\037\156\356\342\354\254\014\356\202\222\342\366\032\015\077\071  
\371\235\145\223\255\370\271\005\301\075\370\067\201\126\303\240  
\376\005\354\340\224\026\072\043\026\004\332\246\012\223\205\162  
\155\141\073\241\215\105\326\343\177\276\025\275\066\204\010\366  
\013\203\153\046\252\242\275\340\260\347\252\340\256\147\304\323  
\202\245\014\251\244\360\063\171\015\120\077\360\357\220\075\044  
\271\177\322\040\154\352\227\363\277\234\334\107\336\011\141\275  
\224\171\225\132\002\166\065\140\304\107\042\015\367\166\143\003  
\323\306\373\203\306\135\253\255\355\151\045\053\003\133\115\045  
\000\101\343\214\207\027\122\250\340\005\053\103\115\024\023\312  
\347\077\103\042\274\067\244\165\361\366\277\072\357\062\036\256  
\356\130\206\220\162\272\004\254\100\110\357\134\304\170\247\251  
\217\047\132\313\172\354\130\362\302\010\130\220\155\115\003\205  
\171\161\025\005\016\116\076\371\337\017\005\367\137\024\110\126  
\041\015\063\222\261\254\214\345\030\376\277\017\356\340\004\252  
\275\041\362\130\266\134\211\012\213\030\011\042\032\263\065\306  
\146\302\365\063\025\231\200\340\010\371\226\057\023\214\356\332  
\267\210\304\351\067\265\327\152\327\072\204\115\253\160\214\323

\116\024\125\240\242\020\374\144\332\147\350\361\313\063\335\311  
\232\212\217\226\057\130\201\331\370\232\000\103\314\220\373\125  
\166\373\206\343\067\001\050\014\157\364\351\131\115\025\167\121  
\102\112\314\064\270\200\103\120\201\357\127\245\023\333\247\224  
\171\017\113\312\176\027\175\257\243\041\144\350\161\125\126\217  
\006\260\107\354\131\017\135\160\133\054\026\102\360\206\236\165  
\336\153\115\110\230\204\342\127\030\266\234\202\231\145\072\213  
\200\170\127\014\111\002\003\001\000\001\243\201\217\060\201\214  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\035\006\003\125\035\016\004\026\004\024\135\263\200\224  
\033\345\206\277\150\272\024\064\244\366\356\155\362\335\337\347  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\112\006\003\125\035\037\004\103\060\101\060\077\240\075\240  
\073\206\071\150\164\164\160\072\057\057\143\162\154\056\144\055  
\164\162\165\163\164\056\156\145\164\057\143\162\154\057\144\055  
\164\162\165\163\164\137\163\142\162\137\162\157\157\164\137\143  
\141\137\062\137\062\060\062\062\056\143\162\154\060\015\006\011  
\052\206\110\206\367\015\001\001\015\005\000\003\202\002\001\000  
\064\124\056\130\030\126\315\112\275\227\323\365\175\053\334\257  
\017\121\341\115\274\041\113\223\364\000\104\023\007\020\013\045  
\030\076\110\131\226\367\241\341\223\220\170\146\032\075\043\353  
\042\253\001\246\216\014\121\063\346\155\214\061\356\254\244\001  
\160\071\110\336\307\146\054\153\015\313\163\237\207\222\351\076  
\107\037\270\357\057\356\267\126\214\110\211\360\070\247\025\071  
\262\356\300\077\027\244\163\002\010\234\274\006\212\244\302\267  
\141\141\371\303\333\304\320\172\174\141\336\261\130\221\365\335  
\145\114\057\013\370\353\075\265\355\212\276\167\034\272\131\002  
\022\146\161\345\230\047\316\016\075\257\121\242\105\371\202\373  
\132\245\224\160\367\213\204\303\114\145\045\233\173\342\037\060  
\160\263\100\216\072\356\275\364\347\150\305\235\311\051\107\161  
\016\223\310\265\110\116\365\146\273\007\210\161\151\153\173\110  
\216\157\360\021\304\264\311\160\024\230\040\275\355\247\352\001  
\332\156\245\233\022\376\076\104\060\263\360\353\165\122\300\364  
\303\372\167\046\244\167\202\055\157\363\050\036\116\225\360\060  
\367\211\370\054\242\120\133\362\276\062\176\154\124\333\162\311  
\052\132\340\034\266\013\330\122\232\131\241\343\260\001\047\305  
\240\026\120\146\334\353\256\155\364\233\133\075\204\155\133\207  
\347\251\211\273\156\270\340\233\123\211\300\377\056\100\032\211  
\104\056\030\103\147\070\344\174\162\137\331\243\051\045\101\101  
\075\034\167\033\144\250\303\125\356\143\161\146\142\203\364\177  
\046\231\240\124\073\241\022\155\160\142\316\323\371\270\275\042  
\374\324\232\324\273\342\070\026\057\267\175\071\302\260\251\003  
\351\234\317\176\030\215\166\334\137\021\273\353\102\354\120\011  
\076\134\354\220\061\330\032\162\272\077\151\007\356\230\064\302  
\064\244\326\332\023\326\251\204\362\000\206\300\124\272\036\021  
\260\342\271\304\007\264\221\347\252\346\061\126\157\261\104\304  
\052\142\274\311\260\145\234\064\374\014\032\123\337\041\027\273  
\302\155\241\012\346\361\260\252\104\011\120\111\070\172\135\161

```
\342\061\056\031\260\337\225\102\004\175\204\210\316\012\043\147
\153\070\235\026\336\006\376\050\160\070\245\132\256\374\203\355
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE
```

```
Trust for "D-Trust SBR Root CA 2 2022"
Issuer: CN=D-Trust SBR Root CA 2 2022,O=D-Trust GmbH,C=DE
Serial Number:54:d5:a3:95:1e:3d:95:ba:72:1b:9a:d0:31:21:4a:ba
Subject: CN=D-Trust SBR Root CA 2 2022,O=D-Trust GmbH,C=DE
Not Valid Before: Thu Jul 07 07:30:00 2022
Not Valid After : Tue Jul 07 07:29:59 2037
Fingerprint (SHA-256):
DB:A8:4D:D7:EF:62:2D:48:54:63:A9:01:37:EA:4D:57:4D:F8:55:09:28:F6:AF:A0:3B:4D:8B:11:41:E6:36:CC
Fingerprint (SHA1): 27:FF:63:B9:EF:34:29:31:03:38:1A:D8:60:60:DA:CC:60:28:35:E1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "D-Trust SBR Root CA 2 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\047\377\143\271\357\064\051\061\003\070\032\330\140\140\332\314
\140\050\065\341
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\220\361\364\053\074\247\312\112\210\073\005\053\010\124\205\336
END
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\062\040\062\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\124\325\243\225\036\075\225\272\162\033\232\320\061\041
\112\272
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
Certificate "Telekom Security SMIME ECC Root 2021"
```

```
#
Issuer: CN=Telekom
Security SMIME ECC Root 2021,O=Deutsche Telekom Security GmbH,C=DE
Serial Number:15:2a:dd:14:c9:18:d1:a4:56:40:86:a6:25:af:07:5f
Subject: CN=Telekom Security SMIME ECC Root 2021,O=Deutsche Telekom Security GmbH,C=DE
Not Valid Before: Thu Mar 18 11:08:30 2021
Not Valid After : Sat Mar 17 23:59:59 2046
Fingerprint (SHA-256):
3A:E6:DF:7E:0D:63:7A:65:A8:C8:16:12:EC:6F:9A:14:2F:85:A1:68:34:C1:02:80:D8:8E:70:70:28:51:87:55
Fingerprint (SHA1): B7:F9:1D:98:EC:25:93:F3:50:14:84:9A:A8:7E:22:10:3C:C4:39:27
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security SMIME ECC Root 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\105\103\103\040\122\157
\157\164\040\062\060\062\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\105\103\103\040\122\157
\157\164\040\062\060\062\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\052\335\024\311\030\321\244\126\100\206\246\045\257
\007\137
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\107\060\202\001\315\240\003\002\001\002\002\020\025
\052\335\024\311\030\321\244\126\100\206\246\045\257\007\137\060
\012\006\010\052\206\110\316\075\004\003\003\060\145\061\013\060
\011\006\003\125\004\006\023\002\104\105\061\047\060\045\006\003
\125\004\012\014\036\104\145\165\164\163\143\150\145\040\124\145
\154\145\153\157\155\040\123\145\143\165\162\151\164\171\040\107
\155\142\110\061\055\060\053\006\003\125\004\003\014\044\124\145
```

\154\145\153\157\155\040\123\145\143\165\162\151\164\171\040\123  
\115\111\115\105\040\105\103\103\040\122\157\157\164\040\062\060  
\062\061\060\036\027\015\062\061\060\063\061\070\061\061\060\070  
\063\060\132\027\015\064\066\060\063\061\067\062\063\065\071\065  
\071\132\060\145\061\013\060\011\006\003\125\004\006\023\002\104  
\105\061\047\060\045\006\003\125\004\012\014\036\104\145\165\164  
\163\143\150\145\040\124\145\154\145\153\157\155\040\123\145\143  
\165\162\151\164\171\040\107\155\142\110\061\055\060\053\006\003  
\125\004\003\014\044\124\145\154\145\153\157\155\040\123\145\143  
\165\162\151\164\171\040\123\115\111\115\105\040\105\103\103\040  
\122\157\157\164\040\062\060\062\061\060\166\060\020\006\007\052  
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000  
\004\260\031\217\242\153\265\307\315\017\060\231\067\014\303\140  
\133\361\361\047\040\125\075\300\222\213\253\127\241\157\163\203  
\041\302\103\023\014\136\211\252\307\005\065\171\223\142\220\326  
\135\023\037\321\172\240\274\236\020\247\146\174\106\012\260\127  
\154\277\346\124\071\070\041\154\022\134\161\314\323\132\137\155  
\267\247\206\337\263\337\356\302\347\211\101\226\065\366\057\112  
\265\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024  
\053\313\001\014\143\303\123\022\245\250\127\257\320\234\203\373  
\275\220\072\113\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\012\006\010\052\206\110\316\075\004\003  
\003\003\150\000\060\145\002\061\000\326\274\110\222\207\107\003  
\307\160\073\045\266\037\256\106\147\163\164\000\047\113\344\245  
\004\242\003\337\136\050\255\156\136\003\310\335\150\234\266\277  
\224\020\110\225\057\017\377\030\213\002\060\001\100\063\236\227  
\227\115\005\362\164\124\014\315\071\375\152\153\011\301\044\077  
\141\216\070\241\267\350\327\104\025\021\142\377\016\141\067\107  
\113\100\177\112\137\262\147\132\163\165\302

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Telekom Security SMIME ECC Root 2021"

# Issuer: CN=Telekom Security SMIME ECC Root 2021,O=Deutsche Telekom Security GmbH,C=DE

# Serial Number:15:2a:dd:14:c9:18:d1:a4:56:40:86:a6:25:af:07:5f

# Subject: CN=Telekom Security SMIME ECC Root 2021,O=Deutsche Telekom Security GmbH,C=DE

# Not Valid Before: Thu Mar 18 11:08:30 2021

# Not Valid After : Sat Mar 17 23:59:59 2046

# Fingerprint (SHA-256):

3A:E6:DF:7E:0D:63:7A:65:A8:C8:16:12:EC:6F:9A:14:2F:85:A1:68:34:C1:02:80:D8:8E:70:70:28:51:87:55

# Fingerprint (SHA1): B7:F9:1D:98:EC:25:93:F3:50:14:84:9A:A8:7E:22:10:3C:C4:39:27

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE

```

CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security SMIME ECC Root 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\267\371\035\230\354\045\223\363\120\024\204\232\250\176\042\020
\074\304\071\047
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\165\275\136\355\174\015\146\076\007\244\233\274\002\007\330\264
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\105\103\103\040\122\157
\157\164\040\062\060\062\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\052\335\024\311\030\321\244\126\100\206\246\045\257
\007\137
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Telekom Security TLS ECC Root 2020"
#
Issuer: CN=Telekom Security TLS ECC Root 2020,O=Deutsche Telekom Security GmbH,C=DE
Serial Number:36:3a:96:8c:c9:5c:b2:58:cd:d0:01:5d:c5:e5:57:00
Subject: CN=Telekom Security TLS ECC Root 2020,O=Deutsche Telekom Security GmbH,C=DE
Not Valid Before: Tue Aug 25 07:48:20 2020
Not Valid After : Fri Aug 25 23:59:59 2045
Fingerprint (SHA-256):
57:8A:F4:DE:D0:85:3F:4E:59:98:DB:4A:EA:F9:CB:EA:8D:94:5F:60:B6:20:A3:8D:1A:3C:13:B2:BC:7B:A8:E1
Fingerprint (SHA1): C0:F8:96:C5:A9:3B:01:06:21:07:DA:18:42:48:BC:E9:9D:88:D5:EC
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security TLS ECC Root 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061

```

\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143  
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162  
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004  
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162  
\151\164\171\040\124\114\123\040\105\103\103\040\122\157\157\164  
\040\062\060\062\060

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143  
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162  
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004  
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162  
\151\164\171\040\124\114\123\040\105\103\103\040\122\157\157\164  
\040\062\060\062\060

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\066\072\226\214\311\134\262\130\315\320\001\135\305\345  
\127\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\102\060\202\001\311\240\003\002\001\002\002\020\066  
\072\226\214\311\134\262\130\315\320\001\135\305\345\127\000\060  
\012\006\010\052\206\110\316\075\004\003\003\060\143\061\013\060  
\011\006\003\125\004\006\023\002\104\105\061\047\060\045\006\003  
\125\004\012\014\036\104\145\165\164\163\143\150\145\040\124\145  
\154\145\153\157\155\040\123\145\143\165\162\151\164\171\040\107  
\155\142\110\061\053\060\051\006\003\125\004\003\014\042\124\145  
\154\145\153\157\155\040\123\145\143\165\162\151\164\171\040\124  
\114\123\040\105\103\103\040\122\157\157\164\040\062\060\062\060  
\060\036\027\015\062\060\060\070\062\065\060\067\064\070\062\060  
\132\027\015\064\065\060\070\062\065\062\063\065\071\065\071\132  
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143  
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162  
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004  
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162  
\151\164\171\040\124\114\123\040\105\103\103\040\122\157\157\164  
\040\062\060\062\060\060\166\060\020\006\007\052\206\110\316\075  
\002\001\006\005\053\201\004\000\042\003\142\000\004\316\277\376  
\127\250\277\325\252\367\020\232\315\274\321\021\242\275\147\102  
\314\220\353\025\030\220\331\242\315\014\052\045\353\076\117\316  
\265\322\217\017\363\065\332\103\213\002\200\276\157\121\044\035  
\017\153\053\312\237\302\157\120\062\345\067\040\266\040\377\210  
\015\017\155\111\273\333\006\244\207\220\222\224\364\011\320\317  
\177\310\200\013\301\227\263\273\065\047\311\302\033\243\102\060

```
\100\060\035\006\003\125\035\016\004\026\004\024\343\162\314\156
\225\231\107\261\346\263\141\114\321\313\253\343\272\315\336\237
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\012\006\010\052\206\110\316\075\004\003\003\003\147\000
\060\144\002\060\165\122\213\267\244\020\117\256\112\020\213\262
\204\133\102\341\346\052\066\002\332\240\156\031\077\045\277\332
\131\062\216\344\373\220\334\223\144\316\255\264\101\107\140\342
\317\247\313\036\002\060\067\101\214\146\337\101\153\326\203\000
\101\375\057\132\367\120\264\147\321\054\250\161\327\103\312\234
\047\044\221\203\110\015\317\315\367\124\201\257\354\177\344\147
\333\270\220\356\335\045
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Telekom Security TLS ECC Root 2020"

# Issuer: CN=Telekom Security TLS ECC Root 2020,O=Deutsche Telekom Security GmbH,C=DE

# Serial Number:36:3a:96:8c:c9:5c:b2:58:cd:d0:01:5d:c5:e5:57:00

# Subject: CN=Telekom Security TLS ECC Root 2020,O=Deutsche Telekom Security GmbH,C=DE

# Not Valid Before: Tue Aug 25 07:48:20 2020

# Not Valid After : Fri Aug 25 23:59:59 2045

# Fingerprint (SHA-256):

57:8A:F4:DE:D0:85:3F:4E:59:98:DB:4A:EA:F9:CB:EA:8D:94:5F:60:B6:20:A3:8D:1A:3C:13:B2:BC:7B:A8:E1

# Fingerprint (SHA1):

C0:F8:96:C5:A9:3B:01:06:21:07:DA:18:42:48:BC:E9:9D:88:D5:EC

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Telekom Security TLS ECC Root 2020"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\300\370\226\305\251\073\001\006\041\007\332\030\102\110\274\351
\235\210\325\354
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\301\253\376\152\020\054\003\215\274\034\042\062\300\205\247\375
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\105\103\103\040\122\157\157\164
\040\062\060\062\060
```



```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\066\072\226\214\311\134\262\130\315\320\001\135\305\345
\127\000
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Certificate "Telekom Security SMIME RSA Root 2023"
#
Issuer: CN=Telekom Security SMIME RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
Serial Number:0c:7e:62:f5:79:73:3b:9d:43:8e:8b:63:ed:91:95:b8
Subject: CN=Telekom Security SMIME RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
Not Valid Before: Tue Mar 28 12:09:22 2023
Not Valid After : Fri Mar 27 23:59:59 2048
Fingerprint (SHA-256):
78:A6:56:34:4F:94:7E:9C:C0:F7:34:D9:05:3D:32:F6:74:20:86:B6:B9:CD:2C:AE:4F:AE:1A:2E:4E:FD:E0:48
Fingerprint (SHA1): 89:3F:6F:1C:E2:4D:7F:FB:C3:D3:14:7A:05:80:A7:DE:E1:0A:5E:4D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security
SMIME RSA Root 2023"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\122\123\101\040\122\157
\157\164\040\062\060\062\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\122\123\101\040\122\157
\157\164\040\062\060\062\063
END

```

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\014\176\142\365\171\163\073\235\103\216\213\143\355\221  
\225\270

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\267\060\202\003\237\240\003\002\001\002\002\020\014  
\176\142\365\171\163\073\235\103\216\213\143\355\221\225\270\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\145  
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\047\060  
\045\006\003\125\004\012\014\036\104\145\165\164\163\143\150\145  
\040\124\145\154\145\153\157\155\040\123\145\143\165\162\151\164  
\171\040\107\155\142\110\061\055\060\053\006\003\125\004\003\014  
\044\124\145\154\145\153\157\155\040\123\145\143\165\162\151\164  
\171\040\123\115\111\115\105\040\122\123\101\040\122\157\157\164  
\040\062\060\062\063\060\036\027\015\062\063\060\063\062\070\061  
\062\060\071\062\062\132\027\015\064\070\060\063\062\067\062\063  
\065\071\065\071\132\060\145\061\013\060\011\006\003\125\004\006  
\023\002\104\105\061\047\060\045\006\003\125\004\012\014\036\104  
\145\165\164\163\143\150\145\040\124\145\154\145\153\157\155\040  
\123\145\143\165\162\151\164\171\040\107\155\142\110\061\055\060  
\053\006\003\125\004\003\014\044\124\145\154\145\153\157\155\040  
\123\145\143\165\162\151\164\171\040\123\115\111\115\105\040\122  
\123\101\040\122\157\157\164\040\062\060\062\063\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\357\305\016  
\213\276\062\322\147\107\377\012\114\147\263\052\277\310\303\305  
\221\353\265\307\036\221\341\146\250\210\213\125\040\200\037\121  
\136\167\227\236\031\012\134\307\153\067\041\174\003\066\001\364  
\210\045\331\250\056\101\252\374\330\046\340\226\100\142\171\256  
\127\236\003\070\032\034\262\167\024\076\351\241\162\320\344\340  
\067\321\027\106\355\120\134\172\130\305\370\053\367\165\057\317  
\201\236\132\054\267\072\254\240\131\230\004\121\014\377\111\305  
\120\375\036\323\107\205\113\063\117\242\067\265\257\004\232\047  
\062\235\126\325\077\125\141\343\213\157\256\121\376\227\376\151  
\007\372\142\133\046\346\024\171\025\245\023\070\256\137\067\276  
\224\112\326\015\200\026\151\244\221\262\072\111\230\165\235\106  
\020\212\134\172\177\204\245\350\257\036\307\253\263\132\106\265  
\243\113\365\246\043\066\000\106\261\333\005\266\033\316\236\172  
\062\134\232\325\162\303\235\206\115\053\204\323\036\265\210\332  
\020\170\234\042\303\073\043\265\353\023\007\275\157\123\354\233  
\354\233\323\145\365\007\011\343\135\247\231\265\176\206\216\325  
\002\377\267\205\011\343\107\024\335\226\146\030\064\336\010\325  
\337\313\030\231\142\013\053\354\000\135\122\104\323\306\226\374  
\062\126\045\221\317\315\031\073\225\071\076\002\207\231\143\266  
\325\076\064\172\017\021\165\201\274\175\004\312\140\264\050\165  
\327\002\121\335\122\000\056\307\375\211\361\134\363\313\244\047  
\022\070\217\273\373\211\360\344\304\070\054\276\202\240\161\141

\142\221\217\110\014\057\053\251\260\361\313\020\004\347\164\277  
\067\220\357\117\052\103\065\227\022\306\052\160\015\336\054\125  
\107\171\143\051\365\312\037\152\006\122\034\256\055\044\042\203  
\042\257\320\252\060\267\052\037\377\145\043\130\145\223\310\216  
\175\100\020\061\206\170\331\125\313\074\060\360\336\121\052\000  
\066\322\047\105\137\330\350\241\041\075\176\106\126\073\051\105  
\361\035\005\011\316\266\103\060\334\105\220\020\060\114\244\153  
\206\213\077\075\057\061\221\161\357\046\271\366\276\235\260\154  
\337\021\356\130\077\103\171\206\071\200\361\046\027\007\230\360  
\231\252\060\054\103\131\024\316\355\342\100\023\205\002\003\001  
\000\001\243\143\060\141\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004  
\024\232\316\254\052\354\001\372\145\160\336\227\235\361\322\000  
\214\245\243\144\273\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\037\006\003\125\035\043\004\030\060  
\026\200\024\232\316\254\052\354\001\372\145\160\336\227\235\361  
\322\000\214\245\243\144\273\060\015\006\011\052\206\110\206\367  
\015\001\001\014\005\000\003\202\002\001\000\343\120\375\365\100  
\026\042\011\226\072\015\251\357\201\347\056\062\360\241\361\111  
\136\173\210\015\004\162\327\276\147\250\272\035\356\120\273\162  
\156\172\321\273\014\162\060\106\310\325\327\002\022\026\231\116  
\036\337\132\226\356\217\221\276\256\206\370\020\167\245\304\156  
\107\141\300\362\046\331\117\141\150\005\110\165\010\025\245\241  
\173\325\270\263\211\171\346\355\361\363\141\000\206\173\056\061  
\376\243\134\370\171\075\264\133\210\173\340\043\273\015\241\027  
\372\313\150\015\230\167\161\010\342\155\103\164\153\304\066\305  
\224\101\244\000\326\127\055\231\212\213\040\022\025\002\062\016  
\322\111\354\201\110\305\152\047\122\327\262\163\125\123\226\074  
\236\117\114\265\240\320\117\127\320\147\050\110\144\276\306\270  
\272\354\144\317\310\173\305\152\347\052\346\131\127\266\326\324  
\326\300\147\134\331\236\050\011\100\277\363\251\065\061\145\140  
\003\313\031\154\202\225\003\036\137\077\341\275\352\111\161\345  
\133\267\013\107\026\033\040\211\155\224\231\014\176\210\154\035  
\015\364\267\041\032\131\227\254\313\350\276\027\037\225\174\123  
\233\257\120\122\252\215\013\056\257\132\327\140\362\052\151\052  
\271\356\124\160\030\252\275\365\241\077\322\335\241\143\031\000  
\370\247\014\353\243\171\362\160\131\243\370\242\022\003\354\023  
\377\344\002\206\066\327\301\303\244\265\324\244\302\067\105\266  
\224\160\075\305\275\353\243\025\035\343\066\172\025\151\052\126  
\064\071\317\245\232\066\252\310\355\171\274\317\366\316\004\123  
\013\332\262\120\043\174\274\076\046\255\360\016\103\273\046\313  
\256\302\100\336\067\037\012\240\121\315\143\235\266\117\330\306  
\107\174\274\330\264\355\236\213\363\021\342\250\265\076\354\256  
\160\076\176\042\273\065\110\027\140\142\024\221\060\243\166\075  
\246\121\066\213\037\015\335\152\061\034\245\355\335\226\243\156  
\162\017\023\115\252\247\251\134\170\371\003\022\030\223\067\105  
\022\211\075\370\276\312\275\331\276\014\331\030\144\247\310\101  
\076\165\202\041\070\175\145\364\240\324\023\113\007\170\051\371

\235\176\314\207\077\304\332\056\210\335\343\013\334\132\121\132

\351\331\022\117\236\002\333\367\005\045\121

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Telekom Security SMIME RSA Root 2023"

# Issuer: CN=Telekom Security SMIME RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE

# Serial Number:0c:7e:62:f5:79:73:3b:9d:43:8e:8b:63:ed:91:95:b8

# Subject: CN=Telekom Security SMIME RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE

# Not Valid Before: Tue Mar 28 12:09:22 2023

# Not Valid After : Fri Mar 27 23:59:59 2048

# Fingerprint (SHA-256):

78:A6:56:34:4F:94:7E:9C:C0:F7:34:D9:05:3D:32:F6:74:20:86:B6:B9:CD:2C:AE:4F:AE:1A:2E:4E:FD:E0:48

# Fingerprint (SHA1): 89:3F:6F:1C:E2:4D:7F:FB:C3:D3:14:7A:05:80:A7:DE:E1:0A:5E:4D

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Telekom Security SMIME RSA Root 2023"

CKA\_CERT\_SHA1\_HASH

MULTILINE\_OCTAL

\211\077\157\034\342\115\177\373\303\323\024\172\005\200\247\336

\341\012\136\115

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\353\335\044\371\050\017\243\302\303\156\012\077\320\303\015\033

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061

\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143

\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162

\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004

\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162

\151\164\171\040\123\115\111\115\105\040\122\123\101\040\122\157

\157\164\040\062\060\062\063

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\014\176\142\365\171\163\073\235\103\216\213\143\355\221

\225\270

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL

CK\_FALSE

```
#
Certificate "Telekom Security TLS RSA Root 2023"
#
Issuer: CN=Telekom Security TLS RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
Serial Number:21:9c:54:2d:e8:f6:ec:71:77:fa:4e:e8:c3:70:57:97
Subject: CN=Telekom Security TLS RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
Not Valid Before: Tue Mar 28 12:16:45 2023
Not Valid After : Fri Mar 27 23:59:59 2048
Fingerprint (SHA-256):
EF:C6:5C:AD:BB:59:AD:B6:EF:E8:4D:A2:23:11:B3:56:24:B7:1B:3B:1E:A0:DA:8B:66:55:17:4E:C8:97:86:46
Fingerprint (SHA1): 54:D3:AC:B3:BD:57:56:F6:85:9D:CE:E5:C3:21:E2:D4:AD:83:D0:93
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security TLS RSA Root 2023"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\122\123\101\040\122\157\157\164
\040\062\060\062\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\122\123\101\040\122\157\157\164
\040\062\060\062\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\041\234\124\055\350\366\354\161\167\372\116\350\303\160
\127\227
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\263\060\202\003\233\240\003\002\001\002\002\020\041
\234\124\055\350\366\354\161\167\372\116\350\303\160\127\227\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\143
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\047\060
```

\045\006\003\125\004\012\014\036\104\145\165\164\163\143\150\145  
\040\124\145\154\145\153\157\155\040\123\145\143\165\162\151\164  
\171\040\107\155\142\110\061\053\060\051\006\003\125\004\003\014  
\042\124\145\154\145\153\157\155\040\123\145\143\165\162\151\164  
\171\040\124\114\123\040\122\123\101\040\122\157\157\164\040\062  
\060\062\063\060\036\027\015\062\063\060\063\062\070\061\062\061  
\066\064\065\132\027\015\064\070\060\063\062\067\062\063\065\071  
\065\071\132\060\143\061\013\060\011\006\003\125\004\006\023\002  
\104\105\061\047\060\045\006\003\125\004\012\014\036\104\145\165  
\164\163\143\150\145\040\124\145\154\145\153\157\155\040\123\145  
\143\165\162\151\164\171\040\107\155\142\110\061\053\060\051\006  
\003\125\004\003\014\042\124\145\154\145\153\157\155\040\123\145  
\143\165\162\151\164\171\040\124\114\123\040\122\123\101\040\122  
\157\157\164\040\062\060\062\063\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\355\065\241\201\200\363\313  
\112\151\133\302\373\121\203\256\046\375\341\156\363\201\022\175  
\161\100\377\207\165\102\051\041\355\201\122\054\337\022\301\031  
\204\211\301\275\305\050\325\325\113\154\104\326\114\333\007\226  
\112\125\172\312\066\202\004\066\250\245\374\047\366\111\361\325  
\162\236\221\371\043\326\160\173\273\365\233\301\354\223\317\031  
\352\145\176\210\160\240\163\374\366\377\265\126\142\341\163\152  
\064\230\076\202\270\254\225\123\364\001\240\047\007\162\243\000  
\123\240\344\262\253\203\070\127\063\045\224\237\276\110\035\230  
\341\243\272\236\134\315\004\161\121\175\165\170\253\363\131\252  
\304\340\140\276\217\203\122\270\165\032\101\065\355\274\363\072  
\143\351\251\024\105\327\346\122\321\156\322\336\274\343\365\013  
\073\346\340\304\275\103\144\023\246\316\364\230\067\154\212\225  
\250\227\310\107\017\360\136\020\213\347\035\034\376\261\073\240  
\005\063\150\005\101\202\301\003\053\001\310\347\217\115\253\350  
\265\366\315\153\104\265\347\335\213\354\352\045\264\000\042\127  
\115\260\261\262\061\301\026\316\377\375\024\204\267\107\372\262  
\361\160\336\333\213\154\066\130\244\174\263\021\321\303\167\177  
\137\266\045\340\015\305\322\263\371\270\270\167\333\067\161\161  
\107\343\140\030\117\044\266\165\067\170\271\243\142\257\275\311  
\162\216\057\314\273\256\333\344\025\122\031\007\063\373\152\267  
\055\113\220\050\202\163\376\030\213\065\215\333\247\004\152\276  
\352\301\115\066\073\026\066\221\062\357\266\100\211\221\103\340  
\362\242\253\004\056\346\362\114\016\026\064\040\254\207\301\055  
\176\311\146\107\027\024\021\244\363\367\241\044\211\253\330\032  
\310\241\134\261\243\367\214\155\310\001\311\117\311\354\304\374  
\254\121\063\321\310\203\321\311\237\035\324\107\064\051\076\313  
\260\016\372\203\013\050\130\345\051\334\077\174\250\237\311\266  
\012\273\246\350\106\026\017\226\345\173\344\152\172\110\155\166  
\230\005\245\334\155\036\102\036\102\332\032\340\122\367\265\203  
\300\032\173\170\065\054\070\365\037\375\111\243\056\322\131\143  
\277\200\260\214\223\163\313\065\246\231\225\042\141\145\003\140  
\373\057\223\113\372\232\234\200\073\002\003\001\000\001\243\143

\060\141\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\006\060\035\006\003\125\035\016\004\026\004\024\266\247\227  
\202\075\164\205\233\367\074\237\223\232\225\171\165\122\214\155  
\107\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024\266  
\247\227\202\075\164\205\233\367\074\237\223\232\225\171\165\122  
\214\155\107\060\015\006\011\052\206\110\206\367\015\001\001\014  
\005\000\003\202\002\001\000\250\314\141\246\276\165\236\025\120  
\244\153\373\250\160\105\174\272\176\261\132\374\133\043\372\012  
\167\370\230\161\202\014\155\340\136\106\252\223\364\036\240\303  
\341\223\333\113\255\262\246\135\253\260\324\142\313\136\273\146  
\365\055\356\227\100\074\142\353\136\326\024\326\214\342\226\213  
\101\151\223\065\346\271\231\153\142\264\241\027\146\064\246\153  
\143\306\271\116\362\042\351\130\015\126\101\321\372\014\112\360  
\063\315\073\273\155\041\072\256\216\162\265\303\112\373\351\175  
\345\261\233\206\356\342\340\175\264\367\062\375\042\204\361\205  
\311\067\171\351\265\077\277\134\344\164\262\217\021\142\000\335  
\030\146\241\331\173\043\137\361\216\325\147\350\124\332\133\072  
\153\066\157\371\201\261\063\107\063\167\100\371\122\252\335\324  
\203\317\205\170\231\232\223\271\163\147\102\106\021\041\352\376  
\012\251\033\032\145\151\263\217\256\026\266\366\113\126\262\055  
\371\245\310\354\073\142\243\355\153\320\116\325\100\011\244\037  
\230\327\072\245\222\131\040\344\260\175\315\133\163\150\275\155  
\304\242\023\016\147\031\270\215\102\176\154\014\232\156\240\044  
\055\325\105\033\334\304\002\024\376\205\133\145\227\312\116\220  
\120\010\172\102\065\371\352\302\146\324\370\001\256\036\264\276  
\303\250\357\376\166\232\242\246\037\106\366\204\355\374\333\316  
\304\002\316\167\110\054\214\262\354\303\000\243\354\054\125\030  
\301\176\031\356\341\057\362\255\203\233\236\253\031\337\306\212  
\057\214\167\345\267\005\354\073\301\354\276\206\263\206\274\300  
\367\334\347\352\133\256\262\314\265\065\206\113\320\342\077\266  
\330\370\016\000\356\135\343\367\215\130\377\317\213\067\351\143  
\137\156\367\011\161\066\302\022\135\127\362\310\264\315\363\356  
\002\337\021\334\152\271\127\204\035\131\115\214\316\310\016\043  
\302\267\046\232\020\024\161\376\223\262\212\270\200\360\016\020  
\236\323\250\120\014\067\202\057\352\340\212\235\341\054\071\377  
\265\264\163\000\344\367\110\246\163\254\277\262\336\167\004\207  
\264\243\315\233\065\044\067\372\220\223\023\201\102\306\230\046  
\165\067\146\101\020\254\273\365\224\343\302\061\053\255\347\043  
\126\314\065\045\222\263\120

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "Telekom Security TLS RSA Root

2023"

# Issuer: CN=Telekom Security TLS RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE

# Serial Number:21:9c:54:2d:e8:f6:ec:71:77:fa:4e:e8:c3:70:57:97

# Subject: CN=Telekom Security TLS RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE

# Not Valid Before: Tue Mar 28 12:16:45 2023

# Not Valid After : Fri Mar 27 23:59:59 2048

# Fingerprint (SHA-256):

EF:C6:5C:AD:BB:59:AD:B6:EF:E8:4D:A2:23:11:B3:56:24:B7:1B:3B:1E:A0:DA:8B:66:55:17:4E:C8:97:86:46

# Fingerprint (SHA1): 54:D3:AC:B3:BD:57:56:F6:85:9D:CE:E5:C3:21:E2:D4:AD:83:D0:93

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Telekom Security TLS RSA Root 2023"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\124\323\254\263\275\127\126\366\205\235\316\345\303\041\342\324

\255\203\320\223

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\277\133\353\124\100\315\110\161\304\040\215\175\336\012\102\362

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061

\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143

\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162

\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004

\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162

\151\164\171\040\124\114\123\040\122\123\101\040\122\157\157\164

\040\062\060\062\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\041\234\124\055\350\366\354\161\167\372\116\350\303\160

\127\227

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

#

# Certificate "FIRMAPROFESIONAL CA ROOT-A WEB"

#

# Issuer: CN=FIRMAPROFESIONAL CA ROOT-A WEB,OID.2.5.4.97=VATES-A62634068,O=Firmaprofesional SA,C=ES

# Serial Number:31:97:21:ed:af:89:42:7f:35:41:87:a1:67:56:4c:6d

# Subject: CN=FIRMAPROFESIONAL CA ROOT-A WEB,OID.2.5.4.97=VATES-

A62634068,O=Firmaprofesional



SA,C=ES

# Not Valid Before: Wed Apr 06 09:01:36 2022

# Not Valid After : Sun Mar 31 09:01:36 2047

# Fingerprint (SHA-256):

BE:F2:56:DA:F2:6E:9C:69:BD:EC:16:02:35:97:98:F3:CA:F7:18:21:A0:3E:01:82:57:C5:3C:65:61:7F:3D:4A

# Fingerprint (SHA1): A8:31:11:74:A6:14:15:0D:CA:77:DD:0E:E4:0C:5D:58:FC:A0:72:A5

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "FIRMAPROFESIONAL CA ROOT-A WEB"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\156\061\013\060\011\006\003\125\004\006\023\002\105\123\061  
\034\060\032\006\003\125\004\012\014\023\106\151\162\155\141\160  
\162\157\146\145\163\151\157\156\141\154\040\123\101\061\030\060  
\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101\066  
\062\066\063\064\060\066\070\061\047\060\045\006\003\125\004\003  
\014\036\106\111\122\115\101\120\122\117\106\105\123\111\117\116  
\101\114\040\103\101\040\122\117\117\124\055\101\040\127\105\102  
END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\156\061\013\060\011\006\003\125\004\006\023\002\105\123\061  
\034\060\032\006\003\125\004\012\014\023\106\151\162\155\141\160  
\162\157\146\145\163\151\157\156\141\154\040\123\101\061\030\060  
\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101\066  
\062\066\063\064\060\066\070\061\047\060\045\006\003\125\004\003  
\014\036\106\111\122\115\101\120\122\117\106\105\123\111\117\116  
\101\114\040\103\101\040\122\117\117\124\055\101\040\127\105\102  
END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\061\227\041\355\257\211\102\177\065\101\207\241\147\126  
\114\155

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\172\060\202\002\000\240\003\002\001\002\002\020\061  
\227\041\355\257\211\102\177\065\101\207\241\147\126\114\155\060  
\012\006\010\052\206\110\316\075\004\003\003\060\156\061\013\060  
\011\006\003\125\004\006\023\002\105\123\061\034\060\032\006\003  
\125\004\012\014\023\106\151\162\155\141\160\162\157\146\145\163  
\151\157\156\141\154\040\123\101\061\030\060\026\006\003\125\004  
\141\014\017\126\101\124\105\123\055\101\066\062\066\063\064\060  
\066\070\061\047\060\045\006\003\125\004\003\014\036\106\111\122  
\115\101\120\122\117\106\105\123\111\117\116\101\114\040\103\101  
\040\122\117\117\124\055\101\040\127\105\102\060\036\027\015\062  
\062\060\064\060\066\060\071\060\061\063\066\132\027\015\064\067

\060\063\063\061\060\071\060\061\063\066\132\060\156\061\013\060  
\011\006\003\125\004\006\023\002\105\123\061\034\060\032\006\003  
\125\004\012\014\023\106\151\162\155\141\160\162\157\146\145\163  
\151\157\156\141\154\040\123\101\061\030\060\026\006\003\125\004  
\141\014\017\126\101\124\105\123\055\101\066\062\066\063\064\060  
\066\070\061\047\060\045\006\003\125\004\003\014\036\106\111\122  
\115\101\120\122\117\106\105\123\111\117\116\101\114\040\103\101  
\040\122\117\117\124\055\101\040\127\105\102\060\166\060\020\006  
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003  
\142\000\004\107\123\352\054\021\244\167\307\052\352\363\326\137  
\173\323\004\221\134\372\210\306\042\271\203\020\142\167\204\063  
\055\351\003\210\324\340\063\367\355\167\054\112\140\352\344\157  
\255\155\264\370\114\212\244\344\037\312\352\117\070\112\056\202  
\163\053\307\146\233\012\214\100\234\174\212\366\362\071\140\262  
\336\313\354\270\344\157\352\233\135\267\123\220\030\062\125\305  
\040\267\224\243\143\060\141\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043\004  
\030\060\026\200\024\223\341\103\143\134\074\235\326\047\363\122  
\354\027\262\251\257\054\367\166\370\060\035\006\003\125\035\016  
\004\026\004\024\223\341\103\143\134\074\235\326\047\363\122\354  
\027\262\251\257\054\367\166\370\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\012\006\010\052\206\110\316  
\075\004\003\003\003\150\000\060\145\002\060\035\174\244\173\303  
\211\165\063\341\073\251\105\277\106\351\351\241\335\311\042\026  
\267\107\021\013\330\232\272\361\310\013\160\120\123\002\221\160  
\205\131\251\036\244\346\352\043\061\240\000\002\061\000\375\342  
\370\263\257\026\271\036\163\304\226\343\301\060\031\330\176\346  
\303\227\336\034\117\270\211\057\063\353\110\017\031\367\207\106  
\135\046\220\245\205\305\271\172\224\076\207\250\275\000

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_TRUE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Trust for "FIRMAPROFESIONAL CA ROOT-A WEB"

# Issuer: CN=FIRMAPROFESIONAL CA ROOT-A WEB,OID.2.5.4.97=VATES-A62634068,O=Firmaprofesional SA,C=ES

# Serial Number:31:97:21:ed:af:89:42:7f:35:41:87:a1:67:56:4c:6d

# Subject: CN=FIRMAPROFESIONAL CA ROOT-A WEB,OID.2.5.4.97=VATES-A62634068,O=Firmaprofesional SA,C=ES

# Not Valid Before: Wed Apr 06 09:01:36 2022

# Not Valid After : Sun Mar 31 09:01:36 2047

# Fingerprint (SHA-256):

BE:F2:56:DA:F2:6E:9C:69:BD:EC:16:02:35:97:98:F3:CA:F7:18:21:A0:3E:01:82:57:C5:3C:65:61:7F:3D:4A

# Fingerprint (SHA1): A8:31:11:74:A6:14:15:0D:CA:77:DD:0E:E4:0C:5D:58:FC:A0:72:A5

CKA\_CLASS

```

CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "FIRMAPROFESIONAL CA ROOT-A WEB"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\250\061\021\164\246\024\025\015\312\167\335\016\344\014\135\130
\374\240\162\245
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\202\262\255\105\000\202\260\146\143\370\137\303\147\116\316\243
END
CKA_ISSUER MULTILINE_OCTAL
\060\156\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\034\060\032\006\003\125\004\012\014\023\106\151\162\155\141\160
\162\157\146\145\163\151\157\156\141\154\040\123\101\061\030\060
\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101\066
\062\066\063\064\060\066\070\061\047\060\045\006\003\125\004\003
\014\036\106\111\122\115\101\120\122\117\106\105\123\111\117\116
\101\114\040\103\101\040\122\117\117\124\055\101\040\127\105\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\061\227\041\355\257\211\102\177\065\101\207\241\147\126
\114\155
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "CAEDICOM Root"
Issuer: C=ES,O=EDICOM,CN=CAEDICOM Root
Serial Number:fb:71:26:58:ad:99:e5
Subject: C=ES,O=EDICOM,CN=CAEDICOM Root
Not Valid Before: Wed May 21 11:06:35 2014
Not Valid After: Sun May 21 10:20:00 2034
Fingerprint (MD5): cd:d5:a1:fe:28:31:9c:13:be:d5:c1:e8:cf:56:f0:76
Fingerprint (SHA1): 55:9b:ba:7b:0f:fe:80:d6:d3:82:9b:1f:d0:7a:a4:d3:22:19:47:90

```

```

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CAEDICOM Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\066\061\026\060\024\006\003\125\004\003\014\015\103\101\105

```

```
\104\111\103\117\115\040\122\157\157\164\061\017\060\015\006\003
\125\004\012\014\006\105\104\111\103\117\115\061\013\060\011\006
\003\125\004\006\023\002\105\123
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\066\061\026\060\024\006\003\125\004\003\014\015\103\101\105
\104\111\103\117\115\040\122\157\157\164\061\017\060\015\006\003
\125\004\012\014\006\105\104\111\103\117\115\061\013\060\011\006
\003\125\004\006\023\002\105\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\000\373\161\046\130\255\231\345
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\121\060\202\003\071\240\003\002\001\002\002\010\000
\373\161\046\130\255\231\345\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\066\061\026\060\024\006\003\125\004
\003\014\015\103\101\105\104\111\103\117\115\040\122\157\157\164
\061\017\060\015\006\003\125\004\012\014\006\105\104\111\103\117
\115\061\013\060\011\006\003\125\004\006\023\002\105\123\060\036
\027\015\061\064\060\065\062\061\061\061\060\066\063\065\132\027
\015\063\064\060\065\062\061\061\060\062\060\060\060\132\060\066
\061\026\060\024\006\003\125\004\003\014\015\103\101\105\104\111
\103\117\115\040\122\157\157\164\061\017\060\015\006\003\125\004
\012\014\006\105\104\111\103\117\115\061\013\060\011\006\003\125
\004\006\023\002\105\123\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\333\200\312\350\111\164\307\323\070
\056\361\305\043\142\374\066\214\057\036\176\071\013\351\006\364
\125\233\245\230\051\224\355\206\107\062\203\363\305\222\172\005
\327\051\002\076\026\303\050\177\065\144\051\172\171\273\241\342
\036\141\024\215\347\000\320\334\242\124\145\212\337\151\271\161
\107\177\070\070\026\106\247\151\061\021\065\114\341\052\177\377
\155\117\225\075\343\135\110\115\031\123\010\132\153\041\325\022
\060\151\227\220\257\055\301\365\177\101\137\111\066\217\115\270
\036\032\225\137\332\017\157\134\025\065\304\021\274\137\205\233
\275\255\073\125\136\273\337\316\273\257\134\231\140\335\037\151
\032\111\110\041\371\011\012\317\162\247\360\362\336\345\170\031
\276\022\335\315\207\171\101\316\057\105\327\013\221\020\021\004
\036\022\235\362\070\003\137\026\151\256\240\012\332\300\371\353
\240\015\030\017\171\136\221\235\344\037\024\234\064\023\031\002
\104\272\121\303\356\171\262\140\024\243\257\274\110\055\050\070
\150\001\103\144\312\016\206\203\142\320\212\031\246\047\361\053
\173\113\051\041\133\232\314\150\102\020\310\113\117\017\043\262
\210\174\304\134\156\027\160\305\167\257\225\300\045\244\042\012
\323\174\371\330\162\310\320\055\275\247\350\322\055\213\114\241
```

|156|012|374|264|100|063|273|232|153|374|244|352|311|376|340|064  
|210|103|314|306|274|077|165|322|245|251|257|372|227|271|076|267  
|316|124|240|115|300|135|056|301|050|330|143|124|162|270|254|132  
|365|072|373|040|141|006|072|364|240|053|070|253|314|203|014|111  
|324|156|076|155|017|076|163|057|066|346|363|117|263|300|000|321  
|105|111|133|214|366|243|230|035|204|177|231|012|303|352|012|074  
|303|323|044|170|110|147|365|033|073|016|035|016|103|261|004|165  
|301|240|071|166|213|366|331|002|245|035|341|236|133|007|273|066  
|127|112|041|115|371|211|151|264|154|017|327|257|240|025|044|231  
|347|370|327|123|224|354|022|277|244|245|327|355|356|216|065|167  
|167|334|246|177|040|124|222|326|143|326|162|236|115|052|266|217  
|163|363|031|241|304|260|037|346|064|243|013|000|076|227|111|047  
|141|252|252|004|101|063|070|265|120|121|314|066|025|333|037|377  
|275|312|110|203|110|247|263|002|003|001|000|001|243|143|060|141  
|060|035|006|003|125|035|016|004|026|004|024|024|315|052|131|170  
|143|253|141|031|350|270|075|241|340|132|300|165|347|371|313|060  
|017|006|003|125|035|023|001|001|377|004|005|060|003|001|001|377  
|060|037|006|003|125|035|043|004|030|060|026|200|024|024|315|052  
|131|170|143|253|141|031|350|270|075|241|340|132|300|165|347|371  
|313|060|016|006|003|125|035|017|001|001|377|004|004|003|002|001  
|006|060|015|006|011|052|206|110|206|367|015|001|001|013|005|000  
|003|202|002|001|000|075|011|031|000|266|221|002|154|354|016|367  
|341|342|142|260|277|063|015|375|125|022|364|010|232|367|053|055  
|256|367|234|107|330|037|006|001|023|265|216|347|262|202|013|075  
|204|131|103|324|007|330|053|134|020|172|044|054|312|215|350|325  
|243|071|234|061|314|353|340|072|341|325|277|317|307|207|173|140  
|377|107|071|327|243|104|326|010|046|133|317|132|124|354|210|323  
|216|017|171|074|310|243|117|246|302|216|047|360|336|022|256|136  
|031|255|347|042|126|212|130|062|340|371|006|320|251|052|264|065  
|233|014|206|046|121|000|224|107|120|374|245|304|045|141|371|130  
|360|105|160|056|111|166|177|021|326|157|265|371|051|005|341|015  
|303|116|130|037|257|035|354|067|320|112|371|006|006|201|323|333  
|240|226|270|016|221|060|171|346|120|337|210|270|013|251|134|324  
|007|364|311|250|314|175|217|223|143|011|144|000|005|052|150|146  
|103|273|242|273|376|225|256|371|304|245|012|210|142|110|170|045  
|174|052|077|021|144|246|323|042|040|107|235|062|326|362|343|310  
|244|141|164|347|202|302|104|272|240|321|135|137|274|361|104|016  
|203|117|034|120|205|304|351|347|154|374|346|270|125|341|242|032  
|200|267|220|104|247|204|042|227|107|042|336|253|070|067|317|265  
|362|034|076|102|160|273|165|266|145|050|153|313|177|202|065|252  
|366|363|040|170|050|163|007|226|060|160|245|052|161|134|241|171  
|244|026|271|106|075|136|264|000|111|205|211|323|016|337|201|256  
|130|215|130|326|341|305|104|170|056|034|040|273|242|107|227|277  
|166|024|073|251|050|217|237|013|165|322|241|074|355|053|307|216  
|220|241|172|242|231|060|142|374|205|035|065|163|073|363|265|131  
|042|033|315|010|261|014|235|165|152|333|205|073|016|207|237|062  
|117|222|000|001|001|114|111|150|202|200|101|154|371|375|161|275  
|213|364|170|012|140|243|236|261|122|035|300|212|343|236|305|277

```
\053\031\152\230\247\261\336\025\120\237\252\224\045\217\251\200
\202\247\162\272\111\144\011\047\141\053\156\274\043\050\063\135
\236\156\360\271\275\040\062\214\335\240\013\231\273\264\204\004
\044\165\051\226\367\247\245\027\270\121\005\353\164\255\121\171
\226\374\273\373\337\011\055\010\222\104\316\300\322\263\030\307
\024\042\277\041\361
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CAEDICOM Root"

# Issuer: C=ES,O=EDICOM,CN=CAEDICOM Root

# Serial Number:fb:71:26:58:ad:99:e5

# Subject: C=ES,O=EDICOM,CN=CAEDICOM Root

# Not Valid Before: Wed May 21 11:06:35 2014

# Not Valid After: Sun May 21 10:20:00 2034

# Fingerprint (MD5): cd:d5:a1:fe:28:31:9c:13:be:d5:c1:e8:cf:56:f0:76

# Fingerprint (SHA1): 55:9b:ba:7b:0f:fe:80:d6:d3:82:9b:1f:d0:7a:a4:d3:22:19:47:90

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CAEDICOM Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\125\233\272\173\017\376\200\326\323\202\233\037\320\172\244\323
\042\031\107\220
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\315\325\241\376\050\061\234\023\276\325\301\350\317\126\360\166
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\066\061\026\060\024\006\003\125\004\003\014\015\103\101\105
\104\111\103\117\115\040\122\157\157\164\061\017\060\015\006\003
\125\004\012\014\006\105\104\111\103\117\115\061\013\060\011\006
\003\125\004\006\023\002\105\123
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\010\000\373\161\046\130\255\231\345
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

```

Microsoft Code Signing Only Certificate
Certificate "Symantec Enterprise Mobile Root for Microsoft"
Issuer: CN=Symantec Enterprise Mobile Root for Microsoft,O=Symantec Corporation,C=US
Serial Number:0f:6b:55:2f:9e:bf:90:7b:0f:66:29:a9:bd:f4:d8:ce
Subject: CN=Symantec Enterprise Mobile Root for Microsoft,O=Symantec Corporation,C=US
Not Valid Before: Thu Mar 15 00:00:00 2012
Not Valid
After: Sun Mar 14 23:59:59 2032
Fingerprint (MD5): 71:d0:a5:ff:2d:59:74:16:94:be:e3:7d:1e:5c:86:0b
Fingerprint (SHA1): 92:b4:6c:76:e1:30:54:e1:04:f2:30:51:7e:6e:50:4d:43:ab:10:b5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Enterprise Mobile Root for Microsoft"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164
\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061\066
\060\064\006\003\125\004\003\023\055\123\171\155\141\156\164\145
\143\040\105\156\164\145\162\160\162\151\163\145\040\115\157\142
\151\154\145\040\122\157\157\164\040\146\157\162\040\115\151\143
\162\157\163\157\146\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164
\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061\066
\060\064\006\003\125\004\003\023\055\123\171\155\141\156\164\145
\143\040\105\156\164\145\162\160\162\151\163\145\040\115\157\142
\151\154\145\040\122\157\157\164\040\146\157\162\040\115\151\143
\162\157\163\157\146\164
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\017\153\125\057\236\277\220\173\017\146\051\251\275\364
\330\316
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\275\060\202\002\245\240\003\002\001\002\002\020\017
\153\125\057\236\277\220\173\017\146\051\251\275\364\330\316\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\144
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\035\060
\033\006\003\125\004\012\023\024\123\171\155\141\156\164\145\143
\040\103\157\162\160\157\162\141\164\151\157\156\061\066\060\064
\006\003\125\004\003\023\055\123\171\155\141\156\164\145\143\040

```

\105\156\164\145\162\160\162\151\163\145\040\115\157\142\151\154  
\145\040\122\157\157\164\040\146\157\162\040\115\151\143\162\157  
\163\157\146\164\060\036\027\015\061\062\060\063\061\065\060\060  
\060\060\060\060\132\027\015\063\062\060\063\061\064\062\063\065  
\071\065\071\132\060\144\061\013\060\011\006\003\125\004\006\023  
\002\125\123\061\035\060\033\006\003\125\004\012\023\024\123\171  
\155\141\156\164\145\143\040\103\157\162\160\157\162\141\164\151  
\157\156\061\066\060\064\006\003\125\004\003\023\055\123\171\155  
\141\156\164\145\143\040\105\156\164\145\162\160\162\151\163\145  
\040\115\157\142\151\154\145\040\122\157\157\164\040\146\157\162  
\040\115\151\143\162\157\163\157\146\164\060\202\001\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001  
\017\000\060\202\001\012\002\202\001\001\000\265\075\260\162\356  
\221\351\245\151\234\021\115\172\371\263\372\075\362\224\233\043  
\267\246\003\354\142\030\374\205\022\042\376\301\161\175\124\223  
\271\221\175\142\366\312\250\070\025\145\370\167\075\345\202\040  
\072\324\265\321\156\215\006\111\275\337\202\016\044\205\347\357  
\170\055\030\362\340\013\150\106\076\044\020\310\127\356\016\155  
\161\246\323\261\126\034\327\051\325\262\352\124\005\012\250\074  
\241\270\045\122\007\005\240\337\347\334\356\134\073\101\265\253  
\134\063\062\322\316\353\351\226\370\100\364\012\272\063\035\370  
\126\003\011\202\365\147\007\304\300\064\301\135\374\105\273\352  
\074\232\325\164\161\155\325\206\323\302\374\205\274\124\353\243  
\325\362\117\325\105\257\127\274\360\042\300\217\242\105\310\165  
\064\167\336\241\155\067\162\263\163\215\014\153\123\272\131\341  
\250\076\200\127\322\137\131\356\150\165\317\201\234\243\312\105  
\214\067\333\005\162\064\034\062\002\370\325\371\054\015\332\130  
\236\304\027\264\233\311\220\304\210\131\077\161\221\220\104\030  
\276\042\213\171\222\056\102\260\213\227\133\002\003\001\000\001  
\243\153\060\151\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\047\006\003\125\035\021\004\040\060\036  
\244\034\060\032\061\030\060\026\006\003\125\004\003\023\017\115  
\120\113\111\055\062\060\064\070\055\061\055\061\061\061\060\035  
\006\003\125\035\016\004\026\004\024\115\354\337\046\006\334\044  
\020\300\266\231\364\327\071\307\157\031\370\046\050\060\015\006  
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001  
\000\251\127\131\320\001\124\024\106\257\307\171\124\014\152\052  
\133\330\072\035\201\344\210\243\061\264\361\363\065\361\106\163  
\134\103\311\376\274\242\152\031\300\275\057\137\313\070\243\155  
\156\350\024\136\362\170\176\105\172\341\273\364\056\233\105\353  
\340\035\120\034\064\133\177\230\212\206\017\207\332\344\144\046  
\167\374\011\337\043\101\117\016\237\372\016\372\104\205\360\051  
\227\244\224\342\364\100\055\221\034\166\364\250\140\336\161\246  
\260\005\342\117\151\331\031\013\211\072\340\372\253\053\372\361  
\263\062\355\374\174\160\145\136\320\173\021\173\235\350\133\032  
\112\166\244\173\121\071\254\175\251\014\164\070\350\273\125\337  
\304\316\300\247\041\132\270\033\237\001\305\247\020\376\175\371



```
\152\010\231\001\321\366\065\120\070\344\366\103\344\030\330\200
\114\354\307\004\342\141\214\175\111\355\317\264\245\361\362\220
\222\011\010\065\163\240\043\062\312\351\234\236\034\276\013\007
\054\167\136\027\114\332\234\202\341\200\033\245\363\332\367\210
\277\277\071\047\370\044\376\261\113\310\227\355\344\022\024\045
\210
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Symantec Enterprise Mobile Root for Microsoft"

# Issuer: CN=Symantec Enterprise Mobile Root for Microsoft,O=Symantec Corporation,C=US

# Serial Number:0f:6b:55:2f:9e:bf:90:7b:0f:66:29:a9:bd:f4:d8:ce

# Subject: CN=Symantec Enterprise Mobile Root for Microsoft,O=Symantec Corporation,C=US

# Not Valid Before: Thu Mar 15 00:00:00 2012

# Not Valid After: Sun Mar 14 23:59:59 2032

# Fingerprint (MD5): 71:d0:a5:ff:2d:59:74:16:94:be:e3:7d:1e:5c:86:0b

#

Fingerprint (SHA1): 92:b4:6c:76:e1:30:54:e1:04:f2:30:51:7e:6e:50:4d:43:ab:10:b5

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Symantec Enterprise Mobile Root for Microsoft"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\222\264\154\166\341\060\124\341\004\362\060\121\176\156\120\115
\103\253\020\265
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\161\320\245\377\055\131\164\026\224\276\343\175\036\134\206\013
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\144\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164
\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061\066
\060\064\006\003\125\004\003\023\055\123\171\155\141\156\164\145
\143\040\105\156\164\145\162\160\162\151\163\145\040\115\157\142
\151\154\145\040\122\157\157\164\040\146\157\162\040\115\151\143
\162\157\163\157\146\164
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\020\017\153\125\057\236\277\220\173\017\146\051\251\275\364
\330\316
```

END

CKA\_TRUST\_SERVER\_AUTH

```

CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "I.CA Root CA/RSA"
Issuer: 2.5.4.5=NTRCZ-26439395,CN=I.CA Root CA/RSA,O=První certifikační autorita\, a.s.,C=CZ
Serial Number:05:f5:e1:00
Subject: 2.5.4.5=NTRCZ-26439395,CN=I.CA Root CA/RSA,O=První certifikační autorita\, a.s.,C=CZ
Not Valid Before: Wed May 27 12:20:00 2015
Not Valid After: Sun May 27 12:20:00 2040
Fingerprint (MD5): 34:ba:8d:c4:33:9a:b5:27:ee:bd:5b:7c:7d:82:97:7f
Fingerprint (SHA1): 9b:09:59:89:81:54:08:1b:f6:a9:0e:9b:9e:58:a4:69:0c:9b:a1:04
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA Root CA/RSA"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\055\060\053\006\003\125\004\012\014\044\120\162\166\156\303\255
\040\143\145\162\164\151\146\151\153\141\304\215\156\303\255\040
\141\165\164\157\162\151\164\141\054\040\141\056\163\056\061\031
\060\027\006\003\125\004\003\014\020\111\056\103\101\040\122\157
\157\164\040\103\101\057\122\123\101\061\027\060\025\006\003\125
\004\005\023\016\116\124\122\103\132\055\062\066\064\063\071\063
\071\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\055\060\053\006\003\125\004\012\014\044\120\162\166\156\303\255
\040\143\145\162\164\151\146\151\153\141\304\215\156\303\255\040
\141\165\164\157\162\151\164\141\054\040\141\056\163\056\061\031
\060\027\006\003\125\004\003\014\020\111\056\103\101\040\122\157
\157\164\040\103\101\057\122\123\101\061\027\060\025\006\003\125
\004\005\023\016\116\124\122\103\132\055\062\066\064\063\071\063
\071\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\005\365\341\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\176\060\202\004\146\240\003\002\001\002\002\004\005

```

\365\341\000\060\015\006\011\052\206\110\206\367\015\001\001\015  
\005\000\060\160\061\013\060\011\006\003\125\004\006\023\002\103  
\132\061\055\060\053\006\003\125\004\012\014\044\120\162\166\156  
\303\255\040\143\145\162\164\151\146\151\153\141\304\215\156\303  
\255\040\141\165\164\157\162\151\164\141\054\040\141\056\163\056  
\061\031\060\027\006\003\125\004\003\014\020\111\056\103\101\040  
\122\157\157\164\040\103\101\057\122\123\101\061\027\060\025\006  
\003\125\004\005\023\016\116\124\122\103\132\055\062\066\064\063  
\071\063\071\065\060\036\027\015\061\065\060\065\062\067\061\062  
\062\060\060\060\132\027\015\064\060\060\065\062\067\061\062\062  
\060\060\060\132\060\160\061\013\060\011\006\003\125\004\006\023  
\002\103\132\061\055\060\053\006\003\125\004\012\014\044\120\162  
\166\156\303\255\040\143\145\162\164\151\146\151\153\141\304\215  
\156\303\255\040\141\165\164\157\162\151\164\141\054\040\141\056  
\163\056\061\031\060\027\006\003\125\004\003\014\020\111\056\103  
\101\040\122\157\157\164\040\103\101\057\122\123\101\061\027\060  
\025\006\003\125\004\005\023\016\116\124\122\103\132\055\062\066  
\064\063\071\063\071\065\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202  
\002\012\002\202\002\001\000\252\077\125\265\211\257\166\024\006  
\052\144\046\224\070\017\137\366\334\004\157\061\105\365\012\375  
\073\177\233\162\157\370\100\174\376\135\375\064\231\005\070\224  
\111\272\261\360\275\370\231\134\300\121\372\252\015\373\346\161  
\025\205\143\021\052\167\006\221\222\006\210\263\374\024\341\231  
\106\264\051\202\256\204\203\356\265\046\207\156\370\213\125\104  
\235\100\330\377\052\132\252\350\177\322\145\341\024\107\302\174  
\061\375\165\141\012\033\214\200\112\236\264\342\056\024\107\061  
\356\274\005\121\256\246\176\317\021\270\305\110\275\005\124\302  
\204\344\247\150\153\370\270\372\176\050\311\271\317\344\041\117  
\145\311\210\150\240\070\331\165\245\021\073\114\034\156\113\036  
\324\206\154\301\255\005\107\323\054\224\015\314\207\055\032\055  
\303\326\314\336\204\376\354\153\300\341\043\023\241\323\234\030  
\176\340\162\327\134\125\274\114\263\100\061\033\234\100\315\232  
\353\200\016\161\256\327\142\156\132\026\117\037\366\145\105\321  
\237\172\205\101\031\302\172\072\316\041\222\344\224\160\114\273  
\250\101\306\304\273\065\315\365\072\236\143\251\215\240\152\321  
\040\104\252\052\266\110\245\162\303\316\236\344\130\110\107\011  
\177\002\101\363\015\034\155\011\170\360\327\024\321\240\125\374  
\021\326\132\032\000\171\345\073\346\010\313\122\236\244\011\253  
\153\347\154\234\052\057\042\175\373\271\120\262\336\120\323\057  
\014\162\271\326\263\267\263\010\346\353\173\254\364\264\305\366  
\301\062\037\247\031\041\365\334\136\067\252\307\037\123\233\103  
\076\346\236\237\332\015\327\126\242\017\123\151\055\125\277\353  
\206\170\021\277\246\327\132\115\363\016\223\163\352\377\016\320  
\347\217\361\310\263\360\330\030\163\154\245\162\210\361\160\114  
\107\124\266\233\132\321\274\046\067\215\030\337\233\153\056\333  
\013\045\263\212\262\343\255\006\134\155\273\175\027\003\007\001  
\212\060\227\211\164\155\112\224\167\056\353\356\317\260\036\265

\352\166\364\265\024\070\225\327\325\331\057\077\262\244\046\314  
\115\243\134\215\011\363\136\014\205\062\316\126\154\002\010\361  
\113\243\253\277\310\124\240\005\205\164\344\165\035\172\274\234  
\073\140\075\152\375\031\221\002\003\001\000\001\243\202\001\036  
\060\202\001\032\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024  
\166\271\003\110\373\325\030\241\241\067\240\355\314\150\202\114  
\122\064\066\015\060\201\327\006\003\125\035\040\004\201\317\060  
\201\314\060\201\311\006\004\125\035\040\000\060\201\300\060\201  
\275\006\010\053\006\001\005\005\007\002\002\060\201\260\032\201  
\255\124\145\156\164\157\040\153\166\141\154\151\146\151\153\157  
\166\141\156\171\040\163\171\163\164\145\155\157\166\171\040\143  
\145\162\164\151\146\151\153\141\164\040\142\171\154\040\166\171  
\144\141\156\040\160\157\144\154\145\040\172\141\153\157\156\141  
\040\062\062\067\057\062\060\060\060\040\123\142\056\040\166\040  
\160\154\141\164\156\145\155\040\172\156\145\156\151\057\124\150  
\151\163\040\161\165\141\154\151\146\151\145\144\040\163\171\163  
\164\145\155\040\143\145\162\164\151\146\151\143\141\164\145\040  
\167\141\163\040\151\163\163\165\145\144\040\141\143\143\157\162  
\144\151\156\147\040\164\157\040\101\143\164\040\116\157\056\040  
\062\062\067\057\062\060\060\060\040\103\157\154\154\056\060\015  
\006\011\052\206\110\206\367\015\001\001\015\005\000\003\202\002  
\001\000\031\124\002\045\203\333\042\226\213\035\225\236\231\333  
\064\316\223\320\037\056\173\134\140\044\152\014\327\205\104\170  
\037\034\111\362\024\370\203\124\031\246\235\062\146\270\043\246  
\073\206\052\237\066\374\027\374\120\017\140\306\067\375\044\250  
\367\171\247\216\277\330\007\025\124\136\122\014\276\370\246\330  
\310\101\104\361\366\023\334\203\031\133\257\335\144\367\063\026  
\207\017\025\132\361\144\274\324\347\125\077\062\070\211\232\363  
\314\110\305\154\061\161\222\232\046\027\302\174\107\002\155\065  
\047\237\363\032\341\252\035\015\164\021\251\223\174\101\250\157  
\273\216\234\305\001\344\163\366\272\120\056\346\020\324\274\157  
\023\232\070\271\151\106\245\006\326\362\114\154\067\253\074\370  
\333\032\306\125\360\310\370\035\041\156\057\000\152\261\342\155  
\132\004\055\175\335\011\117\366\357\024\057\300\022\352\011\031  
\053\032\312\240\161\233\261\072\062\274\377\103\030\363\175\057  
\365\056\210\351\121\266\361\111\220\114\377\046\307\303\131\335  
\164\137\301\120\135\070\134\235\150\125\151\152\264\100\167\311  
\137\062\051\110\124\223\301\263\041\043\166\241\125\060\151\043  
\077\061\111\304\241\315\073\166\131\225\132\202\264\255\161\265  
\276\246\221\314\200\025\112\057\316\224\256\030\125\111\165\040  
\104\270\363\001\233\301\170\054\216\020\114\247\144\255\255\072  
\353\114\035\126\056\177\224\324\036\320\012\325\311\124\201\016  
\036\376\367\224\371\141\072\077\065\356\323\140\311\373\110\262  
\156\302\331\276\172\156\230\005\160\000\243\321\027\307\306\064  
\257\154\365\115\217\135\122\014\335\200\233\172\155\347\230\343  
\071\205\134\077\213\314\104\242\100\066\062\223\022\126\220\002

```
\236\076\131\150\002\037\126\210\036\257\301\376\017\173\125\215
\227\331\273\246\223\107\272\174\370\107\266\071\327\214\362\100
\154\207\234\014\376\055\335\334\161\374\016\221\010\244\103\075
\212\127\335\335\007\353\247\227\121\320\272\204\231\255\213\171
\376\311\004\220\203\023\053\351\227\015\145\211\362\021\055\067
\216\113\270\273\322\172\071\052\305\334\320\135\015\335\004\047
\230\237\130\375\216\206\273\005\177\360\355\067\222\220\335\234
\275\374
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL

CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "I.CA Root CA/RSA"

# Issuer: 2.5.4.5=NTRCZ-26439395,CN=I.CA Root CA/RSA,O=První certifikační autorita, a.s.,C=CZ

# Serial Number:05:f5:e1:00

# Subject: 2.5.4.5=NTRCZ-26439395,CN=I.CA Root CA/RSA,O=První certifikační autorita, a.s.,C=CZ

# Not Valid Before: Wed May 27 12:20:00 2015

# Not Valid After: Sun May 27 12:20:00 2040

# Fingerprint (MD5): 34:ba:8d:c4:33:9a:b5:27:ee:bd:5b:7c:7d:82:97:7f

# Fingerprint (SHA1): 9b:09:59:89:81:54:08:1b:f6:a9:0e:9b:9e:58:a4:69:0c:9b:a1:04

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "I.CA Root CA/RSA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\233\011\131\211\201\124\010\033\366\251\016\233\236\130\244\151
\014\233\241\004
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\064\272\215\304\063\232\265\047\356\275\133\174\175\202\227\177
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\055\060\053\006\003\125\004\012\014\044\120\162\166\156\303\255
\040\143\145\162\164\151\146\151\153\141\304\215\156\303\255\040
\141\165\164\157\162\151\164\141\054\040\141\056\163\056\061\031
\060\027\006\003\125\004\003\014\020\111\056\103\101\040\122\157
\157\164\040\103\101\057\122\123\101\061\027\060\025\006\003\125
\004\005\023\016\116\124\122\103\132\055\062\066\064\063\071\063
\071\065
```

END

CKA\_SERIAL\_NUMBER

```

MULTILINE_OCTAL
\002\004\005\365\341\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "MULTICERT Root Certification Authority 01"
Issuer: CN=MULTICERT Root Certification Authority 01,O=MULTICERT - Serviços de Certificação
Electrónica S.A.,C=PT
Serial Number:54:4d:a5:bc:40:35:56:5a
#
Subject: CN=MULTICERT Root Certification Authority 01,O=MULTICERT - Serviços de Certificação
Electrónica S.A.,C=PT
Not Valid Before: Fri Apr 04 08:59:47 2014
Not Valid After: Mon Apr 04 08:59:47 2039
Fingerprint (MD5): 30:b4:c2:a5:23:02:1d:2e:1b:c0:59:f2:ca:23:99:20
Fingerprint (SHA1): 46:af:7a:31:b5:99:46:0d:46:9d:60:41:14:5b:13:65:1d:f9:17:0a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "MULTICERT Root Certification Authority 01"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\120\124
\061\102\060\100\006\003\125\004\012\014\071\115\125\114\124\111
\103\105\122\124\040\055\040\123\145\162\166\151\303\247\157\163
\040\144\145\040\103\145\162\164\151\146\151\143\141\303\247\303
\243\157\040\105\154\145\143\164\162\303\263\156\151\143\141\040
\123\056\101\056\061\062\060\060\006\003\125\004\003\014\051\115
\125\114\124\111\103\105\122\124\040\122\157\157\164\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\040\060\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\120\124
\061\102\060\100\006\003\125\004\012\014\071\115\125\114\124\111
\103\105\122\124\040\055\040\123\145\162\166\151\303\247\157\163
\040\144\145\040\103\145\162\164\151\146\151\143\141\303\247\303
\243\157\040\105\154\145\143\164\162\303\263\156\151\143\141\040
\123\056\101\056\061\062\060\060\006\003\125\004\003\014\051\115
\125\114\124\111\103\105\122\124\040\122\157\157\164\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150

```

\157\162\151\164\171\040\060\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\010\124\115\245\274\100\065\126\132

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\361\060\202\003\331\240\003\002\001\002\002\010\124  
\115\245\274\100\065\126\132\060\015\006\011\052\206\110\206\367  
\015\001\001\013\005\000\060\201\205\061\013\060\011\006\003\125  
\004\006\023\002\120\124\061\102\060\100\006\003\125\004\012\014  
\071\115\125\114\124\111\103\105\122\124\040\055\040\123\145\162  
\166\151\303\247\157\163\040\144\145\040\103\145\162\164\151\146  
\151\143\141\303\247\303\243\157\040\105\154\145\143\164\162\303  
\263\156\151\143\141\040\123\056\101\056\061\062\060\060\006\003  
\125\004\003\014\051\115\125\114\124\111\103\105\122\124\040\122  
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\040\060\061\060\036  
\027\015\061\064\060\064\060\064\060\070\065\071\064\067\132\027  
\015\063\071\060\064\060\064\060\070\065\071\064\067\132\060\201  
\205\061\013\060\011\006\003\125\004\006\023\002\120\124\061\102  
\060\100\006\003\125\004\012\014\071\115\125\114\124\111\103\105  
\122\124\040\055\040\123\145\162\166\151\303\247\157\163\040\144  
\145\040\103\145\162\164\151\146\151\143\141\303\247\303\243\157  
\040\105\154\145\143\164\162\303\263\156\151\143\141\040\123\056  
\101\056\061\062\060\060\006\003\125\004\003\014\051\115\125\114  
\124\111\103\105\122\124\040\122\157\157\164\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\040\060\061\060\202\002\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202  
\002\012\002\202\002\001\000\316\334\077\364\031\156\273\025\151  
\206\364\344\315\347\072\160\073\307\232\213\073\203\000\201\133  
\373\040\026\132\276\277\130\000\137\051\346\127\157\176\212\054  
\025\007\134\032\143\214\102\137\026\335\332\211\204\105\127\027  
\226\240\234\241\165\042\101\032\072\375\305\027\221\023\366\276  
\142\012\274\156\045\055\133\300\214\020\146\367\342\326\373\334  
\110\061\243\032\250\345\115\110\311\242\034\163\376\217\146\100  
\143\167\131\007\074\075\024\237\324\367\205\221\320\303\102\365  
\033\141\263\167\200\200\052\155\022\002\226\213\121\331\301\157  
\047\013\032\007\064\000\377\322\131\114\051\350\327\031\143\330  
\221\264\077\374\216\016\045\362\241\022\007\145\312\065\336\253  
\376\026\243\010\214\257\177\176\022\364\131\026\005\037\350\255  
\164\171\062\367\170\002\266\264\314\253\333\036\070\141\004\031  
\172\101\100\332\132\021\144\165\002\375\144\321\326\224\102\017  
\042\347\145\315\257\220\016\014\133\061\001\231\121\357\105\214  
\175\245\070\332\236\174\113\344\246\350\263\244\202\326\003\064  
\056\117\267\121\253\167\070\011\365\006\376\334\146\033\017\077  
\372\175\357\214\125\276\340\015\206\225\241\334\275\304\303\010  
\321\105\036\362\275\276\160\361\346\046\306\273\010\261\050\245

\302\245\355\210\326\241\300\373\043\361\047\071\314\341\204\007  
\031\274\176\366\314\070\377\156\020\273\106\351\043\211\044\201  
\377\000\342\121\000\334\122\120\175\023\120\175\026\075\100\215  
\323\277\371\212\145\330\142\022\051\167\302\272\302\111\064\117  
\212\171\151\311\113\025\363\064\336\317\257\206\342\345\310\251  
\126\141\114\006\124\132\305\154\031\352\363\310\104\315\044\032  
\166\321\161\000\131\153\331\165\233\316\375\020\376\261\203\242  
\245\267\222\206\166\233\112\367\035\334\214\205\246\130\255\212  
\246\150\151\027\311\155\033\246\317\047\113\051\054\335\161\102  
\032\211\020\345\325\233\022\137\111\213\204\274\330\010\134\373  
\317\070\102\257\276\321\156\173\221\252\146\100\305\005\176\053  
\320\146\266\307\337\122\376\364\105\155\043\222\041\236\022\001  
\220\163\203\342\245\011\015\327\300\370\205\225\036\143\321\077  
\065\332\224\321\067\331\365\002\003\001\000\001\243\143\060\141  
\060\035\006\003\125\035\016\004\026\004\024\325\071\034\234\133  
\157\004\252\242\225\114\357\040\335\051\164\244\305\105\161\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\037\006\003\125\035\043\004\030\060\026\200\024\325\071\034  
\234\133\157\004\252\242\225\114\357\040\335\051\164\244\305\105  
\161\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000  
\003\202\002\001\000\077\347\137\363\042\026\336\203\236\040\344  
\202\347\345\236\167\311\373\053\260\164\015\337\033\164\042\017  
\163\020\241\260\027\354\114\014\324\050\160\152\146\162\104\151  
\020\223\166\065\317\057\370\217\074\253\031\174\161\222\225\161  
\033\067\025\302\033\050\172\357\156\170\070\337\373\217\233\001  
\040\334\257\366\326\215\011\146\332\304\106\251\374\225\252\104  
\043\022\337\107\300\260\025\354\265\261\236\154\017\221\252\246  
\072\345\301\015\140\154\120\100\160\134\134\310\316\263\314\353  
\355\252\210\031\126\245\244\310\014\172\345\166\100\147\063\264  
\075\226\334\167\313\043\170\371\123\133\317\215\336\261\247\216  
\132\172\242\062\143\243\210\327\045\141\132\135\111\072\162\346  
\317\252\224\206\154\156\367\202\340\216\147\223\050\305\250\015  
\115\357\070\255\171\112\146\215\204\001\010\004\171\363\122\306  
\101\347\232\142\006\263\365\022\036\354\331\000\103\323\353\226  
\167\164\341\171\371\024\224\204\155\272\124\202\005\214\337\001  
\362\060\210\201\254\172\057\213\103\054\166\064\316\065\347\207  
\216\116\013\012\245\032\127\261\123\132\277\153\330\276\000\176  
\306\371\356\146\061\010\261\337\224\063\204\234\167\117\173\144  
\057\357\216\017\131\050\042\313\360\134\076\053\375\065\326\225  
\377\003\354\145\122\176\276\362\031\370\173\325\122\054\122\167  
\232\221\146\101\160\215\325\111\347\013\110\177\212\256\336\105  
\075\335\376\346\322\344\222\303\173\316\060\240\111\156\067\255  
\250\323\054\266\075\236\041\333\006\127\342\360\256\006\373\331  
\305\021\067\241\173\333\035\021\174\150\166\040\076\365\274\245  
\331\146\265\041\255\105\046\306\135\036\002\243\101\304\324\175  
\201\031\313\027\227\006\017\346\354\164\000\106\304\165\335\075  
\360\103\064\257\246\274\374\366\202\373\317\305\372\263\017\045



```
\245\077\146\020\326\236\202\245\333\072\023\171\336\215\251\327
\246\215\206\322\057\331\151\015\342\165\170\176\111\137\042\253
\206\160\050\121\263\172\266\240\171\372\324\345\203\247\260\167
\312\333\001\202\357\342\276\115\057\323\300\115\320\343\151\156
\174\046\233\353\246\373\105\357\261\004\212\057\252\041\006\366
\346\324\274\101\043
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "MULTICERT Root Certification Authority 01"

# Issuer: CN=MULTICERT Root Certification Authority 01,O=MULTICERT - Serviços de Certificação  
Electrónica S.A.,C=PT

# Serial Number:54:4d:a5:bc:40:35:56:5a

# Subject: CN=MULTICERT Root Certification Authority 01,O=MULTICERT - Serviços de Certificação  
Electrónica S.A.,C=PT

# Not Valid Before: Fri Apr 04 08:59:47 2014

# Not Valid After: Mon Apr 04 08:59:47 2039

# Fingerprint (MD5): 30:b4:c2:a5:23:02:1d:2e:1b:c0:59:f2:ca:23:99:20

# Fingerprint (SHA1): 46:af:7a:31:b5:99:46:0d:46:9d:60:41:14:5b:13:65:1d:f9:17:0a

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL

UTF8 "MULTICERT Root Certification Authority 01"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\106\257\172\061\265\231\106\015\106\235\140\101\024\133\023\145
\035\371\027\012
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\060\264\302\245\043\002\035\056\033\300\131\362\312\043\231\040
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\120\124
\061\102\060\100\006\003\125\004\012\014\071\115\125\114\124\111
\103\105\122\124\040\055\040\123\145\162\166\151\303\247\157\163
\040\144\145\040\103\145\162\164\151\146\151\143\141\303\247\303
\243\157\040\105\154\145\143\164\162\303\263\156\151\143\141\040
\123\056\101\056\061\062\060\060\006\003\125\004\003\014\051\115
\125\114\124\111\103\105\122\124\040\122\157\157\164\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\040\060\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\010\124\115\245\274\100\065\126\132
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "Certification Authority of WoSign G2"
Issuer: CN=Certification Authority of WoSign G2,O=WoSign CA Limited,C=CN
Serial Number:6b:25:da:8a:88:9d:7c:bc:0f:05:b3:b1:7a:61:45:44
Subject: CN=Certification Authority of WoSign G2,O=WoSign CA Limited,C=CN
Not Valid Before: Sat Nov 08 00:58:58 2014
Not Valid After: Tue Nov 08 00:58:58 2044
Fingerprint (MD5): c8:1c:7d:19:aa:cb:71:93:f2:50:f8:52:a8:1e:ba:60
Fingerprint (SHA1): fb:ed:dc:90:65:b7:27:20:37:bc:55:0c:9c:56:de:bb:f2:78:94:e1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certification Authority of WoSign G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\130\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\055\060\053\006
\003\125\004\003\023\044\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156\040\107\062
```

```
END
```

```
CKA_ID
```

```
UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
```

```
\060\130\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\055\060\053\006
\003\125\004\003\023\044\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156\040\107\062
```

```
END
```

```
CKA_SERIAL_NUMBER MULTILINE_OCTAL
```

```
\002\020\153\045\332\212\210\235\174\274\017\005\263\261\172\141
\105\104
```

```
END
```

```
CKA_VALUE MULTILINE_OCTAL
```

```
\060\202\003\174\060\202\002\144\240\003\002\001\002\002\020\153
\045\332\212\210\235\174\274\017\005\263\261\172\141\105\104\060
```

\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\130  
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\032\060  
\030\006\003\125\004\012\023\021\127\157\123\151\147\156\040\103  
\101\040\114\151\155\151\164\145\144\061\055\060\053\006\003\125  
\004\003\023\044\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\040\157\146\040\127  
\157\123\151\147\156\040\107\062\060\036\027\015\061\064\061\061  
\060\070\060\060\065\070\065\070\132\027\015\064\064\061\061\060  
\070\060\060\065\070\065\070\132\060\130\061\013\060\011\006\003  
\125\004\006\023\002\103\116\061\032\060\030\006\003\125\004\012  
\023\021\127\157\123\151\147\156\040\103\101\040\114\151\155\151  
\164\145\144\061\055\060\053\006\003\125\004\003\023\044\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150  
\157\162\151\164\171\040\157\146\040\127\157\123\151\147\156\040  
\107\062\060\202\001\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202  
\001\001\000\276\305\304\240\042\200\111\117\277\331\207\021\306  
\123\341\273\017\275\140\177\257\366\202\016\037\334\260\216\075  
\227\340\120\074\217\072\357\146\073\105\007\233\040\370\343\327  
\045\206\065\220\026\242\135\157\060\031\010\207\013\177\006\262  
\235\142\217\336\257\222\245\140\324\053\200\232\122\077\365\232  
\203\351\064\132\313\331\325\142\134\346\016\340\337\006\230\016  
\200\174\312\264\035\023\210\153\016\250\044\167\003\320\356\133  
\363\312\151\221\065\071\126\305\155\343\367\075\117\136\223\070  
\044\312\030\351\044\313\222\003\335\314\034\075\011\160\344\040  
\344\361\256\254\273\163\151\243\143\072\017\105\017\241\112\232  
\302\321\143\254\313\020\370\075\346\116\050\267\353\304\225\261  
\254\375\136\253\372\101\313\135\235\113\334\364\174\166\357\147  
\177\000\172\215\322\240\032\134\115\042\341\265\332\335\166\263  
\324\166\337\136\270\213\230\310\024\124\314\153\027\222\267\340  
\112\277\111\224\141\013\070\220\217\135\044\154\045\173\073\171  
\331\342\176\235\255\237\230\241\006\374\170\024\140\127\370\356  
\200\167\261\002\003\001\000\001\243\102\060\100\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006  
\003\125\035\016\004\026\004\024\372\140\251\353\145\305\335\026  
\024\010\116\014\017\215\233\340\367\144\257\147\060\015\006\011  
\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001\000  
\127\303\172\066\202\234\215\230\342\253\100\252\107\217\307\247  
\133\355\174\347\075\146\132\073\061\273\337\363\026\063\221\374  
\174\173\245\302\246\146\343\252\260\267\047\230\077\111\327\140  
\147\147\077\066\117\112\313\361\024\372\132\207\050\034\355\217  
\101\062\306\225\371\175\332\275\173\133\302\260\041\343\217\106  
\334\041\070\103\164\114\373\060\370\027\162\301\062\374\310\221  
\027\304\314\130\067\116\013\314\132\367\041\065\050\203\154\140  
\055\104\353\122\214\120\075\265\154\022\327\372\011\273\154\262  
\112\261\305\211\344\374\323\122\330\141\027\376\172\224\204\217  
\171\266\063\131\272\017\304\013\342\160\240\113\170\056\372\310

```
\237\375\257\221\145\012\170\070\025\345\227\027\024\335\371\340
\054\064\370\070\320\204\042\000\300\024\121\030\053\002\334\060
\132\360\350\001\174\065\072\043\257\010\344\257\252\216\050\102
\111\056\360\365\231\064\276\355\017\113\030\341\322\044\074\273
\135\107\267\041\362\215\321\012\231\216\343\156\076\255\160\340
\217\271\312\314\156\201\061\366\173\234\172\171\344\147\161\030
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Certification Authority of WoSign G2"

# Issuer: CN=Certification Authority of WoSign G2,O=WoSign CA Limited,C=CN

# Serial Number:6b:25:da:8a:88:9d:7c:bc:0f:05:b3:b1:7a:61:45:44

# Subject: CN=Certification Authority of WoSign G2,O=WoSign CA Limited,C=CN

# Not Valid

Before: Sat Nov 08 00:58:58 2014

# Not Valid After: Tue Nov 08 00:58:58 2044

# Fingerprint (MD5): c8:1c:7d:19:aa:cb:71:93:f2:50:f8:52:a8:1e:ba:60

# Fingerprint (SHA1): fb:ed:dc:90:65:b7:27:20:37:bc:55:0c:9c:56:de:bb:f2:78:94:e1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certification Authority of WoSign G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\373\355\334\220\145\267\047\040\067\274\125\014\234\126\336\273
\362\170\224\341
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\310\034\175\031\252\313\161\223\362\120\370\122\250\036\272\140
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\130\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\055\060\053\006
\003\125\004\003\023\044\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156\040\107\062
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\153\045\332\212\210\235\174\274\017\005\263\261\172\141
\105\104
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "CA WoSign ECC Root"

# Issuer: CN=CA WoSign ECC Root,O=WoSign CA Limited,C=CN

# Serial Number:68:4a:58:70:80:6b:f0:8f:02:fa:f6:de:e8:b0:90:90

# Subject: CN=CA WoSign ECC Root,O=WoSign CA Limited,C=CN

# Not Valid Before: Sat Nov 08 00:58:58 2014

# Not Valid After: Tue Nov 08 00:58:58 2044

# Fingerprint (MD5): 80:c6:53:ee:61:82:28:72:f0:ff:21:b9:17:ca:b2:20

# Fingerprint (SHA1): d2:7a:d2:be:ed:94:c0:a1:3c:c7:25:21:ea:5d:71:be:81:19:f3:2b

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL

UTF8 "CA WoSign ECC Root"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061  
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156  
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006  
\003\125\004\003\023\022\103\101\040\127\157\123\151\147\156\040  
\105\103\103\040\122\157\157\164

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061  
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156  
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006  
\003\125\004\003\023\022\103\101\040\127\157\123\151\147\156\040  
\105\103\103\040\122\157\157\164

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\150\112\130\160\200\153\360\217\002\372\366\336\350\260  
\220\220

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\011\060\202\001\217\240\003\002\001\002\002\020\150  
\112\130\160\200\153\360\217\002\372\366\336\350\260\220\220\060  
\012\006\010\052\206\110\316\075\004\003\003\060\106\061\013\060  
\011\006\003\125\004\006\023\002\103\116\061\032\060\030\006\003  
\125\004\012\023\021\127\157\123\151\147\156\040\103\101\040\114  
\151\155\151\164\145\144\061\033\060\031\006\003\125\004\003\023  
\022\103\101\040\127\157\123\151\147\156\040\105\103\103\040\122  
\157\157\164\060\036\027\015\061\064\061\061\060\070\060\060\065

\070\065\070\132\027\015\064\064\061\061\060\070\060\060\065\070  
\065\070\132\060\106\061\013\060\011\006\003\125\004\006\023\002  
\103\116\061\032\060\030\006\003\125\004\012\023\021\127\157\123  
\151\147\156\040\103\101\040\114\151\155\151\164\145\144\061\033  
\060\031\006\003\125\004\003\023\022\103\101\040\127\157\123\151  
\147\156\040\105\103\103\040\122\157\157\164\060\166\060\020\006  
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003  
\142\000\004\341\375\216\270\103\044\253\226\173\205\302\272\013  
\255\215\340\072\343\044\271\322\261\276\210\072\312\277\112\270  
\371\357\054\057\257\121\120\074\107\165\154\370\224\267\233\374  
\050\036\305\124\314\143\235\026\113\123\301\347\040\253\315\254  
\045\322\177\217\302\301\132\202\136\060\213\172\124\316\003\265  
\221\177\252\224\320\321\212\110\314\202\005\046\241\325\121\022  
\326\173\066\243\102\060\100\060\016\006\003\125\035\017\001\001  
\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004  
\026\004\024\252\375\325\132\243\366\207\213\062\205\375\321\062  
\133\200\105\223\363\003\270\060\012\006\010\052\206\110\316\075  
\004\003\003\003\150\000\060\145\002\061\000\344\244\204\260\201  
\325\075\260\164\254\224\244\350\016\075\000\164\114\241\227\153  
\371\015\121\074\241\331\073\364\015\253\251\237\276\116\162\312  
\205\324\331\354\265\062\105\030\157\253\255\002\060\175\307\367  
\151\143\057\241\341\230\357\023\020\321\171\077\321\376\352\073  
\177\336\126\364\220\261\025\021\330\262\042\025\320\057\303\046  
\056\153\361\221\262\220\145\364\232\346\220\356\112

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CA WoSign ECC Root"

# Issuer: CN=CA WoSign ECC Root,O=WoSign CA Limited,C=CN

# Serial Number:68:4a:58:70:80:6b:f0:8f:02:fa:f6:de:e8:b0:90:90

# Subject: CN=CA WoSign ECC Root,O=WoSign CA Limited,C=CN

# Not Valid Before: Sat Nov 08 00:58:58 2014

# Not Valid After: Tue Nov 08 00:58:58 2044

# Fingerprint (MD5): 80:c6:53:ee:61:82:28:72:f0:ff:21:b9:17:ca:b2:20

# Fingerprint (SHA1): d2:7a:d2:be:ed:94:c0:a1:3c:c7:25:21:ea:5d:71:be:81:19:f3:2b

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CA WoSign ECC Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\322\172\322\276\355\224\300\241\074\307\045\041\352\135\161\276

\201\031\363\053

```

END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\200\306\123\356\141\202\050\162\360\377\041\271\027\312\262\040
END
CKA_ISSUER
MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\023\022\103\101\040\127\157\123\151\147\156\040
\105\103\103\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\150\112\130\160\200\153\360\217\002\372\366\336\350\260
\220\220
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "CCA India 2015 SPL"
Issuer: CN=CCA India 2015 SPL,O=India PKI,C=IN
Serial Number: 10165 (0x27b5)
Subject: CN=CCA India 2015 SPL,O=India PKI,C=IN
Not Valid Before: Thu Jan 29 11:36:43 2015
Not Valid After: Wed Jan 29 11:36:43 2025
#
Fingerprint (MD5): 16:da:3e:ac:1d:0a:57:a9:b4:e2:de:d0:93:96:dc:d4
Fingerprint (SHA1): 3b:c6:dc:e0:03:07:bd:67:60:41:eb:d8:59:70:c6:2f:8f:da:51:09
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CCA India 2015 SPL"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103
\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103

```

\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\002\047\265  
END  
CKA\_VALUE  
MULTILINE\_OCTAL  
\060\202\003\053\060\202\002\023\240\003\002\001\002\002\002\047  
\265\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000  
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061  
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040  
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103  
\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114  
\060\036\027\015\061\065\060\061\062\071\061\061\063\066\064\063  
\132\027\015\062\065\060\061\062\071\061\061\063\066\064\063\132  
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061  
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040  
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103  
\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114  
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001  
\000\227\327\066\211\075\067\101\016\221\077\153\040\137\374\072  
\176\073\132\135\057\303\014\207\123\074\030\242\310\141\163\015  
\010\016\126\036\322\156\140\245\127\145\334\376\317\120\206\017  
\132\116\253\142\213\004\312\126\357\341\321\236\256\164\255\252  
\372\077\101\130\321\125\160\160\076\105\311\033\200\163\374\010  
\210\344\213\162\250\012\265\051\127\260\255\012\221\101\032\234  
\137\120\175\254\027\032\045\133\041\360\225\053\347\337\067\254  
\064\363\007\260\361\035\301\023\357\173\056\072\305\251\141\220  
\262\170\137\124\120\074\263\132\125\143\266\313\020\243\157\373  
\015\364\266\357\346\010\336\242\020\277\166\227\177\352\331\226  
\321\324\303\163\002\161\264\251\260\254\254\037\027\040\245\107  
\106\326\104\002\070\231\276\313\024\170\376\346\137\304\177\335  
\157\351\252\107\024\220\021\330\035\200\300\025\324\214\240\231  
\343\031\016\012\017\314\032\010\234\324\123\007\000\340\037\111  
\277\202\202\114\317\233\330\156\323\324\021\000\022\154\017\175  
\140\147\112\214\120\333\362\057\340\271\171\207\203\303\134\302  
\071\002\003\001\000\001\243\063\060\061\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\021\006\003\125  
\035\016\004\012\004\010\114\021\160\252\217\335\037\007\060\013  
\006\003\125\035\017\004\004\003\002\001\006\060\015\006\011\052  
\206\110\206\367\015\001\001\013\005\000\003\202\001\001\000\055  
\274\214\025\312\064\355\114\050\042\273\341\123\045\113\072\227  
\251\355\046\242\244\253\115\373\012\022\156\347\065\346\147\016  
\030\201\142\066\245\314\302\337\032\345\150\001\201\116\263\231  
\324\107\025\022\235\166\351\241\246\023\035\260\377\175\273\127  
\343\357\131\233\310\073\120\151\306\143\072\254\240\301\345\220  
\350\144\051\134\110\101\151\067\254\073\273\335\343\125\306\327



```
\222\015\225\203\260\050\127\302\243\251\226\247\312\336\114\036
\232\377\076\245\056\047\136\333\146\147\047\205\357\253\212\134
\163\174\210\315\107\146\360\235\203\314\204\217\342\051\364\037
\101\157\267\365\041\015\365\224\126\121\343\374\377\023\130\267
\237\003\356\051\237\322\001\260\142\236\224\275\031\206\132\103
\372\152\211\201\260\352\134\030\207\312\200\225\373\355\001\277
\021\032\337\225\024\256\056\342\257\315\221\220\272\263\047\303
\157\020\330\331\016\264\245\164\154\201\267\137\031\314\376\047
\116\263\105\230\130\030\234\127\304\222\162\022\317\247\202\071
\325\341\020\227\012\206\060\105\205\143\250\153\115\232\374
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CCA India 2015 SPL"

# Issuer: CN=CCA India 2015 SPL,O=India PKI,C=IN

# Serial Number: 10165 (0x27b5)

# Subject: CN=CCA India 2015 SPL,O=India PKI,C=IN

# Not Valid Before: Thu Jan 29 11:36:43 2015

# Not Valid After: Wed Jan 29 11:36:43 2025

# Fingerprint (MD5): 16:da:3e:ac:1d:0a:57:a9:b4:e2:de:d0:93:96:dc:d4

# Fingerprint (SHA1): 3b:c6:dc:e0:03:07:bd:67:60:41:eb:d8:59:70:c6:2f:8f:da:51:09

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CCA India 2015 SPL"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\073\306\334\340\003\007\275\147\140\101\353\330\131\160\306\057
\217\332\121\011
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\026\332\076\254\035\012\127\251\264\342\336\320\223\226\334\324
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103
\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\002\047\265
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Swedish Government Root Authority

v3"

# Issuer: CN=Swedish Government Root Authority v3,O=Swedish Social Insurance Agency,C=SE

# Serial Number:32:69:a2:bf:40:6b:8d:b4:47:83:64:3c:8b:0d:c9:43

# Subject: CN=Swedish Government Root Authority v3,O=Swedish Social Insurance Agency,C=SE

# Not Valid Before: Tue Sep 29 11:32:32 2015

# Not Valid After: Sat Sep 29 11:42:09 2040

# Fingerprint (MD5): 63:e2:fd:ea:a2:55:6a:70:54:fb:3a:22:e3:34:b1:17

# Fingerprint (SHA1): 74:6f:88:f9:ac:16:3c:53:00:9e:ef:92:0c:40:67:75:6a:15:71:7e

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Swedish Government Root Authority v3"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\146\061\013\060\011\006\003\125\004\006\023\002\123\105\061  
\050\060\046\006\003\125\004\012\023\037\123\167\145\144\151\163  
\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156  
\143\145\040\101\147\145\156\143\171\061\055\060\053\006\003\125  
\004\003\023\044\123\167\145\144\151\163\150\040\107\157\166\145  
\162\156\155\145\156\164\040\122\157\157\164\040\101\165\164\150  
\157\162\151\164\171\040\166\063

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\146\061\013\060\011\006\003\125\004\006\023\002\123\105\061  
\050\060\046\006\003\125\004\012\023\037\123\167\145\144\151\163  
\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156  
\143\145\040\101\147\145\156\143\171\061\055\060\053\006\003\125  
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CKA\_VALUE MULTILINE\_OCTAL

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CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Swedish Government Root Authority v3"

```

Issuer: CN=Swedish Government Root Authority v3,O=Swedish Social
Insurance Agency,C=SE
Serial Number:32:69:a2:bf:40:6b:8d:b4:47:83:64:3c:8b:0d:c9:43
Subject: CN=Swedish Government Root Authority v3,O=Swedish Social Insurance Agency,C=SE
Not Valid Before: Tue Sep 29 11:32:32 2015
Not Valid After: Sat Sep 29 11:42:09 2040
Fingerprint (MD5): 63:e2:fd:ea:a2:55:6a:70:54:fb:3a:22:e3:34:b1:17
Fingerprint (SHA1): 74:6f:88:f9:ac:16:3c:53:00:9e:ef:92:0c:40:67:75:6a:15:71:7e
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swedish Government Root Authority v3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\164\157\210\371\254\026\074\123\000\236\357\222\014\100\147\165
\152\025\161\176
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
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\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156
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MULTILINE_OCTAL
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Swedish Government Root Authority v2"
Issuer: CN=Swedish Government Root Authority v2,O=Swedish Social Insurance Agency,C=SE
Serial Number:54:12:15:9f:ab:8a:75:93:44:94:ca:77:40:56:2e:ef
Subject: CN=Swedish Government Root Authority v2,O=Swedish Social Insurance Agency,C=SE
Not Valid Before: Tue May 05 11:15:23 2015
#
Not Valid After: Sat May 05 11:24:19 2040
Fingerprint (MD5): 33:85:e1:95:66:4b:83:50:73:42:c2:e0:da:a0:40:92

```

# Fingerprint (SHA1): 32:f4:42:09:3b:36:d7:03:1b:75:ca:4d:ad:dc:b3:27:fa:a0:2b:9c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "Swedish Government Root Authority v2"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509  
CKA\_SUBJECT MULTILINE\_OCTAL  
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END

CKA\_ID UTF8 "0"

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\201\150\036\107\307\351\055\272\357\215\334\016\243\043\303\262  
\055\265\107\261\213\264\076\047\110\347\334\010\142\014\124\376  
\103\327\225\112\277\007\057\112\100\176\006\245\121\207\046\211  
\005\335\074\312\117\376\034\047\351\333\210\036\300\262\376\343  
\357\037\176\261\350\131\225\240\117\253\012\211\000\340\163\262  
\347\034\301\027\120\200\207\114\322\103\031\131\225\322\133\024  
\133\012\133\300\174\211\161\172\265\012\300\212\105\057\356\304  
\300\376\124\055\347\225\044\167\005\056\356\164\306\240\220\261  
\163\334\102\326\240\165\311\130\131\005\242\336\021\277\131\351  
\015\247\046\302\156\300\106\212\306\036\323\365\352\017\175\075  
\162\315\031\225\114\272\340\150\227\215\130\300\152\357\171\367  
\262\150\152\270\162\066\303\044\014\350\062\355\275\361\237\310  
\357\336\165\322\333\166\251\224\047\070\364\001\141\277\146\070  
\217\152\075\334\000\133\263\374\104\337\003\113\371\361\166\045  
\065\377\122\037\010\035\320\245\024\351\213\006\053\170\203\054  
\161\134\117\221\207\143\326\014\016\005\210\074\224\240\261\132  
\124\026\337\335\121\303\250\066\056\054\202\174\271\232\260

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Swedish

Government Root Authority v2"

# Issuer: CN=Swedish Government Root Authority v2,O=Swedish Social Insurance Agency,C=SE

# Serial Number:54:12:15:9f:ab:8a:75:93:44:94:ca:77:40:56:2e:ef

# Subject: CN=Swedish Government Root Authority v2,O=Swedish Social Insurance Agency,C=SE

# Not Valid Before: Tue May 05 11:15:23 2015

# Not Valid After: Sat May 05 11:24:19 2040

# Fingerprint (MD5): 33:85:e1:95:66:4b:83:50:73:42:c2:e0:da:a0:40:92



# Fingerprint (SHA1): 32:f4:42:09:3b:36:d7:03:1b:75:ca:4d:ad:dc:b3:27:fa:a0:2b:9c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Swedish Government Root Authority v2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\062\364\102\011\073\066\327\003\033\165\312\115\255\334\263\047  
\372\240\053\234

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\063\205\341\225\146\113\203\120\163\102\302\340\332\240\100\222  
END

CKA\_ISSUER MULTILINE\_OCTAL

\060\146\061\013\060\011\006\003\125\004\006\023\002\123\105\061  
\050\060\046\006\003\125\004\012\023\037\123\167\145\144\151\163  
\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156  
\143\145\040\101\147\145\156\143\171\061\055\060\053\006\003\125  
\004\003\023\044\123\167\145\144\151\163\150\040\107\157\166\145  
\162\156\155\145\156\164\040\122\157\157\164\040\101\165\164\150  
\157\162\151\164\171\040\166\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\124\022\025\237\253\212\165\223\104\224\312\167\100\126  
\056\357

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Tunisian Root Certificate Authority - TunRootCA2"

# Issuer: O=National Digital Certification Agency,CN=Tunisian Root Certificate Authority - TunRootCA2,C=TN

# Serial Number:21:66:15:05:05:27:05:05:bc:8a:b0:1d:af:0a:be:c4

# Subject:

O=National Digital Certification Agency,CN=Tunisian Root Certificate Authority - TunRootCA2,C=TN

# Not Valid Before: Tue May 05 08:57:01 2015

# Not Valid After: Wed May 05 08:57:01 2027

# Fingerprint (MD5): 03:d1:25:b1:f0:55:ad:ca:dd:7c:59:93:50:ef:17:21

# Fingerprint (SHA1): 96:38:63:3c:90:56:ae:88:14:a0:65:d2:3b:dc:60:a0:ee:70:2f:a7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Tunisian Root Certificate Authority - TunRootCA2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\170\061\013\060\011\006\003\125\004\006\023\002\124\116\061  
\071\060\067\006\003\125\004\003\023\060\124\165\156\151\163\151  
\141\156\040\122\157\157\164\040\103\145\162\164\151\146\151\143  
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040  
\124\165\156\122\157\157\164\103\101\062\061\056\060\054\006\003  
\125\004\012\023\045\116\141\164\151\157\156\141\154\040\104\151  
\147\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\101\147\145\156\143\171

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\170\061\013\060\011\006\003\125\004\006\023\002\124\116\061  
\071\060\067\006\003\125\004\003\023\060\124\165\156\151\163\151  
\141\156\040\122\157\157\164\040\103\145\162\164\151\146\151\143  
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040  
\124\165\156\122\157\157\164\103\101\062\061\056\060\054\006\003  
\125\004\012\023\045\116\141\164\151\157\156\141\154\040\104\151  
\147\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\101\147\145\156\143\171

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\041\146\025\005\005\047\005\005\274\212\260\035\257\012  
\276\304

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\274\060\202\003\244\240\003\002\001\002\002\020\041  
\146\025\005\005\047\005\005\274\212\260\035\257\012\276\304\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\170  
\061\013\060\011\006\003\125\004\006\023\002\124\116\061\071\060  
\067\006\003\125\004\003\023\060\124\165\156\151\163\151\141\156  
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164  
\145\040\101\165\164\150\157\162\151\164\171\040\055\040\124\165  
\156\122\157\157\164\103\101\062\061\056\060\054\006\003\125\004  
\012\023\045\116\141\164\151\157\156\141\154\040\104\151\147\151  
\164\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\147\145\156\143\171\060\036\027\015\061\065\060\065  
\060\065\060\070\065\067\060\061\132\027\015\062\067\060\065\060  
\065\060\070\065\067\060\061\132\060\170\061\013\060\011\006\003  
\125\004\006\023\002\124\116\061\071\060\067\006\003\125\004\003  
\023\060\124\165\156\151\163\151\141\156\040\122\157\157\164\040  
\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150  
\157\162\151\164\171\040\055\040\124\165\156\122\157\157\164\103  
\101\062\061\056\060\054\006\003\125\004\012\023\045\116\141\164  
\151\157\156\141\154\040\104\151\147\151\164\141\154\040\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\147\145\156  
\143\171\060\202\002\042\060\015\006\011\052\206\110\206\367\015

\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202  
\002\001\000\260\007\347\142\373\320\015\125\316\147\267\127\215  
\156\014\251\047\124\036\353\251\044\253\147\217\217\234\141\017  
\333\050\062\057\073\370\054\145\222\055\256\272\063\222\300\053  
\236\362\037\136\155\043\135\263\130\037\215\241\300\155\165\205  
\012\260\023\116\133\126\106\213\071\275\013\202\273\072\103\233  
\010\272\106\356\371\027\353\315\310\327\343\165\023\336\256\121  
\110\012\316\040\225\106\237\002\354\125\214\164\252\132\374\374  
\352\011\063\065\156\243\107\006\307\335\176\204\150\016\307\022  
\312\224\303\355\346\154\002\155\336\002\211\065\263\004\313\105  
\370\174\107\244\323\037\337\345\134\043\342\363\042\173\271\113  
\242\375\027\065\135\110\351\277\365\263\045\143\213\347\170\353  
\374\165\047\275\210\134\246\205\077\101\337\225\174\335\172\106  
\217\376\036\332\261\253\330\323\216\315\006\214\311\330\122\102  
\021\122\242\203\217\134\203\173\344\047\266\217\037\240\136\075  
\322\165\175\171\123\223\006\227\343\003\307\226\054\332\001\074  
\171\305\073\120\350\260\323\241\244\342\323\203\175\104\370\020  
\317\240\032\052\362\145\200\275\167\301\230\145\166\256\022\041  
\142\312\072\276\276\265\231\303\133\304\321\277\233\300\012\312  
\130\036\025\246\327\041\136\261\115\012\345\160\170\232\150\346  
\164\146\062\024\052\036\021\276\210\367\006\366\125\243\303\037  
\156\027\220\125\321\212\100\211\126\103\325\117\346\242\311\210  
\144\000\005\121\077\127\264\074\266\276\152\221\161\100\361\242  
\134\361\327\355\234\266\127\366\131\324\052\021\345\324\345\277  
\273\036\321\310\327\137\104\005\233\273\211\072\255\247\103\167  
\176\025\140\174\210\135\233\354\245\134\322\106\255\014\213\124  
\105\324\224\121\125\105\122\252\134\330\021\254\370\126\042\154  
\331\322\024\351\267\116\102\205\124\106\370\001\306\075\046\006  
\167\350\262\065\033\360\235\102\311\177\376\200\047\001\120\313  
\177\305\254\124\372\153\155\226\214\101\244\241\322\347\265\221  
\110\157\167\034\213\302\053\164\376\074\134\304\135\224\316\253  
\361\040\226\153\301\014\132\137\371\345\065\271\154\243\020\147  
\357\221\252\110\016\357\110\267\166\130\142\331\276\236\102\263  
\244\275\065\002\003\001\000\001\243\102\060\100\060\035\006\003  
\125\035\016\004\026\004\024\314\163\305\243\152\051\061\227\247  
\215\240\330\124\301\012\165\266\043\077\246\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011  
\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000  
\056\362\207\110\355\231\236\237\001\014\074\311\012\170\123\174  
\030\065\336\266\345\154\364\000\200\341\233\213\331\372\373\252  
\373\145\267\322\311\365\327\247\313\176\311\261\242\161\130\155  
\131\067\326\340\063\020\312\265\331\162\333\116\045\067\252\246  
\335\035\030\275\365\311\212\234\172\210\356\037\002\304\055\222  
\124\175\127\342\134\031\030\043\002\172\134\111\225\266\230\347  
\302\140\101\145\100\273\354\132\267\161\234\120\362\163\166\373  
\137\015\357\065\317\264\151\215\205\350\114\220\027\003\013\311  
\263\056\040\067\143\021\142\246\117\343\064\340\373\171\125\347

```
\306\302\256\102\376\260\064\154\111\043\016\162\007\173\146\005
\125\110\373\022\017\240\300\372\116\321\373\075\314\376\375\026
\113\126\120\315\021\054\247\233\367\261\012\317\246\353\357\335
\216\270\256\102\010\174\244\214\224\352\206\307\103\343\367\074
\212\337\107\322\060\100\310\055\123\365\157\021\111\314\041\214
\226\103\117\020\240\107\241\126\215\037\034\133\330\126\133\353
\064\166\341\065\072\161\324\314\041\057\236\065\050\362\132\336
\236\344\356\107\152\020\350\070\275\112\264\175\004\177\005\256
\110\012\264\003\277\056\263\012\033\237\313\255\335\115\320\207
\041\267\107\166\202\203\055\307\127\276\232\025\243\033\060\030
\154\243\072\161\157\144\107\050\222\333\021\141\040\232\167\145
\055\371\254\126\023\154\113\243\137\377\233\244\350\357\347\130
\350\173\236\073\177\152\247\276\071\012\023\224\311\110\116\146
\144\330\123\114\354\101\153\375\374\066\056\327\016\337\141\013
\173\265\100\254\335\102\111\155\236\200\277\140\225\360\351\300
\077\173\273\030\351\070\265\126\116\247\176\212\142\357\230\036
\370\170\100\251\273\330\351\345\264\264\371\343\147\234\354\123
\317\270\102\264\057\223\201\065\240\154\366\272\040\212\150\075
\367\155\377\177\323\114\367\172\224\150\003\167\103\073\065\121
\252\123\022\076\107\023\024\071\254\326\145\217\250\106\377\074
\041\364\322\277\320\110\244\176\247\121\233\227\022\365\231\064
\027\043\126\204\023\143\313\064\312\037\312\272\250\007\051\363
\103\044\012\111\177\375\016\324\220\360\253\103\041\142\234\217
END
```

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Tunisian Root Certificate

Authority - TunRootCA2"

# Issuer: O=National Digital Certification Agency,CN=Tunisian Root Certificate Authority - TunRootCA2,C=TN

# Serial Number:21:66:15:05:05:27:05:05:bc:8a:b0:1d:af:0a:be:c4

# Subject: O=National Digital Certification Agency,CN=Tunisian Root Certificate Authority - TunRootCA2,C=TN

# Not Valid Before: Tue May 05 08:57:01 2015

# Not Valid After: Wed May 05 08:57:01 2027

# Fingerprint (MD5): 03:d1:25:b1:f0:55:ad:ca:dd:7c:59:93:50:ef:17:21

# Fingerprint (SHA1): 96:38:63:3c:90:56:ae:88:14:a0:65:d2:3b:dc:60:a0:ee:70:2f:a7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Tunisian Root Certificate Authority - TunRootCA2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\226\070\143\074\220\126\256\210\024\240\145\322\073\334\140\240
```

```
\356\160\057\247
```

END

```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\003\321\045\261\360\125\255\312\335\174\131\223\120\357\027\041
END
CKA_ISSUER MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\071\060\067\006\003\125\004\003\023\060\124\165\156\151\163\151
\141\156\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\124\165\156\122\157\157\164\103\101\062\061\056\060\054\006\003
\125\004\012\023\045\116\141\164\151\157\156\141\154\040\104\151
\147\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\147\145\156\143\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\041\146\025\005\005\047\005\005\274\212\260\035\257\012
\276\304
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "OpenTrust Root CA G2"
Issuer: CN=OpenTrust Root CA G2,O=OpenTrust,C=FR
Serial Number:11:20:a1:69:1b:bf:bd:b9:bd:52:96:8f:23:e8:48:bf:26:11
#
Subject: CN=OpenTrust Root CA G2,O=OpenTrust,C=FR
Not Valid Before: Mon May 26 00:00:00 2014
Not Valid After: Fri Jan 15 00:00:00 2038
Fingerprint (MD5): 57:24:b6:59:24:6b:ae:c8:fe:1c:0c:20:f2:c0:4e:eb
Fingerprint (SHA1): 79:5f:88:60:c5:ab:7c:3d:92:e6:cb:f4:8d:e1:45:cd:11:ef:60:0b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OpenTrust Root CA G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL

```

\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162  
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160  
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040  
\107\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\022\021\040\241\151\033\277\275\271\275\122\226\217\043\350  
\110\277\046\021

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\157\060\202\003\127\240\003\002\001\002\002\022\021  
\040\241\151\033\277\275\271\275\122\226\217\043\350\110\277\046  
\021\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000  
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162  
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160  
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040  
\107\062\060\036\027\015\061\064\060\065\062\066\060\060\060\060  
\060\060\132\027\015\063\070\060\061\061\065\060\060\060\060\060  
\060\132\060\100\061\013\060\011\006\003\125\004\006\023\002\106  
\122\061\022\060\020\006\003\125\004\012\014\011\117\160\145\156  
\124\162\165\163\164\061\035\060\033\006\003\125\004\003\014\024  
\117\160\145\156\124\162\165\163\164\040\122\157\157\164\040\103  
\101\040\107\062\060\202\002\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012  
\002\202\002\001\000\314\266\127\245\063\224\020\201\062\123\337  
\141\176\017\166\071\317\134\302\123\165\035\111\172\226\070\335  
\242\163\152\361\157\336\136\242\132\271\161\041\276\066\331\241  
\374\274\356\154\250\174\064\032\161\032\350\032\330\137\016\104  
\006\355\247\340\363\322\141\013\340\062\242\226\321\070\360\302  
\332\001\027\374\344\254\117\350\356\211\036\164\253\117\277\036  
\011\266\066\152\126\363\341\356\226\211\146\044\006\344\315\102  
\072\112\335\340\232\260\304\202\105\263\376\311\253\134\174\076  
\311\353\027\057\014\175\156\256\245\217\310\254\045\012\157\372  
\325\105\230\322\065\011\366\003\103\224\376\331\277\040\225\171  
\200\230\212\331\211\065\273\121\033\244\067\175\374\231\073\253  
\377\277\254\015\217\103\261\231\173\026\020\176\035\157\107\304  
\025\217\004\226\010\006\102\004\370\204\326\035\274\221\246\102  
\276\111\325\152\210\077\274\055\121\321\236\215\340\122\314\127  
\335\065\065\130\333\264\217\044\210\344\213\337\334\153\124\322  
\201\053\262\316\222\113\034\037\106\372\035\330\222\313\166\147  
\265\011\231\011\345\254\027\024\125\160\306\074\240\126\012\003  
\263\334\142\031\337\310\265\060\177\365\074\046\165\021\275\327  
\033\263\207\236\007\257\145\161\345\240\317\032\247\011\020\035  
\223\211\146\133\350\074\142\062\265\265\072\156\351\205\001\213  
\236\103\214\147\163\050\131\133\353\343\334\054\314\245\046\162

\142\022\264\346\234\203\104\366\121\244\342\300\172\044\127\312  
\016\245\077\072\265\073\213\345\166\356\160\346\222\336\026\134  
\050\133\227\031\047\222\376\172\222\124\316\223\071\012\026\207  
\274\143\263\365\261\223\134\340\156\267\320\352\371\142\062\210  
\104\373\277\047\050\266\060\225\135\022\050\271\225\276\217\123  
\030\345\242\030\026\342\126\244\262\054\020\365\035\067\246\370  
\267\366\320\131\134\211\367\302\325\265\224\164\321\325\376\033  
\266\360\346\326\036\173\322\074\313\250\343\365\030\363\041\037  
\156\357\115\150\006\173\055\135\156\103\211\246\300\371\240\277  
\202\036\317\123\177\264\353\054\333\135\366\152\175\100\044\005  
\162\211\070\001\223\313\161\302\071\135\006\021\366\157\170\370  
\067\015\071\204\047\002\003\001\000\001\243\143\060\141\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\035\006\003\125\035\016\004\026\004\024\152\071\372\102\042\367  
\346\211\000\115\136\175\063\203\313\270\156\167\206\257\060\037  
\006\003\125\035\043\004\030\060\026\200\024\152\071\372\102\042  
\367\346\211\000\115\136\175\063\203\313\270\156\167\206\257\060  
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\003\202  
\002\001\000\230\313\253\100\074\345\063\002\227\177\055\207\246  
\217\324\136\112\257\270\036\347\273\161\373\200\144\045\251\263  
\032\076\150\135\047\046\247\272\052\341\360\127\203\012\144\117  
\036\042\164\033\351\220\137\360\254\317\377\117\150\172\070\244  
\020\154\015\261\307\244\167\200\030\266\242\050\104\166\247\064  
\235\161\204\057\312\131\322\107\210\231\101\042\311\060\230\141  
\156\075\250\250\005\155\321\037\300\121\104\126\177\047\065\002  
\335\136\230\012\102\353\060\277\215\241\233\121\252\073\352\223  
\106\144\305\000\171\336\041\153\366\127\240\206\327\006\162\354  
\160\106\113\213\163\335\240\041\165\076\334\035\300\217\323\117  
\163\034\205\331\376\177\142\310\225\157\266\323\173\214\272\123  
\302\157\233\104\114\171\320\035\160\263\327\237\002\364\262\007  
\260\307\345\370\255\043\016\246\126\311\051\022\167\110\331\057  
\106\375\073\360\374\164\160\222\245\216\070\010\037\144\060\266  
\267\113\373\066\254\020\216\240\122\063\143\235\003\065\126\305  
\151\275\306\043\132\047\224\366\244\022\370\055\063\074\241\126  
\245\137\326\031\351\355\174\010\275\167\315\047\144\314\224\332  
\116\106\120\207\340\371\301\123\200\036\273\255\373\107\122\213  
\033\375\242\371\336\016\042\267\075\063\131\154\324\336\365\225  
\006\062\015\121\031\101\134\076\117\006\367\271\053\200\047\366  
\243\252\172\174\006\341\103\303\023\071\142\032\066\275\340\050  
\056\224\002\344\051\056\140\125\256\100\075\260\164\222\136\360  
\040\144\226\077\137\105\135\210\265\212\332\002\240\133\105\124  
\336\070\075\011\300\250\112\145\106\026\374\252\277\124\116\115  
\133\276\070\103\267\050\312\213\063\252\032\045\272\045\134\051  
\057\133\112\156\214\352\055\234\052\366\005\166\340\167\227\200  
\210\335\147\023\157\035\150\044\213\117\267\164\201\345\364\140  
\237\172\125\327\076\067\332\026\153\076\167\254\256\030\160\225  
\010\171\051\003\212\376\301\073\263\077\032\017\244\073\136\037

```
\130\241\225\311\253\057\163\112\320\055\156\232\131\017\125\030
\170\055\074\121\246\227\213\346\273\262\160\252\114\021\336\377
\174\053\067\324\172\321\167\064\217\347\371\102\367\074\201\014
\113\122\012
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL

CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "OpenTrust Root CA G2"

# Issuer: CN=OpenTrust Root CA G2,O=OpenTrust,C=FR

# Serial Number: 11:20:a1:69:1b:bf:bd:b9:bd:52:96:8f:23:e8:48:bf:26:11

# Subject: CN=OpenTrust Root CA G2,O=OpenTrust,C=FR

# Not Valid Before: Mon May 26 00:00:00 2014

# Not Valid After: Fri Jan 15 00:00:00 2038

# Fingerprint (MD5): 57:24:b6:59:24:6b:ae:c8:fe:1c:0c:20:f2:c0:4e:eb

# Fingerprint (SHA1): 79:5f:88:60:c5:ab:7c:3d:92:e6:cb:f4:8d:e1:45:cd:11:ef:60:0b

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "OpenTrust Root CA G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\171\137\210\140\305\253\174\075\222\346\313\364\215\341\105\315
\021\357\140\013
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\127\044\266\131\044\153\256\310\376\034\014\040\362\300\116\353
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\062
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\022\021\040\241\151\033\277\275\271\275\122\226\217\043\350
\110\277\046\021
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE



```
Microsoft Code Signing Only Certificate
Certificate "OpenTrust Root CA G3"
Issuer: CN=OpenTrust Root CA G3,O=OpenTrust,C=FR
Serial Number:11:20:e6:f8:4c:fc:24:b0:be:05:40:ac:da:83:1b:34:60:3f
Subject: CN=OpenTrust Root CA G3,O=OpenTrust,C=FR
Not Valid Before: Mon May 26 00:00:00 2014
Not Valid After: Fri Jan 15 00:00:00 2038
Fingerprint (MD5):
 21:37:b4:17:16:92:7b:67:46:70:a9:96:d7:a8:13:24
Fingerprint (SHA1): 6e:26:64:f3:56:bf:34:55:bf:d1:93:3f:7c:01:de:d8:13:da:8a:a6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OpenTrust Root CA G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\040\346\370\114\374\044\260\276\005\100\254\332\203
\033\064\140\077
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\041\060\202\001\246\240\003\002\001\002\002\022\021
\040\346\370\114\374\044\260\276\005\100\254\332\203\033\064\140
\077\060\012\006\010\052\206\110\316\075\004\003\003\060\100\061
\013\060\011\006\003\125\004\006\023\002\106\122\061\022\060\020
\006\003\125\004\012\014\011\117\160\145\156\124\162\165\163\164
\061\035\060\033\006\003\125\004\003\014\024\117\160\145\156\124
\162\165\163\164\040\122\157\157\164\040\103\101\040\107\063\060
\036\027\015\061\064\060\065\062\066\060\060\060\060\060\060\132
\027\015\063\070\060\061\061\065\060\060\060\060\060\060\132\060
\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061\022
```

\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162\165  
\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160\145  
\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040\107  
\063\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005  
\053\201\004\000\042\003\142\000\004\112\356\130\256\115\312\146  
\336\006\072\243\021\374\340\030\360\156\034\272\055\060\014\211  
\331\326\356\233\163\203\251\043\025\214\057\131\212\132\335\024  
\352\235\131\053\103\267\006\354\062\266\272\356\101\265\255\135  
\241\205\314\352\035\024\146\243\147\176\106\342\224\363\347\266  
\126\241\025\131\241\117\067\227\271\042\036\275\021\353\364\262  
\037\136\303\024\232\345\331\227\231\243\143\060\141\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035  
\006\003\125\035\016\004\026\004\024\107\167\303\024\213\142\071  
\014\311\157\341\120\115\320\020\130\334\225\210\155\060\037\006  
\003\125\035\043\004\030\060\026\200\024\107\167\303\024\213\142  
\071\014\311\157\341\120\115\320\020\130\334\225\210\155\060\012  
\006\010\052\206\110\316\075\004\003\003\003\151\000\060\146\002  
\061\000\217\250\334\235\272\014\004\027\372\025\351\075\057\051  
\001\227\277\201\026\063\100\223\154\374\371\355\200\160\157\252  
\217\333\204\302\213\365\065\312\006\334\144\157\150\026\341\217  
\221\271\002\061\000\330\113\245\313\302\320\010\154\351\030\373  
\132\335\115\137\044\013\260\000\041\045\357\217\247\004\046\161  
\342\174\151\345\135\232\370\101\037\073\071\223\223\235\125\352  
\315\215\361\373\301

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "OpenTrust Root CA G3"

# Issuer: CN=OpenTrust Root CA G3,O=OpenTrust,C=FR

# Serial Number:11:20:e6:f8:4c:fc:24:b0:be:05:40:ac:da:83:1b:34:60:3f

# Subject: CN=OpenTrust Root CA G3,O=OpenTrust,C=FR

# Not Valid Before: Mon May 26 00:00:00 2014

# Not Valid After: Fri Jan 15 00:00:00 2038

# Fingerprint (MD5): 21:37:b4:17:16:92:7b:67:46:70:a9:96:d7:a8:13:24

# Fingerprint (SHA1): 6e:26:64:f3:56:bf:34:55:bf:d1:93:3f:7c:01:de:d8:13:da:8a:a6

CKA\_CLASS CK\_OBJECT\_CLASS

CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "OpenTrust Root CA G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\156\046\144\363\126\277\064\125\277\321\223\077\174\001\336\330

```

\023\332\212\246
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\041\067\264\027\026\222\173\147\106\160\251\226\327\250\023\044
END
CKA_ISSUER MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\040\346\370\114\374\044\260\276\005\100\254\332\203
\033\064\140\077
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Certplus Root CA G1"
Issuer: CN=Certplus Root CA G1,O=Certplus,C=FR
Serial Number:11:20:55:83:e4:2d:3e:54:56:85:2d:83:37:b7:2c:dc:46:11
Subject: CN=Certplus Root CA G1,O=Certplus,C=FR
Not Valid Before: Mon May 26 00:00:00 2014
Not Valid After: Fri Jan 15 00:00:00 2038
Fingerprint (MD5): 7f:09:9c:f7:d9:b9:5c:69:69:56:d5:37:3e:14:0d:42
Fingerprint (SHA1): 22:fd:d0:b7:fd:a2:4e:0d:ac:49:2c:a0:ac:a6:7b:6a:1f:e3:f7:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certplus Root CA G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154

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\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162  
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\022\021\040\125\203\344\055\076\124\126\205\055\203\067\267  
\054\334\106\021  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\005\153\060\202\003\123\240\003\002\001\002\002\022\021  
\040\125\203\344\055\076\124\126\205\055\203\067\267\054\334\106  
\021\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000  
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154  
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162  
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061  
\060\036\027\015\061\064\060\065\062\066\060\060\060\060\060  
\132\027\015\063\070\060\061\061\065\060\060\060\060\060\132  
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154  
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162  
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\332\120\207\266\332\270\251\076\235\144\372\126\063\232\126  
\075\026\345\003\225\262\064\034\232\155\142\005\324\330\217\347  
\211\144\237\272\333\144\213\144\346\171\052\141\315\257\217\132  
\211\221\145\271\130\374\264\003\137\221\077\055\020\025\340\176  
\317\274\374\177\103\147\250\255\136\066\043\330\230\263\115\363  
\103\236\071\174\052\374\354\210\325\210\356\160\275\205\026\055  
\352\113\211\074\243\161\102\376\034\375\323\034\055\020\270\206  
\124\352\103\270\333\306\207\332\250\256\200\045\317\172\046\035  
\252\221\260\110\157\256\265\336\236\330\327\372\000\375\306\217  
\320\121\273\142\175\244\261\214\262\377\040\021\272\065\143\005  
\206\107\140\103\063\220\366\107\242\003\117\226\115\235\117\301  
\352\352\234\242\376\064\056\336\267\312\033\166\244\267\255\237  
\351\250\324\170\077\170\376\362\070\011\066\035\322\026\002\310  
\354\052\150\257\365\216\224\357\055\023\172\036\102\112\035\025  
\061\256\014\004\127\374\141\163\363\061\126\206\061\200\240\304  
\021\156\060\166\343\224\360\137\004\304\254\207\162\211\230\305  
\235\314\127\010\232\364\014\374\175\172\005\072\372\107\200\071  
\266\317\204\023\167\157\047\352\377\226\147\027\010\155\351\015  
\326\043\120\060\260\025\164\023\076\345\057\377\016\315\304\013  
\112\135\360\330\000\063\111\146\353\241\030\174\131\056\075\050  
\271\141\161\313\265\245\272\270\352\334\342\160\157\010\152\334  
\207\147\064\357\337\060\162\335\363\311\077\043\377\065\341\276  
\041\051\040\060\201\344\031\245\040\351\045\312\163\061\164\051  
\276\342\102\325\363\262\046\146\307\150\375\031\263\347\040\223  
\231\350\135\340\136\207\347\106\350\045\234\012\051\044\324\315

\130\206\122\100\044\262\173\017\230\022\040\044\366\220\154\107  
\310\015\273\030\040\056\331\375\374\213\362\051\352\207\164\225  
\340\102\120\170\204\004\101\141\260\364\041\043\217\055\313\050  
\041\362\152\154\364\032\246\305\024\264\067\145\117\225\375\200  
\310\370\162\345\045\153\304\140\261\173\155\216\112\212\163\316  
\131\373\160\172\163\006\023\331\323\164\067\044\101\012\021\157  
\227\334\347\344\176\241\275\025\362\272\207\017\075\150\212\026  
\007\002\003\001\000\001\243\143\060\141\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125  
\035\016\004\026\004\024\250\301\300\233\221\250\103\025\174\135  
\006\047\264\052\121\330\227\013\201\261\060\037\006\003\125\035  
\043\004\030\060\026\200\024\250\301\300\233\221\250\103\025\174  
\135\006\047\264\052\121\330\227\013\201\261\060\015\006\011\052  
\206\110\206\367\015\001\001\015\005\000\003\202\002\001\000\234  
\126\157\001\176\321\275\114\365\212\306\360\046\037\344\340\070  
\030\314\062\303\051\073\235\101\051\064\141\306\327\360\000\241  
\353\244\162\217\224\027\274\023\054\165\264\127\356\012\174\011  
\172\334\325\312\241\320\064\023\370\167\253\237\345\376\330\036  
\164\212\205\007\217\177\314\171\172\312\226\315\315\375\117\373  
\375\043\015\220\365\364\136\323\306\141\175\236\021\340\002\356  
\011\004\331\007\335\246\212\267\014\203\044\273\203\120\222\376  
\140\165\021\076\330\235\260\212\172\265\340\235\233\313\220\122  
\113\260\223\052\324\076\026\063\345\236\306\145\025\076\144\073  
\004\077\333\014\217\137\134\035\151\037\257\363\351\041\214\363  
\357\227\366\232\267\031\266\204\164\234\243\124\265\160\116\143  
\330\127\135\123\041\233\100\222\103\372\326\167\125\063\117\144  
\325\373\320\054\152\216\155\045\246\357\205\350\002\304\123\076  
\271\236\207\274\314\065\032\336\241\351\212\143\207\145\036\021  
\052\333\143\167\227\024\276\232\024\231\021\262\300\356\260\117  
\370\024\041\062\103\117\237\253\242\313\250\017\252\073\006\125  
\306\022\051\127\010\324\067\327\207\047\255\111\131\247\221\253  
\104\172\136\215\160\333\227\316\110\120\261\163\223\366\360\203  
\140\371\315\361\341\061\375\133\174\161\041\143\024\024\252\257  
\305\336\223\176\150\261\354\042\242\252\220\165\236\265\103\162  
\352\144\243\204\113\375\014\250\046\153\161\227\356\126\143\146  
\350\102\124\371\307\035\337\320\217\133\337\310\060\157\210\376  
\015\304\063\034\123\250\243\375\110\020\362\344\012\116\341\025  
\127\374\156\144\060\302\125\021\334\352\251\315\112\124\254\051  
\143\104\317\112\100\240\326\150\131\033\063\371\357\072\213\333  
\040\222\334\102\204\277\001\253\207\300\325\040\202\333\306\271  
\203\205\102\134\017\103\073\152\111\065\325\230\364\025\277\372  
\141\201\014\011\040\030\322\320\027\014\313\110\000\120\351\166  
\202\214\144\327\072\240\007\125\314\036\061\300\357\072\264\145  
\373\343\277\102\153\236\017\250\275\153\230\334\330\333\313\213  
\244\335\327\131\364\156\335\376\252\303\221\320\056\102\007\300  
\014\115\123\315\044\261\114\133\036\121\364\337\351\222\372

END

```

CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "Certplus Root CA G1"
Issuer: CN=Certplus Root CA G1,O=Certplus,C=FR
Serial Number:11:20:55:83:e4:2d:3e:54:56:85:2d:83:37:b7:2c:dc:46:11
Subject: CN=Certplus Root CA G1,O=Certplus,C=FR
Not Valid Before: Mon May 26 00:00:00 2014
Not Valid After: Fri Jan 15 00:00:00 2038
Fingerprint (MD5): 7f:09:9c:f7:d9:b9:5c:69:69:56:d5:37:3e:14:0d:42
Fingerprint (SHA1): 22:fd:d0:b7:fd:a2:4e:0d:ac:49:2c:a0:ac:a6:7b:6a:1f:e3:f7:66
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certplus Root CA G1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\042\375\320\267\375\242\116\015\254\111\054\240\254\246\173\152
\037\343\367\146
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\177\011\234\367\331\271\134\151\151\126\325\067\076\024\015\102
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\040\125\203\344\055\076\124\126\205\055\203\067\267
\054\334\106\021
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Certplus Root CA G2"
Issuer: CN=Certplus Root CA G2,O=Certplus,C=FR
Serial Number:11:20:d9:91:ce:ae:a3:e8:c5:e7:ff:e9:02:af:cf:73:bc:55
Subject: CN=Certplus Root CA G2,O=Certplus,C=FR
#

```

Not Valid Before: Mon May 26 00:00:00 2014  
# Not Valid After: Fri Jan 15 00:00:00 2038  
# Fingerprint (MD5): a7:ee:c4:78:2d:1b:ee:2d:b9:29:ce:d6:a7:96:32:31  
# Fingerprint (SHA1): 4f:65:8e:1f:e9:06:d8:28:02:e9:54:47:41:c9:54:25:5d:69:cc:1a  
CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "Certplus Root CA G2"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509  
CKA\_SUBJECT MULTILINE\_OCTAL  
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154  
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162  
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\062  
END  
CKA\_ID UTF8 "0"  
CKA\_ISSUER MULTILINE\_OCTAL  
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154  
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162  
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\062  
END  
CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\022\021\040\331\221\316\256\243\350\305\347\377\351\002\257  
\317\163\274\125  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\002\034\060\202\001\242\240\003\002\001\002\002\022\021  
\040\331\221\316\256\243\350\305\347\377\351\002\257\317\163\274  
\125\060\012\006\010\052\206\110\316\075\004\003\003\060\076\061  
\013\060\011\006\003\125\004\006\023\002\106\122\061\021\060\017  
\006\003\125\004\012\014\010\103\145\162\164\160\154\165\163\061  
\034\060\032\006\003\125\004\003\014\023\103\145\162\164\160\154  
\165\163\040\122\157\157\164\040\103\101\040\107\062\060\036\027  
\015\061\064\060\065\062\066\060\060\060\060\060\132\027\015  
\063\070\060\061\061\065\060\060\060\060\060\060\132\060\076\061  
\013\060\011\006\003\125\004\006\023\002\106\122\061\021\060\017  
\006\003\125\004\012\014\010\103\145\162\164\160\154\165\163\061  
\034\060\032\006\003\125\004\003\014\023\103\145\162\164\160\154  
\165\163\040\122\157\157\164\040\103\101\040\107\062\060\166\060  
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000  
\042\003\142\000\004\315\017\133\126\202\337\360\105\032\326\255  
\367\171\360\035\311\254\226\326\236\116\234\037\264\102\021\312  
\206\277\155\373\205\243\305\345\031\134\327\356\246\077\151\147  
\330\170\342\246\311\304\333\055\171\056\347\213\215\002\157\061  
\042\115\006\343\140\162\105\235\016\102\167\236\316\317\345\177

```
\205\233\030\344\374\314\056\162\323\026\223\116\312\231\143\134
\241\005\052\154\006\243\143\060\141\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\332\203\143\002\171\216\332\114\306\074\043
\024\330\217\303\040\253\050\140\131\060\037\006\003\125\035\043
\004\030\060\026\200\024\332\203\143\002\171\216\332\114\306\074
\043\024\330\217\303\040\253\050\140\131\060\012\006\010\052\206
\110\316\075\004\003\003\003\150\000\060\145\002\060\160\376\260
\013\331\367\203\227\354\363\125\035\324\334\263\006\016\376\063
\230\235\213\071\220\153\224\041\355\266\327\135\326\114\327\041
\247\347\277\041\017\053\315\367\052\334\205\007\235\002\061\000
\206\024\026\345\334\260\145\302\300\216\024\237\277\044\026\150
\345\274\371\171\151\334\255\105\053\367\266\061\163\314\006\245
\123\223\221\032\223\256\160\152\147\272\327\236\345\141\032\137
END
```

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Certplus Root CA G2"

# Issuer: CN=Certplus Root CA G2,O=Certplus,C=FR

# Serial Number:11:20:d9:91:ce:ae:a3:e8:c5:e7:ff:e9:02:af:cf:73:bc:55

# Subject: CN=Certplus Root CA G2,O=Certplus,C=FR

# Not Valid Before: Mon May 26 00:00:00 2014

# Not Valid After: Fri Jan 15 00:00:00 2038

# Fingerprint (MD5): a7:ee:c4:78:2d:1b:ee:2d:b9:29:ce:d6:a7:96:32:31

# Fingerprint (SHA1):

4f:65:8e:1f:e9:06:d8:28:02:e9:54:47:41:c9:54:25:5d:69:cc:1a

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certplus Root CA G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\117\145\216\037\351\006\330\050\002\351\124\107\101\311\124\045
\135\151\314\032
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\247\356\304\170\055\033\356\055\271\051\316\326\247\226\062\061
```

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\062
```



```
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\040\331\221\316\256\243\350\305\347\377\351\002\257
\317\163\274\125
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "Government Root Certification Authority"
Issuer: O=Government Root Certification Authority,C=TW
Serial Number:b6:4b:88:07:e2:23:ee:c8:5c:12:ad:a6:0e:06:a1:f2
Subject: O=Government Root Certification Authority,C=TW
Not Valid Before: Fri Sep 28 08:58:51 2012
Not Valid After: Thu Dec 31 15:59:59 2037
Fingerprint (MD5): 2f:d4:2d:cd:86:7f:36:b0:5f:1c:e0:53:8d:b6:a2:5b
Fingerprint (SHA1): b0:91:aa:91:38:47:f3:13:d7:27:bc:ef:c8:17:9f:08:6f:3a:8c:0f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Government Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\060\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
```

```
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\060\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
```

```
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\266\113\210\007\342\043\356\310\134\022\255\246\016
\006\241\362
END
```

```
CKA_VALUE MULTILINE_OCTAL
\060\202\005\113\060\202\003\063\240\003\002\001\002\002\021\000
```

\266\113\210\007\342\043\356\310\134\022\255\246\016\006\241\362  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061\060  
\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156\155  
\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171  
\060\036\027\015\061\062\060\071\062\070\060\070\065\070\065\061  
\132\027\015\063\067\061\062\063\061\061\065\065\071\065\071\132  
\060\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061  
\060\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156  
\155\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
\171\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002  
\001\000\266\377\227\074\201\276\001\130\044\047\257\216\001\053  
\326\162\222\060\062\033\137\233\174\324\324\177\350\241\140\163  
\060\127\020\000\372\120\226\044\376\120\346\214\072\225\321\127  
\171\204\325\147\123\014\052\202\076\030\134\270\060\046\032\326  
\136\306\055\262\004\121\016\357\337\014\143\107\353\304\022\010  
\121\053\231\161\136\325\151\173\341\135\311\167\035\040\354\126  
\216\345\141\140\055\374\351\034\200\337\372\152\203\273\005\265  
\036\043\022\234\202\312\012\363\024\035\040\344\006\217\103\044  
\231\237\266\012\223\132\163\033\026\071\276\005\266\361\214\245  
\144\222\217\005\344\134\166\367\071\303\317\055\275\016\330\313  
\250\016\061\233\311\106\017\147\123\103\004\217\310\262\310\203  
\200\137\272\362\017\253\201\065\242\040\041\227\316\017\211\064  
\170\017\317\037\116\351\373\214\050\074\336\064\347\355\237\322  
\146\365\305\312\061\170\322\316\120\321\140\202\143\235\340\114  
\367\007\256\203\064\235\111\111\103\324\176\275\055\342\352\307  
\161\145\200\010\344\066\236\171\160\012\074\207\051\351\344\222  
\224\352\006\222\051\047\170\346\255\327\075\351\012\013\136\364  
\340\326\206\235\055\162\313\213\144\126\346\364\256\170\245\240  
\071\063\130\074\334\250\217\215\264\152\055\375\210\163\351\225  
\120\163\004\337\021\210\076\102\326\002\164\373\054\304\157\274  
\154\326\340\200\157\321\206\245\062\127\003\326\115\364\116\012  
\231\042\166\176\112\100\202\370\311\344\116\313\123\055\307\261  
\266\342\323\302\165\047\156\271\016\161\262\064\374\277\034\116  
\302\075\370\066\351\012\314\130\232\241\030\206\116\342\341\252  
\263\163\131\156\136\235\264\302\010\257\257\134\375\244\002\157  
\377\270\015\273\325\253\327\156\237\032\117\221\100\360\037\106  
\125\155\240\222\303\211\315\267\261\377\034\263\313\243\234\012  
\343\376\315\252\274\001\354\335\124\312\221\335\117\023\207\244  
\366\230\357\375\111\326\127\052\074\246\134\366\140\067\277\330  
\076\176\116\150\052\043\062\072\276\156\344\042\075\007\044\317  
\212\313\233\135\121\263\060\322\161\155\316\106\212\155\174\112  
\063\104\332\022\057\066\113\362\351\361\121\011\155\333\152\227  
\016\027\002\003\001\000\001\243\102\060\100\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003

\125\035\016\004\026\004\024\325\147\035\340\234\172\054\234\313  
\305\230\347\035\007\046\052\206\354\164\315\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052  
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\220  
\073\345\302\123\102\050\352\365\061\116\216\075\221\236\115\011  
\363\330\261\122\346\117\254\014\061\041\273\361\352\231\314\203  
\374\266\050\344\354\204\007\016\017\116\227\273\157\150\106\217  
\016\121\025\225\370\072\073\037\137\202\016\014\161\016\274\221  
\117\256\063\056\043\101\364\046\153\117\023\207\372\170\366\056  
\302\017\221\005\227\252\152\301\152\237\274\204\236\010\052\047  
\335\332\207\027\206\341\263\312\135\355\070\251\051\156\204\336  
\106\153\374\047\031\120\245\022\172\214\175\142\374\332\347\314  
\274\237\111\257\006\270\047\047\362\211\367\026\075\030\346\275  
\336\365\214\022\221\237\343\004\215\376\007\024\032\132\254\071  
\202\033\361\070\031\341\143\343\257\154\266\246\121\027\353\372  
\113\353\213\042\366\227\376\020\072\137\224\240\113\123\161\077  
\132\341\020\370\162\217\226\200\335\215\002\230\000\141\075\215  
\274\055\261\107\314\332\135\341\040\247\214\061\134\361\343\332  
\271\012\206\107\310\241\075\007\243\074\246\163\156\224\221\355  
\156\044\072\371\311\060\321\007\250\201\175\046\175\175\204\337  
\206\311\213\345\256\015\036\276\211\110\121\025\203\230\226\057  
\112\353\163\064\327\164\315\311\157\320\302\272\053\366\232\376  
\231\335\140\024\216\033\371\234\071\074\177\103\211\123\350\345  
\302\253\276\042\255\047\070\233\167\050\267\243\143\143\247\201  
\347\251\151\105\353\216\170\126\314\005\204\307\373\255\266\060  
\174\143\005\237\055\214\044\177\113\213\222\374\070\036\237\240  
\245\127\263\156\235\330\144\270\160\232\140\122\160\310\251\320  
\377\306\234\355\020\141\136\315\203\016\156\350\115\002\101\112  
\342\166\004\171\326\124\077\212\230\062\024\240\335\055\234\347  
\272\202\161\243\206\125\051\231\322\051\333\165\072\367\333\103  
\377\266\133\373\267\176\065\200\216\015\154\256\171\267\066\055  
\227\122\241\260\007\234\007\345\053\066\315\003\227\224\275\055  
\016\064\006\374\300\026\211\374\067\124\344\326\317\075\023\004  
\362\221\331\311\066\056\076\305\132\320\245\114\202\303\377\056  
\174\046\166\367\363\375\105\242\245\156\125\256\056\314\317\054  
\211\064\332\366\015\347\221\250\020\352\027\235\362\366\354

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Government Root Certification Authority"

# Issuer: O=Government Root Certification Authority,C=TW

# Serial Number:b6:4b:88:07:e2:23:ee:c8:5c:12:ad:a6:0e:06:a1:f2

# Subject: O=Government Root Certification Authority,C=TW

# Not Valid Before: Fri Sep 28 08:58:51 2012

```
Not Valid After: Thu Dec 31 15:59:59 2037
Fingerprint (MD5): 2f:d4:2d:cd:86:7f:36:b0:5f:1c:e0:53:8d:b6:a2:5b
Fingerprint (SHA1): b0:91:aa:91:38:47:f3:13:d7:27:bc:ef:c8:17:9f:08:6f:3a:8c:0f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Government Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\260\221\252\221\070\107\363\023\327\047\274\357\310\027\237\010
\157\072\214\017
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\057\324\055\315\206\177\066\260\137\034\340\123\215\266\242\133
END
CKA_ISSUER MULTILINE_OCTAL
\060\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\060\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\266\113\210\007\342\043\356\310\134\022\255\246\016
\006\241\362
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "A-Trust-Root-05"
Issuer: CN=A-Trust-Root-05,OU=A-Trust-Root-05,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr
GmbH,C=AT
Serial Number: 1035700 (0xfcdb4)
Subject: CN=A-Trust-Root-05,OU=A-Trust-Root-05,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
Not Valid Before: Mon Sep 23 13:24:11 2013
Not Valid After: Wed Sep 20 11:24:11 2023
Fingerprint (MD5): f4:6f:96:17:87:40:f4:cf:37:d3:18:29:89:76:e6:0a
Fingerprint (SHA1): 2e:66:c9:84:11:81:c0:8f:b1:df:ab:d4:ff:8d:5c:c7:2b:e0:8f:02
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-Root-05"
```

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124  
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165  
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145  
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155  
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145  
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003  
\125\004\013\014\017\101\055\124\162\165\163\164\055\122\157\157  
\164\055\060\065\061\030\060\026\006\003\125\004\003\014\017\101  
\055\124\162\165\163\164\055\122\157\157\164\055\060\065

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124  
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165  
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145  
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155  
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145  
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003  
\125\004\013\014\017\101\055\124\162\165\163\164\055\122\157\157  
\164\055\060\065\061\030\060\026\006\003\125\004\003\014\017\101  
\055\124\162\165\163\164\055\122\157\157\164\055\060\065

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\003\017\315\264

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\311\060\202\003\261\240\003\002\001\002\002\003\017  
\315\264\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101  
\124\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162  
\165\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150  
\145\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151  
\155\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166  
\145\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006  
\003\125\004\013\014\017\101\055\124\162\165\163\164\055\122\157  
\157\164\055\060\065\061\030\060\026\006\003\125\004\003\014\017  
\101\055\124\162\165\163\164\055\122\157\157\164\055\060\065\060  
\036\027\015\061\063\060\071\062\063\061\063\062\064\061\061\132  
\027\015\062\063\060\071\062\060\061\061\062\064\061\061\132\060  
\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124\061  
\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165\163  
\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145\162  
\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155\040  
\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145\162  
\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003\125

\004\013\014\017\101\055\124\162\165\163\164\055\122\157\157\164  
\055\060\065\061\030\060\026\006\003\125\004\003\014\017\101\055  
\124\162\165\163\164\055\122\157\157\164\055\060\065\060\202\002  
\040\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\002\015\000\060\202\002\010\002\202\002\001\000\344\373  
\214\122\046\245\147\201\204\150\335\202\311\315\250\162\001\131  
\042\077\044\351\022\244\222\227\305\120\316\362\105\077\153\104  
\005\030\272\173\161\257\346\215\273\155\366\344\363\345\334\274  
\344\170\023\043\262\012\104\235\267\275\067\100\326\045\104\120  
\211\316\150\322\303\142\247\104\241\043\105\257\137\006\161\166  
\106\341\151\377\342\041\340\077\317\062\225\352\210\046\247\040  
\254\302\161\135\060\311\014\354\104\055\316\305\145\174\327\007  
\176\065\366\015\030\026\115\173\253\363\252\017\175\336\350\214  
\224\056\223\320\267\156\110\070\304\002\042\032\337\040\245\202  
\143\277\123\325\104\025\006\073\244\073\172\334\266\356\220\213  
\100\002\264\237\300\366\161\063\131\246\042\323\260\150\043\077  
\375\204\310\226\260\371\160\113\057\064\206\375\045\125\231\321  
\315\167\047\070\304\155\134\031\352\353\176\023\206\001\240\020  
\100\046\107\037\276\024\276\137\245\270\077\140\241\156\341\041  
\216\023\045\170\056\247\172\315\130\257\176\133\254\077\316\017  
\263\362\127\174\325\173\155\311\323\374\255\225\255\033\277\207  
\230\117\047\346\013\251\150\073\344\054\054\365\024\107\327\251  
\135\202\366\342\233\267\040\341\345\032\153\054\170\010\215\154  
\165\214\352\067\226\211\235\131\351\164\062\057\030\060\030\072  
\004\045\113\006\355\306\147\147\046\200\152\137\201\167\060\036  
\236\321\164\217\137\214\300\124\152\354\244\030\141\231\172\035  
\371\235\371\350\371\361\357\162\276\316\057\031\222\174\343\050  
\257\321\270\270\157\320\140\276\170\130\244\056\067\072\262\047  
\211\021\121\242\136\211\274\035\314\127\145\113\111\114\023\020  
\002\256\127\276\114\041\361\042\252\036\240\222\324\124\054\270  
\233\174\063\150\047\020\052\035\113\377\006\012\002\223\200\207  
\031\257\277\250\203\022\020\216\175\020\245\053\220\350\016\340  
\024\206\105\366\327\345\126\163\226\037\217\236\074\052\243\032  
\136\054\220\146\205\157\001\166\275\263\360\051\310\047\212\251  
\251\043\260\325\362\360\312\325\275\266\062\160\314\057\034\131  
\277\352\303\006\244\140\337\253\211\156\107\024\357\205\220\153  
\150\043\226\116\006\323\261\047\243\003\303\271\331\275\002\001  
\003\243\066\060\064\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\021\006\003\125\035\016\004\012\004  
\010\100\371\271\147\276\003\322\010\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110  
\206\367\015\001\001\013\005\000\003\202\002\001\000\342\052\145  
\306\153\132\053\310\250\064\313\227\021\035\046\037\243\262\316  
\270\074\053\041\237\230\364\027\037\015\266\173\256\313\020\155  
\203\362\143\301\210\256\351\300\122\102\256\067\237\013\231\127  
\122\350\105\176\230\224\351\051\107\237\361\007\301\102\010\363  
\163\074\252\153\065\263\154\025\053\221\061\033\344\176\222\347  
\303\305\246\041\070\337\033\276\321\237\226\015\120\266\365\173

\224\243\055\252\257\267\215\322\073\055\174\202\020\324\152\112  
\311\141\243\246\217\247\262\240\331\124\303\227\177\321\211\314  
\143\370\331\337\070\130\225\272\001\120\314\012\363\213\111\074  
\177\077\075\250\363\150\314\307\230\323\331\065\060\367\016\202  
\136\370\020\141\256\274\116\360\053\064\172\242\232\366\333\215  
\257\353\003\114\047\303\336\256\154\335\125\024\257\077\035\353  
\217\232\266\170\111\356\274\371\036\167\140\002\044\334\336\336  
\351\245\373\221\246\034\172\262\111\340\367\277\035\007\256\206  
\313\273\331\000\327\313\001\030\357\350\303\217\014\007\060\160  
\130\301\362\143\352\214\375\266\255\343\350\007\074\075\133\005  
\207\164\313\065\345\357\011\267\273\240\204\151\274\101\161\143  
\333\062\234\101\341\137\176\332\166\155\223\243\256\205\372\345  
\214\311\122\254\047\313\140\263\066\054\111\251\004\336\270\047  
\053\011\061\304\222\223\351\214\321\244\113\375\276\126\121\260  
\330\267\316\235\105\303\033\110\057\321\263\060\367\176\134\251  
\133\061\077\345\005\233\341\166\251\327\365\051\206\163\127\034  
\275\057\333\327\031\026\364\045\064\361\203\026\264\062\130\013  
\261\131\116\343\213\320\243\053\213\033\100\302\367\343\122\250  
\116\112\356\165\351\355\143\231\033\006\373\060\215\374\036\127  
\231\354\316\024\050\343\240\215\055\353\357\007\036\014\002\216  
\214\110\314\210\332\246\255\171\224\264\254\351\014\060\266\377  
\006\073\024\161\225\205\373\260\172\313\213\110\131\162\333\120  
\000\362\267\215\171\053\315\004\225\222\165\111\002\226\124\242  
\035\124\205\273\140\257\175\175\252\263\275\371\160\074\131\172  
\301\201\374\254\120\000\030\022\344\265\334\135\330\245\130\136  
\035\137\047\151\216\314\333\357\252\127\032\253\204

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "A-Trust-Root-05"

# Issuer: CN=A-Trust-Root-05,OU=A-Trust-Root-05,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT

# Serial Number: 1035700 (0xfcd4)

# Subject: CN=A-Trust-Root-05,OU=A-Trust-Root-05,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT

# Not Valid Before: Mon Sep 23 13:24:11 2013

# Not Valid After: Wed Sep 20 11:24:11 2023

# Fingerprint (MD5): f4:6f:96:17:87:40:f4:cf:37:d3:18:29:89:76:e6:0a

# Fingerprint (SHA1): 2e:66:c9:84:11:81:c0:8f:b1:df:ab:d4:ff:8d:5c:c7:2b:e0:8f:02

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "A-Trust-Root-05"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\056\146\311\204\021\201\300\217\261\337\253\324\377\215\134\307
\053\340\217\002
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\364\157\226\027\207\100\364\317\067\323\030\051\211\166\346\012
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\122\157\157
\164\055\060\065\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\122\157\157\164\055\060\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\017\315\264
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code
 Signing Only Certificate
Certificate "A-Trust-Qual-02"
Issuer: CN=A-Trust-Qual-02,OU=A-Trust-Qual-02,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr
GmbH,C=AT
Serial Number:14:4d:e4
Subject: CN=A-Trust-Qual-02,OU=A-Trust-Qual-02,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
Not Valid Before: Tue Jul 01 11:23:33 2014
Not Valid After: Mon Jul 01 09:23:33 2024
Fingerprint (MD5): 4b:d4:35:43:a8:b2:43:6d:d7:78:e2:89:a2:a9:39:ab
Fingerprint (SHA1): cd:78:7a:3d:5c:ba:82:07:08:28:48:36:5e:9a:cd:e9:68:33:64:d8
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-Qual-02"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165

```



\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145  
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155  
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CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "A-Trust-Qual-02"

# Issuer: CN=A-Trust-Qual-02,OU=A-Trust-Qual-02,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr

```

GmbH,C=AT
Serial Number:14:4d:e4
Subject: CN=A-Trust-Qual-02,OU=A-Trust-Qual-02,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
Not Valid Before: Tue Jul 01 11:23:33 2014
Not Valid After: Mon Jul 01 09:23:33 2024
Fingerprint (MD5): 4b:d4:35:43:a8:b2:43:6d:d7:78:e2:89:a2:a9:39:ab
Fingerprint (SHA1): cd:78:7a:3d:5c:ba:82:07:08:28:48:36:5e:9a:cd:e9:68:33:64:d8
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-Qual-02"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\315\170\172\075\134\272\202\007\010\050\110\066\136\232\315\351
\150\063\144\330
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Thailand National Root Certification Authority - G1"
Issuer: CN=Thailand National Root Certification Authority - G1,OU=Thailand National Root Certification
Authority,O=Electronic Transactions Development Agency (Public Organization),C=TH
Serial Number:51:52:c5:8c
Subject: CN=Thailand National Root Certification Authority - G1,OU=Thailand National Root Certification
Authority,O=Electronic Transactions Development Agency (Public Organization),C=TH

```

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Not Valid Before: Wed Mar 27 09:40:22 2013
Not Valid After: Thu Mar 27 10:10:22 2036
Fingerprint (MD5): da:9d:b6:26:4a:e5:22:a0:bb:8d:a4:f7:bc:0d:25:cc
Fingerprint (SHA1): 66:f2:dc:fb:3f:81:4d:de:e9:b3:20:6f:11:de:fe:1b:fb:df:e1:32
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Thailand National Root Certification Authority
- G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\073\026\050\300\367\137\341\107\121\323\370\006\105\007\360\013  
\272\302\234\230\354\322\177\115\176\375\006\374\163\302\302\125  
\022\142\320\043\104\337\042\344\370\171\347\245\020\116\076\311  
\216\252\203\351\066\352\253\171\306\005\204\315\226\150\174\164  
\254\077\062\377\256\311\100\354\217\120\277\120\250\267\116\325  
\255\066\152\327\047\063\372\347\330\055\331\067\230\205\033\246  
\014\352\173\020\023\160\036\236\210\305\334\076\216\271\015\125  
\337\001\316\320\111\166\121\333\020\142\170\101\255\151\143\245  
\225\011\267\030\006\157\375\004\147\324\020\017\116\333\073\137

```
\014\143\174\353\144\275\156\113\000\250\201\372\222\062\206\060
\214\011\277\175\130\077\145\015\251\067\321\105\343\146\151\304
\150\364\142\251\250\036\067\331\056\231\111\240\260\006\214\100
\177\205\261\365\361\114\113\070\240\010\314\052\331\226\300\354
\300\015\074\056\105\127\303\357\225\332\266\313\356\133\145\250
\053\062\257\311\047\371\025\123\067\165\130\037\113\352\227\242
\042\134\147\126\342\240\314\065\304\254\303\061\100\271\234\003
\172\275\311\110\016\352\152\025\332\234\274\170\157\311\025\347
\144\003\331\111\023\146\105\113\055\364\204\231\263\352\247\022
\225\345\223\056\374
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Thailand National Root Certification Authority - G1"

# Issuer: CN=Thailand National Root

Certification Authority - G1,OU=Thailand National Root Certification Authority,O=Electronic Transactions  
Development Agency (Public Organization),C=TH

# Serial Number:51:52:c5:8c

# Subject: CN=Thailand National Root Certification Authority - G1,OU=Thailand National Root Certification  
Authority,O=Electronic Transactions Development Agency (Public Organization),C=TH

# Not Valid Before: Wed Mar 27 09:40:22 2013

# Not Valid After: Thu Mar 27 10:10:22 2036

# Fingerprint (MD5): da:9d:b6:26:4a:e5:22:a0:bb:8d:a4:f7:bc:0d:25:cc

# Fingerprint (SHA1): 66:f2:dc:fb:3f:81:4d:de:e9:b3:20:6f:11:de:fe:1b:fb:df:e1:32

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Thailand National Root Certification Authority - G1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\146\362\334\373\077\201\115\336\351\263\040\157\021\336\376\033
\373\337\341\062
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\332\235\266\046\112\345\042\240\273\215\244\367\274\015\045\314
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\201\317\061\013\060\011\006\003\125\004\006\023\002\124\110
\061\111\060\107\006\003\125\004\012\014\100\105\154\145\143\164
\162\157\156\151\143\040\124\162\141\156\163\141\143\164\151\157
\156\163\040\104\145\166\145\154\157\160\155\145\156\164\040\101
\147\145\156\143\171\040\050\120\165\142\154\151\143\040\117\162
\147\141\156\151\172\141\164\151\157\156\051\061\067\060\065\006
```

```
\003\125\004\013\014\056\124\150\141\151\154\141\156\144\040\116
\141\164\151\157\156\141\154\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\061\074\060\072\006\003\125\004\003\014\063\124
\150\141\151\154\141\156\144\040\116\141\164\151\157\156\141\154
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\004\121\122\305\214
```

END

CKA\_TRUST\_SERVER\_AUTH

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Certification Authority of WoSign"

# Issuer: CN=Certification Authority of WoSign,O=WoSign CA Limited,C=CN

# Serial Number:5e:68:d6:11:71:94:63:50:56:00:68:f3:3e:c9:c5:91

# Subject: CN=Certification Authority of WoSign,O=WoSign CA Limited,C=CN

# Not Valid Before: Sat Aug 08 01:00:01 2009

# Not Valid After: Mon Aug 08 01:00:01 2039

# Fingerprint (MD5): a1:f2:f9:b5:d2:c8:7a:74:b8:f3:05:f1:d7:e1:84:8d

# Fingerprint (SHA1): b9:42:94:bf:91:ea:8f:b6:4b:e6:10:97:c7:fb:00:13:59:b6:76:cb

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certification Authority of WoSign"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\125\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\052\060\050\006
\003\125\004\003\023\041\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156
```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\125\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\052\060\050\006
\003\125\004\003\023\041\103\145\162\164\151\146\151\143\141\164
```



\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146  
\040\127\157\123\151\147\156

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\136\150\326\021\161\224\143\120\126\000\150\363\076\311  
\305\221

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\166\060\202\003\136\240\003\002\001\002\002\020\136  
\150\326\021\161\224\143\120\126\000\150\363\076\311\305\221\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\125  
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\032\060  
\030\006\003\125\004\012\023\021\127\157\123\151\147\156\040\103  
\101\040\114\151\155\151\164\145\144\061\052\060\050\006\003\125  
\004\003\023\041\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\040\157\146\040\127  
\157\123\151\147\156\060\036\027\015\060\071\060\070\060\070\060  
\061\060\060\060\061\132\027\015\063\071\060\070\060\070\060\061  
\060\060\060\061\132\060\125\061\013\060\011\006\003\125\004\006  
\023\002\103\116\061\032\060\030\006\003\125\004\012\023\021\127  
\157\123\151\147\156\040\103\101\040\114\151\155\151\164\145\144  
\061\052\060\050\006\003\125\004\003\023\041\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\040\157\146\040\127\157\123\151\147\156\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\275\312\215  
\254\270\221\025\126\227\173\153\134\172\302\336\153\331\241\260  
\303\020\043\372\247\241\262\314\061\372\076\331\246\051\157\026  
\075\340\153\370\270\100\137\333\071\250\000\172\213\240\115\124  
\175\302\042\170\374\216\011\270\250\205\327\314\225\227\113\164  
\330\236\176\360\000\344\016\211\256\111\050\104\032\020\231\062  
\017\045\210\123\244\015\263\017\022\010\026\013\003\161\047\034  
\177\341\333\322\375\147\150\304\005\135\012\016\135\160\327\330  
\227\240\274\123\101\232\221\215\364\236\066\146\172\176\126\301  
\220\137\346\261\150\040\066\244\214\044\054\054\107\013\131\166  
\146\060\265\276\336\355\217\370\235\323\273\001\060\346\362\363  
\016\340\054\222\200\363\205\371\050\212\264\124\056\232\355\367  
\166\374\025\150\026\353\112\154\353\056\022\217\324\317\376\014  
\307\134\035\013\176\005\062\276\136\260\011\052\102\325\311\116  
\220\263\131\015\273\172\176\315\325\010\132\264\177\330\034\151  
\021\371\047\017\173\006\257\124\203\030\173\341\335\124\172\121  
\150\156\167\374\306\277\122\112\146\106\241\262\147\032\273\243  
\117\167\240\276\135\377\374\126\013\103\162\167\220\312\236\371  
\362\071\365\015\251\364\352\327\347\263\020\057\060\102\067\041  
\314\060\160\311\206\230\017\314\130\115\203\273\175\345\032\245  
\067\215\266\254\062\227\000\072\143\161\044\036\236\067\304\377  
\164\324\067\300\342\376\210\106\140\021\335\010\077\120\066\253  
\270\172\244\225\142\152\156\260\312\152\041\132\151\363\363\373

\035\160\071\225\363\247\156\246\201\211\241\210\305\073\161\312  
\243\122\356\203\273\375\240\167\364\344\157\347\102\333\155\112  
\231\212\064\110\274\027\334\344\200\010\042\266\362\061\300\077  
\004\076\353\237\040\171\326\270\006\144\144\002\061\327\251\315  
\122\373\204\105\151\011\000\052\334\125\213\304\006\106\113\300  
\112\035\011\133\071\050\375\251\253\316\000\371\056\110\113\046  
\346\060\114\245\130\312\264\104\202\117\347\221\036\063\303\260  
\223\377\021\374\201\322\312\037\161\051\335\166\117\222\045\257  
\035\201\267\017\057\214\303\006\314\057\047\243\112\344\016\231  
\272\174\036\105\037\177\252\031\105\226\375\374\075\002\003\001  
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\341\146\317\016\321\361\263\113\267\006\040\024\376\207  
\022\325\366\376\373\076\060\015\006\011\052\206\110\206\367\015  
\001\001\005\005\000\003\202\002\001\000\250\313\162\100\262\166  
\301\176\173\374\255\144\343\062\173\314\074\266\135\106\323\365  
\054\342\160\135\310\056\330\006\175\230\321\013\041\240\211\131  
\044\001\235\371\257\011\175\012\043\202\064\325\374\174\162\231  
\271\243\327\124\364\352\122\160\016\305\365\326\073\341\072\011  
\062\346\041\071\223\275\263\025\352\117\152\364\365\213\077\057  
\174\215\130\056\305\341\071\240\076\307\075\112\163\236\100\172  
\300\053\141\251\147\311\363\044\271\263\155\125\054\132\035\236  
\045\162\316\013\255\252\307\125\142\013\276\373\143\263\141\104  
\043\243\313\341\032\016\367\232\006\115\336\324\043\116\041\226  
\133\071\133\127\035\057\135\010\136\011\171\377\174\227\265\115  
\203\256\015\326\346\243\171\340\063\320\231\226\002\060\247\076  
\377\322\243\103\077\005\132\006\352\104\002\332\174\370\110\320  
\063\251\371\007\307\225\341\365\076\365\135\161\272\362\225\251  
\164\210\141\131\343\277\312\132\023\272\162\264\214\135\066\207  
\351\246\305\074\023\277\336\320\104\046\356\267\354\056\160\372  
\327\235\267\254\345\305\100\132\346\327\154\173\054\303\126\233  
\107\315\013\316\372\033\264\041\327\267\146\270\364\045\060\213  
\134\015\271\352\147\262\364\155\256\325\241\236\117\330\237\351  
\047\002\260\035\006\326\217\343\373\110\022\237\177\021\241\020  
\076\114\121\072\226\260\321\023\361\307\330\046\256\072\312\221  
\304\151\235\337\001\051\144\121\157\150\332\024\354\010\101\227  
\220\215\320\262\200\362\317\302\075\277\221\150\305\200\147\036  
\304\140\023\125\325\141\231\127\174\272\225\017\141\111\072\312  
\165\274\311\012\223\077\147\016\022\362\050\342\061\033\300\127  
\026\337\010\174\031\301\176\017\037\205\036\012\066\174\133\176  
\047\274\172\277\340\333\364\332\122\275\336\014\124\160\061\221  
\103\225\310\274\360\076\335\011\176\060\144\120\355\177\001\244  
\063\147\115\150\117\276\025\357\260\366\002\021\242\033\023\045  
\072\334\302\131\361\343\134\106\273\147\054\002\106\352\036\110  
\246\346\133\331\265\274\121\242\222\226\333\252\306\067\042\246  
\376\314\040\164\243\055\251\056\153\313\300\202\021\041\265\223  
\171\356\104\206\276\327\036\344\036\373

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "Certification Authority of WoSign"
Issuer: CN=Certification Authority of WoSign,O=WoSign CA Limited,C=CN
Serial Number:5e:68:d6:11:71:94:63:50:56:00:68:f3:3e:c9:c5:91
Subject: CN=Certification Authority
of WoSign,O=WoSign CA Limited,C=CN
Not Valid Before: Sat Aug 08 01:00:01 2009
Not Valid After: Mon Aug 08 01:00:01 2039
Fingerprint (MD5): a1:f2:f9:b5:d2:c8:7a:74:b8:f3:05:f1:d7:e1:84:8d
Fingerprint (SHA1): b9:42:94:bf:91:ea:8f:b6:4b:e6:10:97:c7:fb:00:13:59:b6:76:cb
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certification Authority of WoSign"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\271\102\224\277\221\352\217\266\113\346\020\227\307\373\000\023
\131\266\166\313
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\241\362\371\265\322\310\172\164\270\363\005\361\327\341\204\215
END
CKA_ISSUER MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\052\060\050\006
\003\125\004\003\023\041\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\136\150\326\021\161\224\143\120\126\000\150\363\076\311
\305\221
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "CA "

```

```
Issuer: CN=CA ,O=WoSign CA Limited,C=CN
Serial Number:50:70:6b:cd:d8:13:fc:1b:4e:3b:33:72:d2:11:48:8d
Subject: CN=CA ,O=WoSign CA Limited,C=CN
Not Valid Before: Sat Aug 08 01:00:01 2009
Not Valid After: Mon Aug 08 01:00:01 2039
Fingerprint (MD5): 78:83:5b:52:16:76:c4:24:3b:83:78:e8:ac:da:9a:93
Fingerprint (SHA1): 16:32:47:8d:89:f9:21:3a:92:00:85:63:f5:a4:a7:d3:12:40:8a:d6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "CA "
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\014\022\103\101\040\346\262\203\351\200\232\346
\240\271\350\257\201\344\271\246
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\014\022\103\101\040\346\262\203\351\200\232\346
\240\271\350\257\201\344\271\246
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\120\160\153\315\330\023\374\033\116\073\063\162\322\021
\110\215
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\130\060\202\003\100\240\003\002\001\002\002\020\120
\160\153\315\330\023\374\033\116\073\063\162\322\021\110\215\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\106
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\032\060
\030\006\003\125\004\012\023\021\127\157\123\151\147\156\040\103
\101\040\114\151\155\151\164\145\144\061\033\060\031\006\003\125
\004\003\014\022\103\101\040\346\262\203\351\200\232\346\240\271
\350\257\201\344\271\246\060\036\027\015\060\071\060\070\060\070
\060\061\060\060\060\061\132\027\015\063\071\060\070\060\070\060
\061\060\060\060\061\132\060\106\061\013\060\011\006\003\125\004
\006\023\002\103\116\061\032\060\030\006\003\125\004\012\023\021
\127\157\123\151\147\156\040\103\101\040\114\151\155\151\164\145
\144\061\033\060\031\006\003\125\004\003\014\022\103\101\040\346
\262\203\351\200\232\346\240\271\350\257\201\344\271\246\060\202
```

\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\320  
\111\041\036\045\374\207\301\052\302\254\333\166\206\006\116\347  
\320\164\064\334\355\145\065\374\120\326\210\077\244\360\177\353  
\017\137\171\057\211\261\375\274\143\130\067\223\233\070\370\267  
\133\251\372\330\161\307\264\274\200\227\215\154\113\361\120\325  
\052\051\252\250\031\172\226\346\225\216\164\355\227\012\127\165  
\364\005\333\155\013\071\271\001\177\252\366\326\332\154\346\005  
\340\244\115\122\374\333\320\164\267\021\214\173\215\117\377\207  
\203\256\377\005\003\023\127\120\067\376\214\226\122\020\114\137  
\277\224\161\151\331\226\076\014\103\117\276\060\300\237\071\164  
\117\006\105\135\243\326\126\071\150\007\314\207\117\120\167\223  
\161\331\104\010\261\212\064\351\211\254\333\233\116\341\331\344  
\122\105\214\056\024\037\221\153\031\035\150\051\054\126\304\342  
\036\023\127\144\360\141\343\271\021\337\260\341\127\240\033\255  
\327\137\321\257\333\053\055\077\320\150\216\017\352\237\017\213  
\065\130\033\023\034\364\336\065\241\012\135\326\352\337\022\157  
\300\373\151\007\106\162\334\201\366\004\043\027\340\115\165\341  
\162\157\260\050\353\233\341\341\203\241\237\112\135\257\314\233  
\372\002\040\266\030\142\167\221\073\243\325\145\255\334\174\220  
\167\034\104\101\244\112\213\353\225\162\351\366\011\144\334\250  
\055\237\164\170\350\301\242\011\143\234\357\240\333\117\235\225  
\253\040\117\267\260\367\207\134\246\240\344\067\070\307\134\343  
\065\017\054\255\243\200\242\354\056\135\300\317\355\213\005\302  
\346\163\156\366\211\325\365\322\106\216\352\155\143\033\036\212  
\311\175\246\370\234\353\345\325\143\205\115\163\146\151\021\376  
\310\016\364\301\307\146\111\123\176\344\031\153\361\351\172\131  
\243\155\176\305\027\346\047\306\357\033\333\157\374\015\115\006  
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\153\176\055\155\130\134\112\324\216\147\270\361\332\325\106\212  
\047\371\021\362\311\102\376\116\336\337\037\134\304\244\206\207  
\026\063\241\247\027\030\245\015\344\005\345\053\302\053\013\242  
\225\220\271\375\140\074\116\211\076\347\234\356\037\273\001\002  
\003\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016  
\004\026\004\024\340\115\277\334\233\101\135\023\350\144\360\247  
\351\025\244\341\201\301\272\061\060\015\006\011\052\206\110\206  
\367\015\001\001\013\005\000\003\202\002\001\000\152\212\160\070  
\131\266\332\213\030\310\276\052\323\266\031\325\146\051\172\135  
\315\133\057\163\034\046\116\243\175\157\253\267\051\115\246\351  
\245\021\203\247\071\163\257\020\104\222\346\045\135\117\141\372  
\310\006\276\116\113\357\376\363\061\376\306\174\160\012\101\130  
\332\350\231\113\226\311\170\274\230\174\002\051\355\011\200\346  
\012\072\202\002\052\342\311\057\310\126\031\046\356\170\034\043  
\375\367\223\145\116\347\363\230\230\257\315\335\331\236\100\210  
\061\050\072\253\056\013\260\254\014\044\372\172\046\230\363\022

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\141\020\364\135\027\367\176\342\170\227\124\342\214\350\051\272
\214\020\062\275\335\063\153\070\206\176\071\075\016\003\162\247
\135\171\217\105\212\131\256\133\041\156\061\106\325\131\215\317
\025\137\335\061\045\317\333\140\326\201\104\162\051\002\127\366
\226\324\326\377\352\051\333\071\305\270\054\212\032\215\316\313
\347\102\061\206\005\150\016\236\024\335\000\220\272\151\105\010
\333\156\220\201\206\247\052\005\077\346\204\071\370\267\371\127
\137\114\244\171\132\020\014\136\325\153\377\065\137\005\121\036
\154\243\165\251\317\120\203\323\174\364\146\367\202\215\075\014
\175\350\337\173\250\016\033\054\234\256\100\160\207\332\355\247
\026\202\132\276\065\154\040\116\042\141\331\274\121\172\315\172
\141\334\113\021\371\376\147\064\317\056\004\146\141\134\127\227
\043\214\363\206\033\110\337\052\257\247\301\377\330\216\076\003
\273\330\052\260\372\024\045\262\121\153\206\103\205\056\007\043
\026\200\215\114\373\264\143\073\314\303\164\355\033\243\036\376
\065\017\137\174\035\026\206\365\016\303\225\361\057\257\135\045
\073\121\346\327\166\101\070\321\113\003\071\050\245\036\221\162
\324\175\253\227\063\304\323\076\340\151\266\050\171\240\011\215
\034\321\377\101\162\110\006\374\232\056\347\040\371\233\242\336
\211\355\256\074\011\257\312\127\263\222\211\160\100\344\057\117
\302\160\203\100\327\044\054\153\347\011\037\323\325\307\301\010
\364\333\016\073\034\007\013\103\021\204\041\206\351\200\324\165
\330\253\361\002\142\301\261\176\125\141\317\023\327\046\260\327
\234\313\051\213\070\112\013\016\220\215\272\241
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CA "

# Issuer: CN=CA ,O=WoSign CA Limited,C=CN

# Serial Number:50:70:6b:cd:d8:13:fc:1b:4e:3b:33:72:d2:11:48:8d

# Subject: CN=CA ,O=WoSign CA Limited,C=CN

# Not Valid Before: Sat Aug 08 01:00:01 2009

# Not Valid After: Mon Aug 08 01:00:01 2039

# Fingerprint (MD5): 78:83:5b:52:16:76:c4:24:3b:83:78:e8:ac:da:9a:93

# Fingerprint

(SHA1): 16:32:47:8d:89:f9:21:3a:92:00:85:63:f5:a4:a7:d3:12:40:8a:d6

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CA "

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\026\062\107\215\211\371\041\072\222\000\205\143\365\244\247\323
```

```
\022\100\212\326
```

```

END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\170\203\133\122\026\166\304\044\073\203\170\350\254\332\232\223
END
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\014\022\103\101\040\346\262\203\351\200\232\346
\240\271\350\257\201\344\271\246
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\120\160\153\315\330\023\374\033\116\073\063\162\322\021
\110\215
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "SSC GDL CA Root B"
Issuer: CN=SSC GDL CA Root B,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
Serial Number:3e:8c:4f:bc:e4:29:83:82:4d:84:55:8e:d5:35:80:cf
Subject: CN=SSC GDL CA Root B,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
Not Valid Before: Tue Jun 04 14:20:15 2013
Not Valid After: Sat Jun 04 14:21:55 2033
Fingerprint (MD5): ca:b5:ab:b2:55:7b:93:36:32:53:23:ed:79:27:30:4a
Fingerprint (SHA1): c8:60:a3:18:fc:f5:b7:13:0b:10:07:ad:7f:61:4a:40:ff:ff:18:5f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC GDL CA Root B"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\102
END
CKA_ID

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UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061  
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155  
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141  
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027  
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123  
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003  
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157  
\164\040\102

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\076\214\117\274\344\051\203\202\115\204\125\216\325\065  
\200\317

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\005\256\060\202\003\226\240\003\002\001\002\002\020\076  
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\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\161  
\061\013\060\011\006\003\125\004\006\023\002\114\124\061\053\060  
\051\006\003\125\004\012\023\042\123\153\141\151\164\155\145\156  
\151\156\151\157\040\163\145\162\164\151\146\151\153\141\166\151  
\155\157\040\143\145\156\164\162\141\163\061\031\060\027\006\003  
\125\004\013\023\020\103\101\040\122\117\117\124\040\123\145\162  
\166\151\143\145\163\061\032\060\030\006\003\125\004\003\023\021  
\123\123\103\040\107\104\114\040\103\101\040\122\157\157\164\040  
\102\060\036\027\015\061\063\060\066\060\064\061\064\062\061\065\065  
\065\132\027\015\063\063\060\066\060\064\061\064\062\061\065\065  
\132\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124  
\061\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164  
\155\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153  
\141\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060  
\027\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040  
\123\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004  
\003\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157  
\157\164\040\102\060\202\002\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012  
\002\202\002\001\000\217\225\351\322\353\301\163\045\307\070\147  
\360\203\216\123\274\266\313\316\272\163\333\117\047\366\042\220  
\077\102\277\041\326\336\142\202\264\157\004\005\111\011\073\167  
\001\327\113\137\122\322\331\031\307\155\174\014\251\072\011\142  
\344\052\030\151\214\240\335\353\254\023\266\016\071\021\200\151  
\116\143\137\334\074\015\372\331\214\142\276\144\205\062\062\131  
\227\120\223\211\337\373\377\324\330\145\161\307\106\125\242\033  
\231\141\037\334\120\000\310\027\171\350\120\260\014\136\346\376  
\166\246\001\116\011\310\160\154\372\220\263\136\334\075\007\315  
\111\243\116\126\136\022\117\144\101\177\176\014\025\303\240\336



\263\243\051\006\111\104\241\137\157\077\201\240\104\115\360\173  
\012\070\050\355\022\356\143\227\303\173\135\214\117\161\335\225  
\072\332\056\250\001\106\012\363\154\350\265\361\037\010\000\361  
\100\222\033\046\000\061\165\071\106\111\046\271\244\324\161\167  
\021\244\117\063\314\011\333\331\321\041\113\222\104\254\316\170  
\142\202\027\373\372\022\264\175\325\362\206\355\364\176\226\024  
\346\215\003\122\257\315\027\242\325\034\245\376\201\246\232\355  
\175\344\331\016\062\146\020\217\333\331\063\061\201\176\051\127  
\357\314\262\241\140\356\212\133\271\145\333\177\033\232\054\217  
\047\061\211\212\050\265\257\261\126\324\003\042\356\045\117\330  
\232\275\322\154\127\274\203\246\110\037\054\125\007\011\064\053  
\271\171\054\002\245\240\137\174\166\237\044\062\074\055\222\337  
\353\110\127\207\241\366\376\043\372\064\253\211\365\150\033\216  
\037\252\156\016\245\322\041\322\357\271\321\261\111\127\065\132  
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\034\175\314\226\042\003\055\152\247\006\102\155\156\220\207\372  
\034\134\260\117\320\003\101\023\372\013\123\346\301\020\002\110  
\013\167\143\364\245\234\121\173\230\146\327\305\166\062\345\157  
\135\024\141\175\014\273\155\225\100\332\251\046\307\367\251\313  
\322\376\047\301\053\366\261\150\206\376\343\142\122\231\120\216  
\053\336\101\041\007\033\207\365\100\035\160\255\317\375\302\103  
\250\065\126\021\102\305\313\136\146\241\310\250\150\367\376\114  
\127\141\066\122\201\002\003\001\000\001\243\102\060\100\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
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\035\263\324\225\143\271\120\167\156\015\253\230\376\057\060\015  
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\001\000\010\333\212\062\201\164\063\161\026\354\041\205\123\110  
\012\157\037\162\343\343\004\370\056\267\077\363\044\225\117\234  
\355\023\341\210\202\002\366\146\367\267\261\055\200\047\255\256  
\270\155\376\043\007\021\010\253\164\141\214\050\022\371\366\020  
\064\360\317\266\174\243\165\055\022\324\224\337\164\356\261\230  
\253\261\356\042\142\113\131\037\177\376\032\145\255\115\342\244  
\021\077\023\041\264\330\065\213\166\100\246\137\275\063\021\337  
\230\343\041\136\035\243\273\170\066\002\073\330\375\144\204\332  
\067\315\131\355\374\014\320\164\244\153\161\074\066\022\104\236  
\176\156\117\012\041\034\145\037\113\022\154\277\216\162\326\335  
\076\000\160\230\001\105\053\354\225\220\343\323\151\070\347\053  
\235\176\145\131\133\341\333\205\312\143\376\253\277\344\320\375  
\344\122\272\032\346\376\306\220\272\173\316\361\244\142\305\107  
\276\044\307\240\172\345\041\341\306\010\340\014\211\203\217\200  
\151\375\356\240\337\172\114\072\323\110\052\026\277\256\246\225  
\265\335\150\037\373\016\265\005\214\321\262\104\174\140\060\126  
\166\027\265\065\117\250\325\012\353\302\265\156\002\356\234\137  
\016\243\261\001\250\345\123\157\176\203\101\037\025\330\377\341  
\302\266\032\361\106\234\144\240\032\340\112\312\270\246\264\211  
\044\356\173\225\231\142\324\342\100\273\316\243\232\175\035\162

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\363\033\201\101\167\000\136\354\074\242\060\005\074\315\174\110
\066\023\310\062\260\153\157\237\070\050\070\151\134\173\346\342
\255\203\273\155\023\321\056\267\321\166\157\135\060\136\271\120
\105\110\326\110\200\223\121\311\026\251\020\135\147\306\313\176
\147\175\005\117\364\040\357\044\045\136\355\147\103\306\373\156
\171\373\262\362\310\311\316\101\174\005\340\255\213\315\012\105
\056\342\142\237\227\221\364\371\143\354\362\302\140\212\334\033
\377\041\250\377\043\207\214\163\215\260\072\314\037\217\061\162
\012\375\226\241\337\032\123\323\066\266\260\167\106\336\003\366
\302\200\056\157\227\043\341\021\314\121\230\077\356\100\377\364
\075\233\210\177\214\273\341\131\206\275\011\064\047\134\236\012
\223\062\073\125\052\251\136\013\015\017\251\246\121\004\342\233
\052\021
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL

CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SSC GDL CA Root B"

# Issuer: CN=SSC GDL CA Root B,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT

# Serial Number:3e:8c:4f:bc:e4:29:83:82:4d:84:55:8e:d5:35:80:cf

# Subject: CN=SSC GDL CA Root B,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT

# Not Valid Before: Tue Jun 04 14:20:15 2013

# Not Valid After: Sat Jun 04 14:21:55 2033

# Fingerprint (MD5): ca:b5:ab:b2:55:7b:93:36:32:53:23:ed:79:27:30:4a

# Fingerprint (SHA1): c8:60:a3:18:fc:f5:b7:13:0b:10:07:ad:7f:61:4a:40:ff:ff:18:5f

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSC GDL CA Root B"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\310\140\243\030\374\365\267\023\013\020\007\255\177\141\112\100
\377\377\030\137
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\312\265\253\262\125\173\223\066\062\123\043\355\171\047\060\112
\112\061\112\100
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
```

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\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\102
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END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

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\002\020\076\214\117\274\344\051\203\202\115\204\125\216\325\065
\200\317
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END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "SAPO Class 2 Root CA"

# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO

Class 2 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western  
Cape,C=ZA

# Serial Number: 1 (0x1)

# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 2 Root CA,OU=SAPO Trust  
Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA

# Not Valid Before: Wed Sep 15 00:00:00 2010

# Not Valid After: Sat Sep 14 00:00:00 2030

# Fingerprint (MD5): 0a:7b:e7:df:15:44:93:ed:92:72:42:1a:28:4b:0c:ee

# Fingerprint (SHA1): e4:55:01:60:8a:a1:ef:89:e2:7b:8c:d3:c3:b3:4c:03:b0:38:e6:d7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SAPO Class 2 Root CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

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\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
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END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007  
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061  
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040  
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146  
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006  
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164  
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003  
\023\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122  
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206  
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100  
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172  
\141

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\130\060\202\003\100\240\003\002\001\002\002\001\001  
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\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101\061  
\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145\162  
\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007\023  
\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061\052  
\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040\101  
\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146\151  
\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006\003  
\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164\040  
\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003\023  
\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122\157  
\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206\367  
\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100\164  
\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172\141  
\060\036\027\015\061\060\060\071\061\065\060\060\060\060\060  
\132\027\015\063\060\060\071\061\064\060\060\060\060\060\060\132  
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007  
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061  
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040  
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146  
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006  
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164  
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003

\023\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122  
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206  
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100  
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172  
\141\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001  
\001\000\267\174\151\174\140\365\154\046\364\252\034\027\177\135  
\324\021\113\347\363\332\347\163\247\372\244\102\111\150\077\332  
\245\100\134\006\150\137\116\314\275\276\201\070\044\055\314\046  
\240\104\155\003\313\043\340\273\336\205\123\113\224\137\137\173  
\252\310\032\227\376\327\043\223\355\260\152\275\330\374\000\076  
\263\222\004\340\113\276\117\073\230\247\235\355\315\143\360\201  
\347\154\230\324\154\140\125\000\345\271\074\346\064\225\135\340  
\375\161\207\351\377\201\356\345\167\157\030\377\363\311\174\245  
\225\335\202\334\024\331\242\341\276\315\047\163\273\105\133\077  
\164\261\142\170\146\020\042\054\365\150\363\027\210\026\073\232  
\033\035\373\024\256\015\272\362\220\125\242\325\060\326\053\225  
\062\307\071\156\173\145\322\167\070\316\156\126\245\331\043\253  
\070\262\073\121\205\300\035\033\267\021\057\005\151\107\330\002  
\312\222\250\341\063\336\205\010\233\355\220\325\330\041\231\161  
\277\266\365\163\357\147\010\230\144\322\362\052\172\113\041\026  
\341\037\130\141\336\221\107\037\041\237\037\376\214\043\206\203  
\030\047\002\003\001\000\001\243\077\060\075\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\014\006\003\125  
\035\023\004\005\060\003\001\001\377\060\035\006\003\125\035\016  
\004\026\004\024\253\235\043\223\375\037\063\112\062\055\252\044  
\132\362\055\144\251\001\232\101\060\015\006\011\052\206\110\206  
\367\015\001\001\005\005\000\003\202\001\001\000\126\122\121\271  
\017\002\341\366\056\234\261\061\132\246\370\316\274\356\002\204  
\025\011\361\050\122\137\347\341\054\275\333\171\012\172\277\353  
\142\236\325\206\107\051\356\164\060\354\114\165\265\036\343\252  
\063\357\255\341\152\114\277\067\001\276\125\203\114\251\122\330  
\067\230\120\157\150\335\107\101\267\054\060\310\156\114\007\054  
\306\323\111\271\265\134\322\313\314\324\066\306\007\015\030\117  
\077\143\000\304\354\266\210\373\001\144\143\255\321\367\167\174  
\144\124\053\022\075\064\025\205\360\240\272\171\051\137\230\233  
\102\352\256\301\250\237\023\211\212\155\351\270\070\311\141\355  
\140\354\367\052\130\005\233\241\140\170\203\027\341\176\137\350  
\375\170\340\153\126\052\206\166\256\133\302\136\353\105\344\060  
\270\061\355\144\261\135\056\300\075\200\015\307\047\023\323\166  
\342\206\373\334\333\200\012\201\341\375\010\371\013\304\061\264  
\143\133\347\214\063\345\006\266\122\152\263\327\351\153\343\062  
\170\062\146\224\116\335\215\167\155\323\044\050\133\124\141\167  
\002\147\165\224\113\127\113\346\154\305\071\157

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SAPO Class 2 Root CA"

# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 2 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA

# Serial Number: 1 (0x1)

# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 2 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA

# Not Valid Before: Wed Sep 15 00:00:00 2010

# Not Valid After: Sat Sep 14 00:00:00 2030

# Fingerprint (MD5): 0a:7b:e7:df:15:44:93:ed:92:72:42:1a:28:4b:0c:ee

# Fingerprint (SHA1): e4:55:01:60:8a:a1:ef:89:e2:7b:8c:d3:c3:b3:4c:03:b0:38:e6:d7

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SAPO Class 2 Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\344\125\001\140\212\241\357\211\342\173\214\323\303\263\114\003  
\260\070\346\327

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\012\173\347\337\025\104\223\355\222\162\102\032\050\113\014\356  
END

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007  
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061  
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040  
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146  
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006  
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164  
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003  
\023\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122  
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206  
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\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172  
\141

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "SAPO Class 3 Root CA"

# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 3 Root CA,OU=SAPO Trust  
Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA

# Serial Number: 2 (0x2)

# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 3 Root CA,OU=SAPO Trust  
Centre,O=South African Post

Office Limited,L=Somerset West,ST=Western Cape,C=ZA

# Not Valid Before: Wed Sep 15 00:00:00 2010

# Not Valid After: Sat Sep 14 00:00:00 2030

# Fingerprint (MD5): 54:e5:eb:35:d1:75:05:3c:7c:df:30:d6:bf:f3:ff:53

# Fingerprint (SHA1): 38:dd:76:59:c7:35:10:0b:00:a2:37:e4:91:b7:bc:0f:fc:d2:31:6c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SAPO Class 3 Root CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007  
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061  
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040  
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146  
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006  
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164  
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003  
\023\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122  
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206  
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100  
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172  
\141

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101  
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\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007  
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061  
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040  
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146  
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006  
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164

\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003  
\023\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122  
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206  
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100  
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172  
\141

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\002

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\130\060\202\004\100\240\003\002\001\002\002\001\002  
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\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101\061  
\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145\162  
\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007\023  
\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061\052  
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\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146\151  
\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006\003  
\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164\040  
\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003\023  
\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122\157  
\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206\367  
\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100\164  
\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172\141  
\060\036\027\015\061\060\060\071\061\065\060\060\060\060\060  
\132\027\015\063\060\060\071\061\064\060\060\060\060\060\060\132  
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007  
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061  
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040  
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146  
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006  
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164  
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003  
\023\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122  
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206  
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100  
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172  
\141\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002  
\001\000\312\170\032\007\274\366\373\264\267\211\274\320\031\126  
\070\052\131\235\007\352\032\371\370\370\150\147\136\217\357\312  
\367\365\152\211\346\243\225\177\251\333\051\044\034\065\320\070  
\226\154\076\126\044\377\136\142\121\220\056\207\350\234\307\332



\274\063\361\236\241\157\013\216\012\044\364\370\115\220\246\262  
\315\136\021\323\302\227\114\365\137\100\035\046\044\115\215\011  
\020\013\377\273\040\033\223\046\031\014\103\077\351\216\274\061  
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\367\233\256\112\142\230\321\147\040\145\336\171\341\261\062\036  
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\062\162\007\014\376\325\224\321\360\300\170\362\200\250\106\365
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\041\126\140\103\246\020\367\177\111\277\276\007\323\120\144\155
\002\272\052\125\054\317\331\302\156\257\174\013\110\320\361\341
\247\302\255\164\217\206\344\355\252\372\134\203\175\102\350\175
\007\035\007\125\314\053\151\062\271\167\202\150\306\167\362\042
\151\246\311\012\135\207\231\345\161\236\175\057\023\036\322\364
\375\011\171\047\130\053\012\207\201\052\373\152\043\055\113\044
\205\164\026\107\030\017\011\305\376\251\110\044\343\254\320\151
\075\137\123\230\062\275\354\340\121\301\123\112\261\366\073\360
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SAPO Class 3 Root CA"

# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 3 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA

# Serial Number: 2 (0x2)

# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 3 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA

# Not Valid Before: Wed Sep 15 00:00:00 2010

# Not Valid After: Sat Sep 14 00:00:00 2030

# Fingerprint (MD5): 54:e5:eb:35:d1:75:05:3c:7c:df:30:d6:bf:f3:ff:53

# Fingerprint (SHA1): 38:dd:76:59:c7:35:10:0b:00:a2:37:e4:91:b7:bc:0f:fc:d2:31:6c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SAPO Class 3 Root CA"

CKA\_CERT\_SHA1\_HASH

MULTILINE\_OCTAL

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\374\322\061\154
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END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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END

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CKA_ISSUER MULTILINE_OCTAL
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\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "SAPO Class 4 Root CA"

# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 4 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA

# Serial Number: 3 (0x3)

# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 4 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA

# Not Valid Before: Wed Sep 15 00:00:00 2010

# Not Valid After: Sat Sep 14 00:00:00 2030

# Fingerprint (MD5): f8:a7:f6:89:94:8c:61:f7:43:98:36:df:22:82:9b:3b

# Fingerprint (SHA1):

20:a8:f5:ff:c4:3a:f4:a9:bc:89:88:1e:bf:99:20:ff:91:e9:fd:0a

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SAPO Class 4 Root CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

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\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
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CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006  
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\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003  
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CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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END

CKA\_VALUE MULTILINE\_OCTAL

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\123\147\301\116\301\056\102\103\247\262\244\371\026\213\102\356  
\334\064\177\110\263\220\333\044\342\310\344\123\065\123\234\352  
\067\205\317\277\230\006\065\107\046\327\256\155\335\204\251\143  
\130\046\101\365\165\062\056\141\236\117\223\122\122\366\132\043  
\353\301\240\163\046\045\042\102\221\221\221\200\117\377\210\316  
\136\163\347\226\302\355\011\022\367\166\226\251\171\142\220\111  
\201\203\237\014\062\062\342\133\312\335\110\064\254\207\216\161  
\225\256\114\344\174\170\035\247\121\303\275\021\372\002\321\225  
\211\163\010\106\042\211\151\000\317\117\200\301\115\133\224\304  
\312\231\121\230\057\015\275\175\124\144\324\012\332\047\131\247  
\067\273\126\014\320\006\242\162\271\022\271\133

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SAPO Class 4 Root CA"

```
Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO
Class 4 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western
Cape,C=ZA
Serial Number: 3 (0x3)
Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 4 Root CA,OU=SAPO Trust
Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
Not Valid Before: Wed Sep 15 00:00:00 2010
Not Valid After: Sat Sep 14 00:00:00 2030
Fingerprint (MD5): f8:a7:f6:89:94:8c:61:f7:43:98:36:df:22:82:9b:3b
Fingerprint (SHA1): 20:a8:f5:ff:c4:3a:f4:a9:bc:89:88:1e:bf:99:20:ff:91:e9:fd:0a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SAPO Class 4 Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\040\250\365\377\304\072\364\251\274\211\210\036\277\231\040\377
\221\351\375\012
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\370\247\366\211\224\214\141\367\103\230\066\337\042\202\233\073
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\064\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\003
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "CA Disig Root R1"
Issuer: CN=CA Disig Root R1,O=Disig a.s.,L=Bratislava,C=SK
Serial Number:c3:03:9a:ee:50:90:6e:28
Subject: CN=CA Disig Root R1,O=Disig a.s.,L=Bratislava,C=SK
Not Valid Before: Thu Jul 19 09:06:56 2012
Not Valid After: Sat Jul 19 09:06:56 2042
Fingerprint (MD5): be:ec:11:93:9a:f5:69:21:bc:d7:c1:c0:67:89:cc:2a
Fingerprint (SHA1): 8e:1c:74:f8:a6:20:b9:e5:8a:f4:61:fa:ec:2b:47:56:51:1a:52:c6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig Root R1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\303\003\232\356\120\220\156\050
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\151\060\202\003\121\240\003\002\001\002\002\011\000
\303\003\232\356\120\220\156\050\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\060\122\061\013\060\011\006\003\125
\004\006\023\002\123\113\061\023\060\021\006\003\125\004\007\023
\012\102\162\141\164\151\163\154\141\166\141\061\023\060\021\006
\003\125\004\012\023\012\104\151\163\151\147\040\141\056\163\056
\061\031\060\027\006\003\125\004\003\023\020\103\101\040\104\151
\163\151\147\040\122\157\157\164\040\122\061\060\036\027\015\061
\062\060\067\061\071\060\071\060\066\065\066\132\027\015\064\062
\060\067\061\071\060\071\060\066\065\066\132\060\122\061\013\060
\011\006\003\125\004\006\023\002\123\113\061\023\060\021\006\003
```



\125\004\007\023\012\102\162\141\164\151\163\154\141\166\141\061  
\023\060\021\006\003\125\004\012\023\012\104\151\163\151\147\040  
\141\056\163\056\061\031\060\027\006\003\125\004\003\023\020\103  
\101\040\104\151\163\151\147\040\122\157\157\164\040\122\061\060  
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001  
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000  
\252\303\170\367\334\230\243\247\132\136\167\030\262\335\004\144  
\017\143\375\233\226\011\200\325\350\252\245\342\234\046\224\072  
\350\231\163\214\235\337\327\337\203\363\170\117\100\341\177\322  
\247\322\345\312\023\223\347\355\306\167\137\066\265\224\257\350  
\070\216\333\233\345\174\273\314\215\353\165\163\341\044\315\346  
\247\055\031\056\330\326\212\153\024\353\010\142\012\330\334\263  
\000\115\303\043\174\137\103\010\043\062\022\334\355\014\255\300  
\175\017\245\172\102\331\132\160\331\277\247\327\001\034\366\233  
\253\216\267\112\206\170\240\036\126\061\256\357\202\012\200\101  
\367\033\311\256\253\062\046\324\054\153\355\175\153\344\342\136  
\042\012\105\313\204\061\115\254\376\333\321\107\272\371\140\227  
\071\261\145\307\336\373\231\344\012\042\261\055\115\345\110\046  
\151\253\342\252\363\373\374\222\051\062\351\263\076\115\037\047  
\241\315\216\271\027\373\045\076\311\156\363\167\332\015\022\366  
\135\307\273\066\020\325\124\326\363\340\342\107\110\346\336\024  
\332\141\122\257\046\264\365\161\117\311\327\322\006\337\143\312  
\377\041\350\131\006\340\010\325\204\025\123\367\103\345\174\305  
\240\211\230\153\163\306\150\316\145\336\275\177\005\367\261\356  
\366\127\241\140\225\305\314\352\223\072\276\231\256\233\002\243  
\255\311\026\265\316\335\136\231\170\176\032\071\176\262\300\005  
\244\300\202\245\243\107\236\214\352\134\266\274\147\333\346\052  
\115\322\004\334\243\256\105\367\274\213\234\034\247\326\325\003  
\334\010\313\056\026\312\134\100\063\350\147\303\056\347\246\104  
\352\021\105\034\065\145\055\036\105\141\044\033\202\056\245\235  
\063\135\145\370\101\371\056\313\224\077\037\243\014\061\044\104  
\355\307\136\255\120\272\306\101\233\254\360\027\145\300\370\135  
\157\133\240\012\064\074\356\327\352\210\237\230\371\257\116\044  
\372\227\262\144\166\332\253\364\355\343\303\140\357\325\371\002  
\310\055\237\203\257\147\151\006\247\061\125\325\317\113\157\377  
\004\005\307\130\254\137\026\033\345\322\243\353\061\333\037\063  
\025\115\320\362\245\123\365\313\341\075\116\150\055\330\022\335  
\252\362\346\115\233\111\345\305\050\241\272\260\132\306\240\265  
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125\035  
\016\004\026\004\024\211\012\264\070\223\032\346\253\356\233\221  
\030\371\365\074\076\065\320\323\202\060\015\006\011\052\206\110  
\206\367\015\001\001\005\005\000\003\202\002\001\000\062\213\366  
\235\112\311\276\024\345\214\254\070\312\072\011\324\033\316\206  
\263\335\353\324\272\050\276\022\256\105\054\004\164\254\023\121  
\305\130\030\146\115\202\332\325\334\223\300\047\341\276\174\237  
\122\236\022\126\366\325\234\251\364\165\234\372\067\022\217\034

\223\354\127\376\007\017\253\325\022\367\017\256\141\136\126\200  
\111\365\374\060\365\233\117\037\101\057\034\204\323\211\307\342  
\332\002\166\355\011\317\154\301\270\034\203\034\026\372\224\315  
\175\240\310\030\322\310\235\156\365\275\151\324\155\075\065\350  
\036\242\117\140\327\007\051\374\262\243\244\235\156\025\222\126  
\031\114\012\260\351\174\322\031\115\102\106\354\275\375\366\127  
\133\335\230\176\244\115\314\162\003\203\130\135\357\223\072\101  
\172\143\252\174\072\250\365\254\244\321\335\242\055\266\052\374  
\237\001\216\342\020\261\304\312\344\147\333\125\045\031\077\375  
\350\066\176\263\341\341\201\257\021\026\213\120\227\140\031\202  
\000\300\153\115\163\270\321\023\007\076\352\266\061\117\360\102  
\232\155\342\021\164\345\224\254\215\204\225\074\041\257\305\332  
\107\310\337\071\142\142\313\133\120\013\327\201\100\005\234\233  
\355\272\266\213\036\004\157\226\040\071\355\244\175\051\333\110  
\316\202\334\324\002\215\035\004\061\132\307\113\360\154\141\122  
\327\264\121\302\201\154\315\341\373\247\241\322\222\166\317\261  
\017\067\130\244\362\122\161\147\077\014\210\170\200\211\301\310  
\265\037\222\143\276\247\172\212\126\054\032\250\246\234\265\135  
\263\143\320\023\040\241\353\221\154\320\215\175\257\337\013\344  
\027\271\206\236\070\261\224\014\130\214\340\125\252\073\143\155  
\232\211\140\270\144\052\222\306\067\364\176\103\103\267\163\350  
\001\347\177\227\017\327\362\173\031\375\032\327\217\311\372\205  
\153\172\235\236\211\266\246\050\231\223\210\100\367\076\315\121  
\243\312\352\357\171\107\041\265\376\062\342\307\303\121\157\276  
\200\164\360\244\303\072\362\117\351\137\337\031\012\362\073\023  
\103\254\061\244\263\347\353\374\030\326\001\251\363\052\217\066  
\016\353\264\261\274\267\114\311\153\277\241\363\331\364\355\342  
\360\343\355\144\236\075\057\226\122\117\200\123\213

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CA Disig Root R1"

# Issuer: CN=CA Disig Root R1,O=Disig a.s.,L=Bratislava,C=SK

# Serial Number:c3:03:9a:ee:50:90:6e:28

# Subject: CN=CA Disig Root R1,O=Disig a.s.,L=Bratislava,C=SK

# Not Valid Before: Thu Jul 19 09:06:56 2012

# Not Valid After: Sat Jul 19 09:06:56 2042

# Fingerprint (MD5): be:ec:11:93:9a:f5:69:21:bc:d7:c1:c0:67:89:cc:2a

# Fingerprint (SHA1): 8e:1c:74:f8:a6:20:b9:e5:8a:f4:61:fa:ec:2b:47:56:51:1a:52:c6

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

```

CKA_LABEL UTF8 "CA Disig Root R1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\216\034\164\370\246\040\271\345\212\364\141\372\354\053\107\126
\121\032\122\306
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\276\354\021\223\232\365\151\041\274\327\301\300\147\211\314\052
END
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\303\003\232\356\120\220\156\050
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Autoridad Certificadora Raíz Nacional de Uruguay"
Issuer: C=UY,O=AGESIC,CN=Autoridad Certificadora Raíz Nacional de Uruguay
Serial Number:02:ee:00:9b:66:d8:6a:1d:67:fe:da:8a:25:6f:21:5a:75:1b
Subject: C=UY,O=AGESIC,CN=Autoridad Certificadora Raíz Nacional de Uruguay
Not Valid Before: Thu Nov 03 15:02:49 2011
Not Valid After: Wed Oct 29 15:02:49 2031
Fingerprint (MD5): 7b:b7:e7:2e:64:18:e4:11:0c:f7:42:78:3e:65:a2:ae
Fingerprint (SHA1): 7a:1c:dd:e3:d2:19:7e:71:37:43:3d:3f:99:c0:b3:69:f7:06:c7:49
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad Certificadora Raíz Nacional de Uruguay"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\072\060\070\006\003\125\004\003\014\061\101\165\164
\157\162\151\144\141\144\040\103\145\162\164\151\146\151\143\141
\144\157\162\141\040\122\141\303\255\172\040\116\141\143\151\157
\156\141\154\040\144\145\040\125\162\165\147\165\141\171\061\017
\060\015\006\003\125\004\012\023\006\101\107\105\123\111\103\061
\013\060\011\006\003\125\004\006\023\002\125\131
END

```

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\132\061\072\060\070\006\003\125\004\003\014\061\101\165\164  
\157\162\151\144\141\144\040\103\145\162\164\151\146\151\143\141  
\144\157\162\141\040\122\141\303\255\172\040\116\141\143\151\157  
\156\141\154\040\144\145\040\125\162\165\147\165\141\171\061\017  
\060\015\006\003\125\004\012\023\006\101\107\105\123\111\103\061  
\013\060\011\006\003\125\004\006\023\002\125\131

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\022\002\356\000\233\146\330\152\035\147\376\332\212\045\157  
\041\132\165\033

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\235\060\202\004\205\240\003\002\001\002\002\022\002  
\356\000\233\146\330\152\035\147\376\332\212\045\157\041\132\165  
\033\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000  
\060\132\061\072\060\070\006\003\125\004\003\014\061\101\165\164  
\157\162\151\144\141\144\040\103\145\162\164\151\146\151\143\141  
\144\157\162\141\040\122\141\303\255\172\040\116\141\143\151\157  
\156\141\154\040\144\145\040\125\162\165\147\165\141\171\061\017  
\060\015\006\003\125\004\012\023\006\101\107\105\123\111\103\061  
\013\060\011\006\003\125\004\006\023\002\125\131\060\036\027\015  
\061\061\061\061\060\063\061\065\060\062\064\071\132\027\015\063  
\061\061\060\062\071\061\065\060\062\064\071\132\060\132\061\072  
\060\070\006\003\125\004\003\014\061\101\165\164\157\162\151\144  
\141\144\040\103\145\162\164\151\146\151\143\141\144\157\162\141  
\040\122\141\303\255\172\040\116\141\143\151\157\156\141\154\040  
\144\145\040\125\162\165\147\165\141\171\061\017\060\015\006\003  
\125\004\012\023\006\101\107\105\123\111\103\061\013\060\011\006  
\003\125\004\006\023\002\125\131\060\202\002\040\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\015\000  
\060\202\002\010\002\202\002\001\000\227\304\037\052\104\241\201  
\113\110\221\165\335\353\332\217\312\033\213\362\264\074\054\306  
\345\364\301\036\321\270\060\023\157\134\237\345\121\226\177\032  
\244\026\376\322\324\035\045\366\320\346\067\140\137\000\243\031  
\251\354\047\277\120\055\005\240\134\136\223\353\343\150\375\233  
\075\271\024\066\055\347\045\025\020\220\032\222\311\021\261\051  
\227\223\126\125\142\255\107\254\177\325\014\167\226\322\223\150  
\152\061\335\124\357\223\362\012\117\240\137\002\132\357\266\104  
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CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Autoridad Certificadora Raíz Nacional de Uruguay"

# Issuer: C=UY,O=AGESIC,CN=Autoridad

Certificadora Raíz Nacional de Uruguay

# Serial Number:02:ee:00:9b:66:d8:6a:1d:67:fe:da:8a:25:6f:21:5a:75:1b

# Subject: C=UY,O=AGESIC,CN=Autoridad Certificadora Raíz Nacional de Uruguay

# Not Valid Before: Thu Nov 03 15:02:49 2011

# Not Valid After: Wed Oct 29 15:02:49 2031

# Fingerprint (MD5): 7b:b7:e7:2e:64:18:e4:11:0c:f7:42:78:3e:65:a2:ae

# Fingerprint (SHA1): 7a:1c:dd:e3:d2:19:7e:71:37:43:3d:3f:99:c0:b3:69:f7:06:c7:49

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Autoridad Certificadora Raíz Nacional de Uruguay"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\367\006\307\111

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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CKA\_ISSUER MULTILINE\_OCTAL

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CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\022\002\356\000\233\146\330\152\035\147\376\332\212\045\157  
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CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "E-Tugra Certification Authority"

# Issuer: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifikasyon Merkezi,O=E-Tura EBG Biliim  
Teknolojileri ve Hizmetleri A.,L=Ankara,C=TR

# Serial Number:6a:68:3e:9c:51:9b:cb:53

# Subject: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifikasyon Merkezi,O=E-Tura EBG Biliim  
Teknolojileri ve

Hizmetleri A.,L=Ankara,C=TR

# Not Valid Before: Tue Mar 05 12:09:48 2013

# Not Valid After: Fri Mar 03 12:09:48 2023

# Fingerprint (MD5): b8:a1:03:63:b0:bd:21:71:70:8a:6f:13:3a:bb:79:49

# Fingerprint (SHA1): 51:c6:e7:08:49:06:6e:f3:92:d4:5c:a0:0d:6d:a3:62:8f:c3:52:39

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "E-Tugra Certification Authority"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\262\061\013\060\011\006\003\125\004\006\023\002\124\122  
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\141\061\100\060\076\006\003\125\004\012\014\067\105\055\124\165  
\304\237\162\141\040\105\102\107\040\102\151\154\151\305\237\151  
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\166\145\040\110\151\172\155\145\164\154\145\162\151\040\101\056  
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END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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CKA\_VALUE MULTILINE\_OCTAL

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\245\323\147\046\001\206\246\123\322\140\073\174\103\177\125\212  
\274\225\032\301\050\071\114\037\103\322\221\364\162\131\212\271  
\126\374\077\264\235\332\160\234\166\132\214\103\120\356\216\060  
\162\115\337\377\111\367\306\251\147\331\155\254\002\021\342\072  
\026\045\247\130\010\313\157\123\101\234\110\070\107\150\063\321  
\327\307\217\324\164\041\324\303\005\220\172\377\316\226\210\261  
\025\051\135\043\253\320\140\241\022\117\336\364\027\315\062\345  
\311\277\310\103\255\375\056\216\361\257\342\364\230\372\022\037  
\040\330\300\247\014\205\305\220\364\073\055\226\046\261\054\276  
\114\253\353\261\322\212\311\333\170\023\017\036\011\235\155\217  
\000\237\002\332\301\372\037\172\172\011\304\112\346\210\052\227  
\237\211\213\375\067\137\137\072\316\070\131\206\113\257\161\013  
\264\330\362\160\117\237\062\023\343\260\247\127\345\332\332\103  
\313\204\064\362\050\304\352\155\364\052\357\301\153\166\332\373  
\176\273\205\074\322\123\302\115\276\161\341\105\321\375\043\147  
\015\023\165\373\317\145\147\042\235\256\260\011\321\011\377\035  
\064\277\376\043\227\067\322\071\372\075\015\006\013\264\333\073  
\243\253\157\134\035\266\176\350\263\202\064\355\006\134\044

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "E-Tugra Certification Authority"

# Issuer: CN=E-Tugra Certification Authority,OU=E-Tugra

Sertifikasyon Merkezi,O=E-Tura EBG Biliim Teknolojileri ve Hizmetleri A...,L=Ankara,C=TR

# Serial Number:6a:68:3e:9c:51:9b:cb:53

# Subject: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifkasyon Merkezi,O=E-Tura EBG Biliim Teknolojileri ve Hizmetleri A...,L=Ankara,C=TR

# Not Valid Before: Tue Mar 05 12:09:48 2013

```
Not Valid After: Fri Mar 03 12:09:48 2023
Fingerprint (MD5): b8:a1:03:63:b0:bd:21:71:70:8a:6f:13:3a:bb:79:49
Fingerprint (SHA1): 51:c6:e7:08:49:06:6e:f3:92:d4:5c:a0:0d:6d:a3:62:8f:c3:52:39
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\121\306\347\010\111\006\156\363\222\324\134\240\015\155\243\142
\217\303\122\071
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\270\241\003\143\260\275\041\161\160\212\157\023\072\273\171\111
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\262\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\014\006\101\156\153\141\162
\141\061\100\060\076\006\003\125\004\012\014\067\105\055\124\165
\304\237\162\141\040\105\102\107\040\102\151\154\151\305\237\151
\155\040\124\145\153\156\157\154\157\152\151\154\145\162\151\040
\166\145\040\110\151\172\155\145\164\154\145\162\151\040\101\056
\305\236\056\061\046\060\044\006\003\125\004\013\014\035\105\055
\124\165\147\162\141\040\123\145\162\164\151\146\151\153\141\163
\171\157\156\040\115\145\162\153\145\172\151\061\050\060\046\006
\003\125\004\003\014\037\105\055\124\165\147\162\141\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\152\150\076\234\121\233\313\123
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
```

```
Microsoft Code Signing Only Certificate
```

```
Certificate "ApplicationCA2 Root"
```

```
Issuer: CN=ApplicationCA2 Root,OU=GPKI,O=Japanese Government,C=JP
```

```
Serial Number:31:32:35:33:37:32:38:32:38:32:38
```

```
Subject: CN=ApplicationCA2 Root,OU=GPKI,O=Japanese Government,C=JP
```

```
Not Valid Before: Tue Mar 12 15:00:00 2013
```

```
Not Valid After: Sat Mar 12 15:00:00 2033
```

```
Fingerprint (MD5): 7b:4c:15:74:3b:54:96:07:aa:95:3b:60:10:23:cf:f3
```

```
Fingerprint (SHA1): f0:0f:c3:7d:6a:1c:92:61:fb:6b:c1:c2:18:49:8c:5a:a4:dc:51:fb
```

```

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ApplicationCA2 Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\015\060
\013\006\003\125\004\013\023\004\107\120\113\111\061\034\060\032
\006\003\125\004\003\023\023\101\160\160\154\151\143\141\164\151
\157\156\103\101\062\040\122\157\157\164
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\015\060
\013\006\003\125\004\013\023\004\107\120\113\111\061\034\060\032
\006\003\125\004\003\023\023\101\160\160\154\151\143\141\164\151
\157\156\103\101\062\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\061\062\065\063\067\062\070\062\070\062\070
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\367\060\202\002\337\240\003\002\001\002\002\013\061
\062\065\063\067\062\070\062\070\062\070\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\130\061\013\060\011\006
\003\125\004\006\023\002\112\120\061\034\060\032\006\003\125\004
\012\023\023\112\141\160\141\156\145\163\145\040\107\157\166\145
\162\156\155\145\156\164\061\015\060\013\006\003\125\004\013\023
\004\107\120\113\111\061\034\060\032\006\003\125\004\003\023\023
\101\160\160\154\151\143\141\164\151\157\156\103\101\062\040\122
\157\157\164\060\036\027\015\061\063\060\063\061\062\061\065\060\060
\060\060\060\132\027\015\063\063\060\063\061\062\061\065\060\060
\060\060\132\060\130\061\013\060\011\006\003\125\004\006\023\002
\112\120\061\034\060\032\006\003\125\004\012\023\023\112\141\160
\141\156\145\163\145\040\107\157\166\145\162\156\155\145\156\164
\061\015\060\013\006\003\125\004\013\023\004\107\120\113\111\061
\034\060\032\006\003\125\004\003\023\023\101\160\160\154\151\143
\141\164\151\157\156\103\101\062\040\122\157\157\164\060\202\001
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\246\252
\255\045\145\326\000\021\326\350\172\166\252\364\346\264\113\363
\314\303\122\264\215\254\246\117\265\222\161\157\106\265\325\255

```

\213\022\042\027\045\316\105\350\024\172\205\232\344\043\020\250  
\372\261\147\120\345\155\107\340\152\211\023\343\256\256\065\361  
\364\102\305\005\367\115\227\176\074\050\374\260\046\221\036\214  
\036\070\032\226\334\130\104\227\142\343\062\310\321\025\101\115  
\165\230\170\276\253\150\251\136\355\107\276\244\272\216\241\002  
\227\336\223\164\231\155\147\264\005\045\356\224\310\355\252\244  
\272\062\154\102\021\353\276\313\027\006\220\341\223\205\310\144  
\050\316\037\107\307\300\135\140\356\166\066\334\063\073\121\353  
\173\317\162\330\017\170\250\031\202\010\220\076\032\230\215\216  
\264\317\025\066\246\156\335\267\342\115\100\040\123\331\166\052  
\320\170\254\211\360\117\213\062\155\104\352\056\272\260\251\353  
\211\335\267\157\171\017\253\201\156\270\346\213\051\013\131\257  
\266\111\015\121\054\251\375\235\050\143\146\270\160\225\163\232  
\330\372\073\063\274\102\102\033\062\254\261\062\373\075\002\003  
\001\000\001\243\201\301\060\201\276\060\035\006\003\125\035\016  
\004\026\004\024\126\247\254\252\002\035\262\254\075\220\016\240  
\157\056\101\306\166\347\173\332\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\174\006\003\125\035\021\004  
\165\060\163\244\161\060\157\061\013\060\011\006\003\125\004\006  
\023\002\112\120\061\030\060\026\006\003\125\004\012\014\017\346  
\227\245\346\234\254\345\233\275\346\224\277\345\272\234\061\033  
\060\031\006\003\125\004\013\014\022\346\224\277\345\272\234\350  
\252\215\350\250\274\345\237\272\347\233\244\061\051\060\047\006  
\003\125\004\003\014\040\343\202\242\343\203\227\343\203\252\343  
\202\261\343\203\274\343\202\267\343\203\247\343\203\263\103\101  
\062\040\122\157\157\164\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\015\006\011\052\206\110\206\367  
\015\001\001\013\005\000\003\202\001\001\000\177\232\011\165\254  
\007\321\162\164\056\167\127\060\302\004\234\324\200\246\203\347  
\245\240\033\237\376\253\363\200\275\325\112\243\241\217\266\114  
\140\021\347\312\341\140\201\327\110\301\040\131\245\141\062\213  
\235\236\227\323\146\203\332\145\056\130\076\333\345\057\245\315  
\214\163\246\121\276\130\050\240\171\134\151\057\103\337\143\262  
\211\107\312\273\336\271\064\021\143\240\016\045\027\345\207\364  
\035\260\260\245\317\101\250\164\306\350\123\325\102\364\202\055  
\123\011\021\150\046\161\224\165\023\115\252\166\210\074\164\261  
\326\343\114\117\142\303\111\114\116\155\361\160\176\303\177\246  
\005\314\170\233\351\201\333\250\310\307\134\236\374\222\222\055  
\246\227\362\070\265\156\163\225\014\300\077\316\246\224\060\265  
\372\005\267\336\236\040\252\374\023\144\311\212\272\144\357\342  
\143\344\330\230\256\153\265\076\246\125\270\063\076\054\162\373  
\054\021\000\373\133\026\057\204\322\023\236\372\005\305\301\313  
\162\116\042\335\204\312\113\274\322\055\206\032\004\166\131\037  
\111\102\142\073\023\037\026\350\272\327\375

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ApplicationCA2

Root"

# Issuer: CN=ApplicationCA2 Root,OU=GPKI,O=Japanese Government,C=JP

# Serial Number:31:32:35:33:37:32:38:32:38:32:38

# Subject: CN=ApplicationCA2 Root,OU=GPKI,O=Japanese Government,C=JP

# Not Valid Before: Tue Mar 12 15:00:00 2013

# Not Valid After: Sat Mar 12 15:00:00 2033

# Fingerprint (MD5): 7b:4c:15:74:3b:54:96:07:aa:95:3b:60:10:23:cf:f3

# Fingerprint (SHA1): f0:0f:c3:7d:6a:1c:92:61:fb:6b:c1:c2:18:49:8c:5a:a4:dc:51:fb

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ApplicationCA2 Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\360\017\303\175\152\034\222\141\373\153\301\302\030\111\214\132

\244\334\121\373

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\173\114\025\164\073\124\226\007\252\225\073\140\020\043\317\363

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061

\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145

\163\145\040\107\157\166\145\162\156\155\145\156\164\061\015\060

\013\006\003\125\004\013\023\004\107\120\113\111\061\034\060\032

\006\003\125\004\003\023\023\101\160\160\154\151\143\141\164\151

\157\156\103\101\062\040\122\157\157\164

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\013\061\062\065\063\067\062\070\062\070\062\070

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "ADOCA02"

# Issuer: CN=ADOCA02,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU

# Serial Number: 1813 (0x715)

# Subject: CN=ADOCA02,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU

# Not Valid Before: Thu Sep 01 04:26:07 2011

# Not Valid After: Sun Jan 27 02:31:24 2019

```
Fingerprint (MD5): c4:4f:6a:cd:50:fd:44:c4:36:e0:b3:38:d3:7c:c0:97
Fingerprint (SHA1): 84:42:9d:9f:e2:e7:3a:0d:c8:aa:0a:e0:a9:02:f2:74:99:33:fe:02
CKA_CLASS CK_OBJECT_CLASS
CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ADOCA02"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\020\060\016\006\003\125\004\003
\023\007\101\104\117\103\101\060\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\020\060\016\006\003\125\004\003
\023\007\101\104\117\103\101\060\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\002\007\025
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\331\060\202\002\301\240\003\002\001\002\002\002\007
\025\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\127\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\020\060\016\006\003\125\004\003
\023\007\101\104\117\103\101\060\062\060\036\027\015\061\061\060
\071\060\061\060\064\062\066\060\067\132\027\015\061\071\060\061
\062\067\060\062\063\061\062\064\132\060\127\061\013\060\011\006
\003\125\004\006\023\002\101\125\061\014\060\012\006\003\125\004
\012\023\003\107\117\126\061\014\060\012\006\003\125\004\013\023
\003\104\157\104\061\014\060\012\006\003\125\004\013\023\003\120
\113\111\061\014\060\012\006\003\125\004\013\023\003\103\101\163
\061\020\060\016\006\003\125\004\003\023\007\101\104\117\103\101
\060\062\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
```

\001\001\000\344\120\205\110\167\217\276\377\111\321\273\165\256  
\207\040\012\226\101\045\053\274\106\007\335\313\004\206\225\054  
\111\056\275\106\014\016\367\130\240\140\026\205\332\135\073\343  
\165\136\102\175\144\154\217\301\135\051\144\101\262\205\267\033  
\106\275\205\332\327\072\035\262\264\361\112\075\376\036\332\310  
\356\206\235\243\152\121\013\344\105\230\257\330\033\110\274\074  
\024\042\355\053\237\073\177\157\063\074\326\175\254\340\171\117  
\277\145\223\313\027\052\157\274\172\017\351\133\137\341\014\052  
\373\100\122\066\112\135\145\070\313\131\301\110\263\244\221\205  
\026\135\170\175\302\317\055\063\356\131\112\310\346\141\263\206  
\037\204\310\270\032\154\236\321\140\264\202\065\353\275\043\250  
\057\223\124\120\316\044\136\061\256\323\152\064\054\141\207\067  
\106\036\103\211\306\200\313\042\003\323\311\205\056\037\233\261  
\254\071\113\115\140\362\212\141\033\377\203\261\054\163\217\210  
\102\300\055\261\312\236\300\225\147\164\173\226\344\152\172\216  
\101\105\240\064\363\316\270\347\342\217\363\120\125\144\157\271  
\040\053\223\002\003\001\000\001\243\201\256\060\201\253\060\014  
\006\003\125\035\023\004\005\060\003\001\001\377\060\113\006\003  
\125\035\040\004\104\060\102\060\070\006\011\052\044\001\202\116  
\001\001\001\001\060\053\060\051\006\010\053\006\001\005\005\007  
\002\001\026\035\150\164\164\160\072\057\057\167\167\167\056\144  
\145\146\145\156\143\145\056\147\157\166\056\141\165\057\160\153  
\151\060\006\006\004\125\035\040\000\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\306\060\037\006\003\125\035\043  
\004\030\060\026\200\024\351\347\235\353\065\275\270\262\053\111  
\130\364\274\222\175\213\161\212\021\132\060\035\006\003\125\035  
\016\004\026\004\024\351\347\235\353\065\275\270\262\053\111\130  
\364\274\222\175\213\161\212\021\132\060\015\006\011\052\206\110  
\206\367\015\001\001\005\005\000\003\202\001\001\000\126\320\250  
\310\154\311\264\254\361\073\201\165\053\021\304\366\126\264\127  
\256\302\222\031\134\226\163\012\355\056\103\234\144\052\131\170  
\023\265\120\214\116\152\220\124\363\031\076\026\030\317\103\023  
\311\062\163\370\125\340\312\320\222\031\076\145\243\336\200\022  
\034\121\245\030\054\300\151\335\267\206\062\257\360\255\317\340  
\303\043\304\345\374\266\077\013\005\327\226\072\144\136\167\214  
\204\316\361\334\315\004\012\334\227\361\041\034\307\175\060\045  
\135\327\040\065\225\303\207\035\266\077\333\123\342\052\244\370  
\031\027\072\014\025\356\263\005\070\061\356\105\161\335\227\373  
\170\161\206\002\364\237\064\031\163\111\020\053\240\177\361\311  
\372\240\362\130\043\061\026\370\020\120\202\273\135\322\352\357  
\151\335\147\166\125\070\307\250\016\003\200\070\117\000\040\153  
\337\053\145\223\333\010\257\140\154\064\040\250\255\110\077\020  
\176\246\303\224\001\225\341\201\054\240\355\214\256\124\116\072  
\113\303\322\302\317\176\002\174\357\052\054\273\354\332\336\305  
\001\257\224\111\355\017\302\277\016\220\151\055\153

END

CKA\_NSS\_MOZILLA\_CA\_POLICY



```

CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "ADOCA02"
Issuer: CN=ADOCA02,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
Serial Number: 1813 (0x715)
Subject: CN=ADOCA02,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
Not Valid Before: Thu Sep 01 04:26:07 2011
Not Valid After: Sun Jan 27 02:31:24 2019
Fingerprint (MD5): c4:4f:6a:cd:50:fd:44:c4:36:e0:b3:38:d3:7c:c0:97
Fingerprint (SHA1): 84:42:9d:9f:e2:e7:3a:0d:c8:aa:0a:e0:a9:02:f2:74:99:33:fe:02
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ADOCA02"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\204\102\235\237\342\347\072\015\310\252\012\340\251\002\362\164
\231\063\376\002
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\304\117\152\315\120\375\104\304\066\340\263\070\323\174\300\227
END
CKA_ISSUER
MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\020\060\016\006\003\125\004\003
\023\007\101\104\117\103\101\060\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\007\025
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "StartCom Certification Authority G2"
Issuer: CN=StartCom Certification Authority G2,O=StartCom Ltd.,C=IL
Serial Number: 59 (0x3b)
Subject: CN=StartCom Certification Authority G2,O=StartCom Ltd.,C=IL
Not Valid

```

```
Before: Fri Jan 01 01:00:01 2010
Not Valid After: Sat Dec 31 23:59:01 2039
Fingerprint (MD5): 78:4b:fb:9e:64:82:0a:d3:b8:4c:62:f3:64:f2:90:64
Fingerprint (SHA1): 31:f1:fd:68:22:63:20:ee:c6:3b:3f:9d:ea:4a:3e:53:7c:7c:39:17
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "StartCom Certification Authority G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\054\060\052\006\003\125\004\003
\023\043\123\164\141\162\164\103\157\155\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\054\060\052\006\003\125\004\003
\023\043\123\164\141\162\164\103\157\155\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\073
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\143\060\202\003\113\240\003\002\001\002\002\001\073
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\123\061\013\060\011\006\003\125\004\006\023\002\111\114\061\026
\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103\157
\155\040\114\164\144\056\061\054\060\052\006\003\125\004\003\023
\043\123\164\141\162\164\103\157\155\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\107\062\060\036\027\015\061\060\060\061\060\061\060\061
\060\060\060\061\132\027\015\063\071\061\062\063\061\062\063\065
\071\060\061\132\060\123\061\013\060\011\006\003\125\004\006\023
\002\111\114\061\026\060\024\006\003\125\004\012\023\015\123\164
\141\162\164\103\157\155\040\114\164\144\056\061\054\060\052\006
\003\125\004\003\023\043\123\164\141\162\164\103\157\155\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\107\062\060\202\002\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017
```

\000\060\202\002\012\002\202\002\001\000\266\211\066\133\007\267  
\040\066\275\202\273\341\026\040\003\225\172\257\016\243\125\311  
\045\231\112\305\320\126\101\207\220\115\041\140\244\024\207\073  
\315\375\262\076\264\147\003\152\355\341\017\113\300\221\205\160  
\105\340\102\236\336\051\043\324\001\015\240\020\171\270\333\003  
\275\363\251\057\321\306\340\017\313\236\212\024\012\270\275\366  
\126\142\361\305\162\266\062\045\331\262\363\275\145\305\015\054  
\156\325\222\157\030\213\000\101\024\202\157\100\040\046\172\050  
\017\365\036\177\047\367\224\261\067\075\267\307\221\367\342\001  
\354\375\224\211\341\314\156\323\066\326\012\031\171\256\327\064  
\202\145\377\174\102\273\266\335\013\246\064\257\113\140\376\177  
\103\111\006\213\214\103\270\126\362\331\177\041\103\027\352\247  
\110\225\001\165\165\352\053\245\103\225\352\025\204\235\010\215  
\046\156\125\233\253\334\322\071\322\061\035\140\342\254\314\126  
\105\044\365\034\124\253\356\206\335\226\062\205\370\114\117\350  
\225\166\266\005\335\066\043\147\274\377\025\342\312\073\346\246  
\354\073\354\046\021\064\110\215\366\200\053\032\043\002\353\212  
\034\072\166\052\173\126\026\034\162\052\263\252\343\140\245\000  
\237\004\233\342\157\036\024\130\133\245\154\213\130\074\303\272  
\116\072\134\367\341\226\053\076\357\007\274\244\345\135\314\115  
\237\015\341\334\252\273\341\156\032\354\217\341\266\114\115\171  
\162\135\027\065\013\035\327\301\107\332\226\044\340\320\162\250  
\132\137\146\055\020\334\057\052\023\256\046\376\012\034\031\314  
\320\076\013\234\310\011\056\371\133\226\172\107\234\351\172\363  
\005\120\164\225\163\236\060\011\363\227\202\136\346\217\071\010  
\036\131\345\065\024\102\023\377\000\234\367\276\252\120\317\342  
\121\110\327\270\157\257\370\116\176\063\230\222\024\142\072\165  
\143\317\173\372\336\202\073\251\273\071\342\304\275\054\000\016  
\310\027\254\023\357\115\045\216\330\263\220\057\251\332\051\175  
\035\257\164\072\262\047\300\301\036\076\165\243\026\251\257\172  
\042\135\237\023\032\317\247\240\353\343\206\012\323\375\346\226  
\225\327\043\310\067\335\304\174\252\066\254\230\032\022\261\340  
\116\350\261\073\365\326\157\361\060\327\002\003\001\000\001\243  
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\113  
\305\264\100\153\255\034\263\245\034\145\156\106\066\211\207\005  
\014\016\266\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\002\001\000\163\127\077\054\325\225\062\176\067  
\333\226\222\353\031\136\176\123\347\101\354\021\266\107\357\265  
\336\355\164\134\305\361\216\111\340\374\156\231\023\315\237\212  
\332\315\072\012\330\072\132\011\077\137\064\320\057\003\322\146  
\035\032\275\234\220\067\310\014\216\007\132\224\105\106\052\346  
\276\172\332\241\251\244\151\022\222\260\175\066\324\104\207\327  
\121\361\051\143\326\165\315\026\344\047\211\035\370\302\062\110  
\375\333\231\320\217\137\124\164\314\254\147\064\021\142\331\014  
\012\067\207\321\243\027\110\216\322\027\035\366\327\375\333\145  
\353\375\250\324\365\326\117\244\133\165\350\305\322\140\262\333

\011\176\045\213\173\272\122\222\236\076\350\305\167\241\074\340  
\112\163\153\141\317\206\334\103\377\377\041\376\043\135\044\112  
\365\323\155\017\142\004\005\127\202\332\156\244\063\045\171\113  
\056\124\031\213\314\054\075\060\351\321\006\377\350\062\106\276  
\265\063\166\167\250\001\135\226\301\301\325\276\256\045\300\311  
\036\012\011\040\210\241\016\311\363\157\115\202\124\000\040\247  
\322\217\344\071\124\027\056\215\036\270\033\273\033\275\232\116  
\073\020\064\334\234\210\123\357\242\061\133\130\117\221\142\310  
\302\232\232\315\025\135\070\251\326\276\370\023\265\237\022\151  
\362\120\142\254\373\027\067\364\356\270\165\147\140\020\373\203  
\120\371\104\265\165\234\100\027\262\376\375\171\135\156\130\130  
\137\060\374\000\256\257\063\301\016\116\154\272\247\246\241\177  
\062\333\070\340\261\162\027\012\053\221\354\152\143\046\355\211  
\324\170\314\164\036\005\370\153\376\214\152\166\071\051\256\145  
\043\022\225\010\042\034\227\316\133\006\356\014\342\273\274\037  
\104\223\366\330\070\105\005\041\355\344\255\253\022\266\003\244  
\102\056\055\304\011\072\003\147\151\204\232\341\131\220\212\050  
\205\325\135\164\261\321\016\040\130\233\023\245\260\143\246\355  
\173\107\375\105\125\060\244\356\232\324\346\342\207\357\230\311  
\062\202\021\051\042\274\000\012\061\136\055\017\300\216\351\153  
\262\217\056\006\330\321\221\307\306\022\364\114\375\060\027\303  
\301\332\070\133\343\251\352\346\241\272\171\357\163\330\266\123  
\127\055\366\320\341\327\110

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "StartCom Certification Authority G2"

# Issuer: CN=StartCom Certification Authority G2,O=StartCom Ltd.,C=IL

# Serial Number: 59 (0x3b)

# Subject: CN=StartCom Certification Authority G2,O=StartCom Ltd.,C=IL

# Not Valid Before: Fri Jan 01 01:00:01 2010

# Not Valid After: Sat Dec 31 23:59:01 2039

# Fingerprint (MD5): 78:4b:fb:9e:64:82:0a:d3:b8:4c:62:f3:64:f2:90:64

# Fingerprint (SHA1): 31:f1:fd:68:22:63:20:ee:c6:3b:3f:9d:ea:4a:3e:53:7c:7c:39:17

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "StartCom Certification Authority G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\061\361\375\150\042\143\040\356\306\073\077\235\352\112\076\123  
\174\174\071\027

END

```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\170\113\373\236\144\202\012\323\270\114\142\363\144\362\220\144
END
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\054\060\052\006\003\125\004\003
\023\043\123\164\141\162\164\103\157\155\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\073
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Symantec Class 3 Public Primary Certification Authority - G6"
Issuer: CN=Symantec Class 3 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
Serial Number:65:63:71:85:d3:6f:45:c6:8f:7f:31:f9:09:87:92:82
Subject: CN=Symantec Class 3 Public Primary Certification
Authority - G6,OU=Symantec Trust Network,O=Symantec Corporation,C=US
Not Valid Before: Thu Oct 18 00:00:00 2012
Not Valid After: Tue Dec 01 23:59:59 2037
Fingerprint (MD5): 8d:d1:96:24:c4:4c:8f:5d:26:f4:6c:8d:52:41:1a:c6
Fingerprint (SHA1): 26:a1:6c:23:5a:24:72:22:9b:23:62:80:25:bc:80:97:c8:85:24:a1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Class 3 Public Primary Certification Authority - G6"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066

```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156  
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061  
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164  
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153  
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156  
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154  
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\040\055\040\107\066

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\145\143\161\205\323\157\105\306\217\177\061\371\011\207  
\222\202

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\005\366\060\202\003\336\240\003\002\001\002\002\020\145  
\143\161\205\323\157\105\306\217\177\061\371\011\207\222\202\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\201  
\224\061\013\060\011\006\003\125\004\006\023\002\125\123\061\035  
\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164\145  
\143\040\103\157\162\160\157\162\141\164\151\157\156\061\037\060  
\035\006\003\125\004\013\023\026\123\171\155\141\156\164\145\143  
\040\124\162\165\163\164\040\116\145\164\167\157\162\153\061\105  
\060\103\006\003\125\004\003\023\074\123\171\155\141\156\164\145  
\143\040\103\154\141\163\163\040\063\040\120\165\142\154\151\143  
\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171  
\040\055\040\107\066\060\036\027\015\061\062\061\060\061\070\060  
\060\060\060\060\060\132\027\015\063\067\061\062\060\061\062\063  
\065\071\065\071\132\060\201\224\061\013\060\011\006\003\125\004  
\006\023\002\125\123\061\035\060\033\006\003\125\004\012\023\024  
\123\171\155\141\156\164\145\143\040\103\157\162\160\157\162\141  
\164\151\157\156\061\037\060\035\006\003\125\004\013\023\026\123  
\171\155\141\156\164\145\143\040\124\162\165\163\164\040\116\145  
\164\167\157\162\153\061\105\060\103\006\003\125\004\003\023\074  
\123\171\155\141\156\164\145\143\040\103\154\141\163\163\040\063  
\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171\040  
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165  
\164\150\157\162\151\164\171\040\055\040\107\066\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\267\016\262  
\372\115\274\232\162\025\373\167\133\333\375\103\017\313\013\367

\140\056\263\053\176\014\273\123\362\314\116\145\363\031\273\377  
\065\035\367\323\251\273\100\055\265\335\170\324\246\371\067\352  
\205\005\173\155\267\346\023\113\006\174\373\166\143\217\040\035  
\055\070\053\004\205\362\350\260\321\137\115\112\041\311\152\330  
\224\352\036\002\120\246\252\220\007\240\107\041\352\146\371\004  
\240\346\203\360\304\365\136\226\342\047\115\141\303\263\301\214  
\042\266\146\241\000\321\126\051\373\355\301\177\044\312\075\372  
\132\224\260\204\303\307\272\103\034\375\144\016\361\050\373\107  
\131\362\046\341\061\271\104\371\253\335\373\276\276\054\067\343  
\254\013\030\323\374\001\242\361\244\012\065\202\107\114\253\275  
\212\136\337\023\205\374\040\314\110\131\257\257\101\157\313\043  
\315\312\223\247\335\325\137\310\144\073\377\001\003\240\012\117  
\055\156\075\204\276\257\310\062\262\123\051\220\025\367\260\005  
\232\012\074\366\271\006\220\311\245\341\135\240\073\260\376\250  
\266\277\365\211\050\127\044\072\041\206\161\344\334\212\213\101  
\125\354\036\060\044\131\321\300\131\270\170\257\252\132\164\336  
\045\200\060\230\355\060\104\157\041\160\034\333\022\123\016\326  
\246\050\146\223\054\037\314\117\074\033\201\305\271\366\170\157  
\320\062\072\010\162\333\153\016\106\027\205\224\363\274\357\274  
\367\244\136\216\351\351\265\144\345\267\113\105\022\054\114\067  
\267\140\103\012\115\161\006\000\224\046\065\164\037\273\172\071  
\134\116\073\346\270\003\342\307\223\213\204\054\045\111\105\335  
\177\043\224\140\037\313\351\315\366\253\227\367\141\347\373\177  
\142\201\310\334\012\060\134\030\174\346\316\357\307\156\036\207  
\174\263\351\312\310\173\152\364\150\374\203\245\014\126\264\272  
\262\215\112\012\307\227\227\305\210\060\025\075\020\010\124\025  
\162\162\147\063\063\364\174\267\316\000\047\123\145\316\044\361  
\132\144\347\066\057\362\056\002\302\227\337\162\350\002\036\240  
\367\075\265\373\150\140\003\372\063\251\346\022\155\006\341\251  
\250\135\116\074\376\331\347\000\145\254\266\031\115\173\203\177  
\064\107\352\341\030\155\261\213\034\171\253\347\235\002\003\001  
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\071\161\010\000\076\336\310\206\347\220\377\344\375\041  
\017\316\044\031\026\366\060\015\006\011\052\206\110\206\367\015  
\001\001\014\005\000\003\202\002\001\000\120\153\210\115\140\110  
\316\132\343\042\316\147\174\204\247\315\034\375\351\014\003\214  
\066\257\012\207\016\152\256\127\256\001\320\066\273\362\375\271  
\163\301\137\265\250\256\114\242\372\111\313\007\106\026\066\275  
\343\310\127\070\176\070\344\277\045\063\140\306\334\067\234\143  
\273\136\230\036\032\262\202\360\256\246\167\021\200\104\107\241  
\051\305\360\263\072\316\230\360\270\354\323\016\200\006\167\043  
\060\114\377\171\144\143\042\133\167\223\103\113\165\263\333\073  
\156\073\112\335\361\310\256\265\067\212\225\210\072\020\150\160  
\070\271\133\160\176\325\103\311\374\137\117\345\346\173\066\356  
\360\040\355\107\127\023\046\020\136\024\006\015\173\166\007\302  
\306\055\026\364\256\247\154\017\274\210\017\117\054\002\266\243

\327\042\346\231\107\065\330\215\245\117\201\022\072\021\175\263  
\314\013\165\363\036\160\243\033\003\352\372\232\350\346\056\066  
\071\314\231\316\072\077\014\267\256\370\103\231\260\223\156\157  
\252\331\017\152\061\221\273\234\323\264\050\373\203\114\172\163  
\202\120\147\322\016\254\355\140\305\262\135\065\230\317\207\176  
\036\131\035\044\274\126\272\332\244\132\330\314\346\274\036\020  
\217\033\214\216\363\301\333\267\276\324\260\133\145\217\026\150  
\363\126\305\052\031\026\115\017\270\145\207\155\044\203\270\142  
\334\340\107\141\032\210\173\316\116\177\375\334\306\015\132\232  
\244\363\265\114\366\335\061\246\350\035\021\041\063\060\004\141  
\175\034\340\076\117\215\077\265\213\022\000\132\175\251\241\000  
\324\203\353\160\273\030\370\244\322\034\201\055\267\010\021\310  
\046\173\266\324\345\017\003\106\162\324\045\100\036\276\111\135  
\155\223\361\134\262\073\165\124\151\072\240\356\114\042\272\254  
\232\342\010\255\105\143\005\112\122\065\166\304\064\365\136\007  
\062\255\334\174\046\321\133\217\255\344\346\252\033\165\237\353  
\135\264\350\300\251\025\174\116\112\007\162\337\106\311\324\221  
\222\165\126\260\341\356\067\066\145\050\305\025\310\053\166\314  
\155\157\031\203\364\375\332\025\342\101\347\063\171\106\203\127  
\371\361\245\266\155\323\274\327\123\347\356\161\155\170\251\227  
\247\356\040\234\031\025\162\025\075\004

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Symantec Class 3 Public Primary Certification Authority - G6"

# Issuer: CN=Symantec Class 3 Public Primary Certification Authority - G6,OU=Symantec Trust  
Network,O=Symantec Corporation,C=US

# Serial Number:65:63:71:85:d3:6f:45:c6:8f:7f:31:f9:09:87:92:82

# Subject: CN=Symantec Class 3 Public Primary Certification Authority - G6,OU=Symantec Trust  
Network,O=Symantec Corporation,C=US

# Not Valid Before: Thu Oct 18 00:00:00 2012

# Not Valid After: Tue Dec 01 23:59:59 2037

# Fingerprint (MD5): 8d:d1:96:24:c4:4c:8f:5d:26:f4:6c:8d:52:41:1a:c6

# Fingerprint (SHA1): 26:a1:6c:23:5a:24:72:22:9b:23:62:80:25:bc:80:97:c8:85:24:a1

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Symantec Class 3 Public Primary Certification Authority - G6"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\046\241\154\043\132\044\162\042\233\043\142\200\045\274\200\227  
\310\205\044\241

END



```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\215\321\226\044\304\114\217\135\046\364\154\215\122\101\032\306
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\145\143\161\205\323\157\105\306\217\177\061\371\011\207
\222\202
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Symantec Class 3 Public Primary Certification Authority - G4"
Issuer: CN=Symantec Class 3 Public Primary Certification Authority - G4,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
Serial Number:4c:79:b5:9a:28:9c:76:31:64:f5:89:44:d0:91:02:de
Subject: CN=Symantec Class 3 Public Primary Certification Authority - G4,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
Not Valid Before: Thu Oct 18 00:00:00 2012
Not Valid After: Tue Dec 01 23:59:59 2037
#
Fingerprint (MD5): 36:c9:b7:4b:6c:b0:21:4c:c7:11:17:b1:18:fe:2b:4d
Fingerprint (SHA1): 58:d5:2d:b9:33:01:a4:fd:29:1a:8c:96:45:a0:8f:ee:7f:52:92:82
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Class 3 Public Primary Certification Authority - G4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164

```

\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153  
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156  
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154  
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\040\055\040\107\064

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156  
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061  
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164  
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153  
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156  
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154  
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\040\055\040\107\064

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\114\171\265\232\050\234\166\061\144\365\211\104\320\221  
\002\336

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\247\060\202\002\055\240\003\002\001\002\002\020\114  
\171\265\232\050\234\166\061\144\365\211\104\320\221\002\336\060  
\012\006\010\052\206\110\316\075\004\003\003\060\201\224\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\035\060\033\006  
\003\125\004\012\023\024\123\171\155\141\156\164\145\143\040\103  
\157\162\160\157\162\141\164\151\157\156\061\037\060\035\006\003  
\125\004\013\023\026\123\171\155\141\156\164\145\143\040\124\162  
\165\163\164\040\116\145\164\167\157\162\153\061\105\060\103\006  
\003\125\004\003\023\074\123\171\155\141\156\164\145\143\040\103  
\154\141\163\163\040\063\040\120\165\142\154\151\143\040\120\162  
\151\155\141\162\171\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040  
\107\064\060\036\027\015\061\062\061\060\061\070\060\060\060\060  
\060\060\132\027\015\063\067\061\062\060\061\062\063\065\071\065  
\071\132\060\201\224\061\013\060\011\006\003\125\004\006\023\002  
\125\123\061\035\060\033\006\003\125\004\012\023\024\123\171\155  
\141\156\164\145\143\040\103\157\162\160\157\162\141\164\151\157  
\156\061\037\060\035\006\003\125\004\013\023\026\123\171\155\141  
\156\164\145\143\040\124\162\165\163\164\040\116\145\164\167\157  
\162\153\061\105\060\103\006\003\125\004\003\023\074\123\171\155  
\141\156\164\145\143\040\103\154\141\163\163\040\063\040\120\165  
\142\154\151\143\040\120\162\151\155\141\162\171\040\103\145\162

\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171\040\055\040\107\064\060\166\060\020\006\007\052  
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000  
\004\127\317\352\263\071\115\077\241\041\340\156\057\070\162\306  
\207\227\363\205\013\107\347\017\121\310\321\364\231\233\312\131  
\145\377\114\371\352\013\267\045\325\322\366\354\061\055\062\142  
\022\327\166\206\247\372\070\311\145\324\376\163\342\204\071\370  
\114\111\142\023\335\272\325\210\240\137\075\310\117\260\077\217  
\241\120\021\344\223\106\255\303\137\313\361\244\152\225\126\350  
\300\243\102\060\100\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004  
\024\044\235\274\322\161\367\035\302\045\276\042\361\211\245\054  
\025\073\064\036\136\060\012\006\010\052\206\110\316\075\004\003  
\003\003\150\000\060\145\002\061\000\271\146\150\145\333\005\320  
\070\175\016\363\310\165\141\270\320\050\304\261\112\063\121\130  
\373\362\074\020\310\256\107\170\166\312\146\044\027\206\076\120  
\126\156\245\055\231\210\270\275\044\002\060\003\352\247\347\250  
\074\352\235\142\306\137\124\332\230\364\167\275\117\217\030\234  
\221\134\107\153\100\115\020\035\263\341\211\312\013\042\310\032  
\305\305\376\213\335\301\337\157\170\237\221

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Symantec Class 3 Public Primary Certification Authority - G4"

# Issuer: CN=Symantec Class 3 Public Primary Certification Authority - G4,OU=Symantec Trust  
Network,O=Symantec

Corporation,C=US

# Serial Number:4c:79:b5:9a:28:9c:76:31:64:f5:89:44:d0:91:02:de

# Subject: CN=Symantec Class 3 Public Primary Certification Authority - G4,OU=Symantec Trust  
Network,O=Symantec Corporation,C=US

# Not Valid Before: Thu Oct 18 00:00:00 2012

# Not Valid After: Tue Dec 01 23:59:59 2037

# Fingerprint (MD5): 36:c9:b7:4b:6c:b0:21:4c:c7:11:17:b1:18:fe:2b:4d

# Fingerprint (SHA1): 58:d5:2d:b9:33:01:a4:fd:29:1a:8c:96:45:a0:8f:ee:7f:52:92:82

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Symantec Class 3 Public Primary Certification Authority - G4"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\130\325\055\271\063\001\244\375\051\032\214\226\105\240\217\356  
\177\122\222\202

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL  
\066\311\267\113\154\260\041\114\307\021\027\261\030\376\053\115  
END

CKA\_ISSUER MULTILINE\_OCTAL  
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156  
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061  
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164  
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153  
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156  
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154  
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\040\055\040\107\064  
END

CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\020\114\171\265\232\050\234\166\061\144\365\211\104\320\221  
\002\336  
END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Certificate "Hellenic Academic and Research Institutions RootCA 2011"  
# Issuer: CN=Hellenic  
Academic and Research Institutions RootCA 2011,O=Hellenic Academic and Research Institutions Cert.  
Authority,C=GR  
# Serial Number: 0 (0x0)  
# Subject: CN=Hellenic Academic and Research Institutions RootCA 2011,O=Hellenic Academic and Research  
Institutions Cert. Authority,C=GR  
# Not Valid Before: Tue Dec 06 13:49:52 2011  
# Not Valid After: Mon Dec 01 13:49:52 2031  
# Fingerprint (MD5): 73:9f:4c:4b:73:5b:79:e9:fa:ba:1c:ef:6e:cb:d5:c9  
# Fingerprint (SHA1): fe:45:65:9b:79:03:5b:98:a1:61:b5:51:2e:ac:da:58:09:48:22:4d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2011"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509  
CKA\_SUBJECT MULTILINE\_OCTAL  
\060\201\225\061\013\060\011\006\003\125\004\006\023\002\107\122  
\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145  
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144  
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164

\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164  
\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023  
\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155  
\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040  
\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157  
\164\103\101\040\062\060\061\061

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\225\061\013\060\011\006\003\125\004\006\023\002\107\122  
\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145  
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144  
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164  
\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164  
\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023  
\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155  
\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040  
\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157  
\164\103\101\040\062\060\061\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\061\060\202\003\031\240\003\002\001\002\002\001\000  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\201\225\061\013\060\011\006\003\125\004\006\023\002\107\122\061  
\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145\156  
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040  
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165  
\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164\150  
\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023\067  
\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155\151  
\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040\111  
\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157\164  
\103\101\040\062\060\061\061\060\036\027\015\061\061\061\062\060  
\066\061\063\064\071\065\062\132\027\015\063\061\061\062\060\061  
\061\063\064\071\065\062\132\060\201\225\061\013\060\011\006\003  
\125\004\006\023\002\107\122\061\104\060\102\006\003\125\004\012  
\023\073\110\145\154\154\145\156\151\143\040\101\143\141\144\145  
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150  
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\103\145  
\162\164\056\040\101\165\164\150\157\162\151\164\171\061\100\060  
\076\006\003\125\004\003\023\067\110\145\154\154\145\156\151\143  
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145  
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151

\157\156\163\040\122\157\157\164\103\101\040\062\060\061\061\060  
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001  
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000  
\251\123\000\343\056\246\366\216\372\140\330\055\225\076\370\054  
\052\124\116\315\271\204\141\224\130\117\217\075\213\344\103\363  
\165\211\215\121\344\303\067\322\212\210\115\171\036\267\022\335  
\103\170\112\212\222\346\327\110\325\017\244\072\051\104\065\270  
\007\366\150\035\125\315\070\121\360\214\044\061\205\257\203\311  
\175\351\167\257\355\032\173\235\027\371\263\235\070\120\017\246  
\132\171\221\200\257\067\256\246\323\061\373\265\046\011\235\074  
\132\357\121\305\053\337\226\135\353\062\036\002\332\160\111\354  
\156\014\310\232\067\215\367\361\066\140\113\046\054\202\236\320  
\170\363\015\017\143\244\121\060\341\371\053\047\022\007\330\352  
\275\030\142\230\260\131\067\175\276\356\363\040\121\102\132\203  
\357\223\272\151\025\361\142\235\237\231\071\202\241\267\164\056  
\213\324\305\013\173\057\360\310\012\332\075\171\012\232\223\034  
\245\050\162\163\221\103\232\247\321\115\205\204\271\251\164\217  
\024\100\307\334\336\254\101\144\154\264\031\233\002\143\155\044  
\144\217\104\262\045\352\316\135\164\014\143\062\134\215\207\345  
\002\003\001\000\001\243\201\211\060\201\206\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\013\006\003  
\125\035\017\004\004\003\002\001\006\060\035\006\003\125\035\016  
\004\026\004\024\246\221\102\375\023\141\112\043\236\010\244\051  
\345\330\023\004\043\356\101\045\060\107\006\003\125\035\036\004  
\100\060\076\240\074\060\005\202\003\056\147\162\060\005\202\003  
\056\145\165\060\006\202\004\056\145\144\165\060\006\202\004\056  
\157\162\147\060\005\201\003\056\147\162\060\005\201\003\056\145  
\165\060\006\201\004\056\145\144\165\060\006\201\004\056\157\162  
\147\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000  
\003\202\001\001\000\037\357\171\101\341\173\156\077\262\214\206  
\067\102\112\116\034\067\036\215\146\272\044\201\311\117\022\017  
\041\300\003\227\206\045\155\135\323\042\051\250\154\242\015\251  
\353\075\006\133\231\072\307\314\303\232\064\177\253\016\310\116  
\034\341\372\344\334\315\015\276\277\044\376\154\347\153\302\015  
\310\006\236\116\215\141\050\246\152\375\345\366\142\352\030\074  
\116\240\123\235\262\072\234\353\245\234\221\026\266\115\202\340  
\014\005\110\251\154\365\314\370\313\235\111\264\360\002\245\375  
\160\003\355\212\041\245\256\023\206\111\303\063\163\276\207\073  
\164\213\027\105\046\114\026\221\203\376\147\175\315\115\143\147  
\372\363\003\022\226\170\006\215\261\147\355\216\077\276\237\117  
\002\365\263\011\057\363\114\207\337\052\313\225\174\001\314\254  
\066\172\277\242\163\172\367\217\301\265\232\241\024\262\217\063  
\237\015\357\042\334\146\173\204\275\105\027\006\075\074\312\271  
\167\064\217\312\352\317\077\061\076\343\210\343\200\111\045\310  
\227\265\235\232\231\115\260\074\370\112\000\233\144\335\237\071  
\113\321\047\327\270

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

```

CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "Hellenic Academic and Research Institutions RootCA 2011"
Issuer: CN=Hellenic Academic and Research Institutions RootCA 2011,O=Hellenic Academic and Research
Institutions Cert. Authority,C=GR
Serial Number: 0 (0x0)
Subject: CN=Hellenic Academic and Research
Institutions RootCA 2011,O=Hellenic Academic and Research Institutions Cert. Authority,C=GR
Not Valid Before: Tue Dec 06 13:49:52 2011
Not Valid After: Mon Dec 01 13:49:52 2031
Fingerprint (MD5): 73:9f:4c:4b:73:5b:79:e9:fa:ba:1c:ef:6e:cb:d5:c9
Fingerprint (SHA1): fe:45:65:9b:79:03:5b:98:a1:61:b5:51:2e:ac:da:58:09:48:22:4d
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2011"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\376\105\145\233\171\003\133\230\241\141\265\121\056\254\332\130
\011\110\042\115
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\163\237\114\113\163\133\171\351\372\272\034\357\156\313\325\311
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\225\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164
\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164
\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023
\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155
\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040
\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157
\164\103\101\040\062\060\061\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "ATHEX Root CA"
Issuer: CN=ATHEX Root CA,O=Athens Exchange S.A.,C=GR
Serial Number: 10012 (0x271c)
Subject: CN=ATHEX Root CA,O=Athens Exchange S.A.,C=GR
Not Valid Before: Mon Oct 18 15:56:03 2010
Not Valid After: Thu Oct 17 21:00:00 2030
Fingerprint
(MD5): af:2b:7a:55:2d:3a:35:02:a4:92:40:16:0c:fa:98:26
Fingerprint (SHA1): db:2b:7b:43:4d:fb:7f:c1:cb:59:26:ec:5d:95:21:fe:35:0f:f2:79
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ATHEX Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\035\060\033\006\003\125\004\012\023\024\101\164\150\145\156\163
\040\105\170\143\150\141\156\147\145\040\123\056\101\056\061\026
\060\024\006\003\125\004\003\023\015\101\124\110\105\130\040\122
\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\035\060\033\006\003\125\004\012\023\024\101\164\150\145\156\163
\040\105\170\143\150\141\156\147\145\040\123\056\101\056\061\026
\060\024\006\003\125\004\003\023\015\101\124\110\105\130\040\122
\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\002\047\034
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\067\060\202\002\037\240\003\002\001\002\002\002\047
\034\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\104\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\035\060\033\006\003\125\004\012\023\024\101\164\150\145\156\163
\040\105\170\143\150\141\156\147\145\040\123\056\101\056\061\026
\060\024\006\003\125\004\003\023\015\101\124\110\105\130\040\122
\157\157\164\040\103\101\060\036\027\015\061\060\061\060\061\070
\061\065\065\066\060\063\132\027\015\063\060\061\060\061\067\062
\061\060\060\060\060\132\060\104\061\013\060\011\006\003\125\004
\006\023\002\107\122\061\035\060\033\006\003\125\004\012\023\024
\101\164\150\145\156\163\040\105\170\143\150\141\156\147\145\040
\123\056\101\056\061\026\060\024\006\003\125\004\003\023\015\101

```



\124\110\105\130\040\122\157\157\164\040\103\101\060\202\001\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\001\017\000\060\202\001\012\002\202\001\001\000\315\032\075  
\060\265\263\070\262\277\172\273\256\241\326\327\205\360\042\072  
\244\211\151\304\341\142\004\311\160\323\074\063\022\342\346\070  
\345\167\244\044\104\144\015\267\256\114\132\335\341\030\006\076  
\355\233\132\005\365\341\336\022\355\066\052\334\107\331\221\121  
\231\355\261\277\152\163\241\012\010\044\250\212\215\034\013\131  
\323\277\160\043\125\104\240\214\060\305\316\155\117\260\354\276  
\363\214\061\337\012\132\334\323\127\134\005\240\063\225\073\227  
\217\124\013\270\365\153\175\307\305\254\265\171\216\006\070\361  
\250\051\125\075\232\066\320\047\137\064\152\022\170\027\050\331  
\230\111\354\331\132\122\332\046\072\372\356\114\246\046\216\250  
\076\125\037\262\037\341\265\233\371\072\065\366\355\221\034\375  
\013\020\044\375\037\371\323\343\000\045\261\013\045\300\267\175  
\232\074\007\072\200\013\326\250\376\221\105\350\301\322\305\042  
\157\323\345\161\037\266\054\066\264\130\240\355\315\112\150\344  
\152\127\364\241\165\354\327\000\231\325\366\231\134\353\116\311  
\273\327\032\243\105\131\000\017\214\073\333\164\065\002\003\001  
\000\001\243\063\060\061\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\021\006\003\125\035\016\004\012  
\004\010\103\342\200\350\273\322\267\301\060\013\006\003\125\035  
\017\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367  
\015\001\001\005\005\000\003\202\001\001\000\077\001\143\165\007  
\062\053\137\165\377\166\216\323\251\270\157\314\120\075\204\127  
\117\050\203\350\174\243\156\242\274\367\302\272\256\072\253\116  
\320\017\222\050\270\335\133\054\333\345\326\037\072\223\341\221  
\016\327\252\137\001\141\054\076\141\117\336\225\025\115\314\075  
\352\062\342\243\376\370\026\251\362\274\051\374\051\236\175\162  
\245\135\241\153\002\325\137\110\364\240\073\313\030\106\360\075  
\027\125\203\320\051\141\221\273\232\101\111\321\023\276\101\224  
\362\076\303\044\253\237\307\153\102\220\102\171\176\132\121\373  
\074\136\013\041\037\313\331\110\023\025\261\152\177\003\304\321  
\272\121\322\160\211\252\010\112\207\034\366\172\230\261\324\121  
\005\125\306\220\027\157\303\340\004\300\172\364\057\030\242\126  
\102\163\056\266\262\233\321\071\276\011\302\002\112\044\027\371  
\367\254\275\161\007\277\225\342\227\345\241\204\010\215\262\342  
\104\241\334\211\060\073\250\014\005\172\135\166\000\117\036\157  
\161\177\053\071\332\105\102\071\061\322\251\062\100\324\070\143  
\023\226\067\232\111\135\331\307\375\270\114

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ATHEX Root CA"

```

Issuer: CN=ATHEX Root CA,O=Athens Exchange S.A.,C=GR
Serial Number: 10012 (0x271c)
Subject: CN=ATHEX Root CA,O=Athens Exchange S.A.,C=GR
Not Valid Before: Mon Oct 18 15:56:03 2010
Not Valid After: Thu Oct 17 21:00:00 2030
Fingerprint (MD5): af:2b:7a:55:2d:3a:35:02:a4:92:40:16:0c:fa:98:26
Fingerprint (SHA1): db:2b:7b:43:4d:fb:7f:c1:cb:59:26:ec:5d:95:21:fe:35:0f:f2:79
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ATHEX Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\333\053\173\103\115\373\177\301\313\131\046\354\135\225\041\376
\065\017\362\171
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\257\053\172\125\055\072\065\002\244\222\100\026\014\372\230\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\035\060\033\006\003\125\004\012\023\024\101\164\150\145\156\163
\040\105\170\143\150\141\156\147\145\040\123\056\101\056\061\026
\060\024\006\003\125\004\003\023\015\101\124\110\105\130\040\122
\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\047\034
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Halcom Root CA"
Issuer: CN=Halcom Root CA,O=Halcom,C=SI
Serial Number: 504275 (0x7b1d3)
Subject: CN=Halcom Root CA,O=Halcom,C=SI
Not Valid Before: Wed Feb 08 09:55:41 2012
Not Valid After: Sun Feb 08 09:55:41 2032
Fingerprint (MD5): c3:8b:d2:53:ac:00:ec:d1:db:97:61:a5:38:d9:7d:87
Fingerprint (SHA1): 53:5b:00:16:72:ab:bf:7b:6c:c2:54:05:ae:4d:24:fe:03:3f:d1:cc
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\007\261\323
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\036\060\202\002\006\240\003\002\001\002\002\003\007
\261\323\060\015\006\011\052\206\110\206\367\015\001\001\015\005
\000\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111
\061\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157
\155\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143
\157\155\040\122\157\157\164\040\103\101\060\036\027\015\061\062
\060\062\060\070\060\071\065\065\064\061\132\027\015\063\062\060
\062\060\070\060\071\065\065\064\061\132\060\067\061\013\060\011
\006\003\125\004\006\023\002\123\111\061\017\060\015\006\003\125
\004\012\023\006\110\141\154\143\157\155\061\027\060\025\006\003
\125\004\003\023\016\110\141\154\143\157\155\040\122\157\157\164
\040\103\101\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\211\271\205\312\376\364\165\175\177\354\235\102
\067\272\272\215\274\354\075\027\003\375\331\105\145\326\315\311
\116\137\214\110\134\227\010\127\024\213\055\234\074\220\111\231
\317\151\257\111\215\333\034\001\260\156\351\364\352\221\147\135
\312\263\151\117\330\314\301\015\075\356\252\003\166\340\311\160
\242\237\376\353\233\320\266\311\226\323\360\373\133\320\360\007
\253\114\136\115\244\342\107\136\005\150\164\246\216\042\107\356
\176\323\147\204\124\067\222\107\016\363\243\354\025\032\363\155
\173\277\031\065\041\217\202\113\254\124\234\011\315\156\266\301
\127\275\320\111\075\157\237\163\216\261\154\176\275\376\326\273
\075\003\350\346\114\032\264\356\257\264\203\116\062\220\124\366
\116\033\341\057\316\245\064\032\216\243\040\371\331\076\042\153
\157\156\343\372\331\063\134\010\240\367\025\000\075\234\020\222
\112\125\315\200\262\006\252\375\327\217\267\132\222\047\044\017
```

```
\063\074\050\272\361\037\150\265\167\051\136\256\302\332\215\066
\160\342\172\062\033\043\246\336\305\141\015\232\245\022\040\265
\363\226\131\265\002\003\001\000\001\243\063\060\061\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\021
\006\003\125\035\016\004\012\004\010\116\224\330\212\143\302\317
\171\060\013\006\003\125\035\017\004\004\003\002\001\006\060\015
\006\011\052\206\110\206\367\015\001\001\015\005\000\003\202\001
\001\000\051\276\347\261\344\372\003\242\017\257\166\131\235\370
\116\123\115\074\004\203\237\241\342\214\366\224\331\264\256\150
\052\126\153\062\123\050\203\007\162\114\260\116\250\035\201\203
\041\147\003\067\321\214\306\301\116\204\351\064\073\323\365\365
\047\266\215\043\005\122\270\114\062\362\056\332\321\052\175\076
\203\003\052\322\261\343\232\351\212\203\102\360\054\012\241\123
\017\300\053\342\217\032\116\225\271\105\274\113\147\072\275\062
\363\255\245\217\217\303\056\352\366\364\173\142\320\156\156\305
\141\061\023\146\346\147\111\231\073\057\200\117\172\174\163\212
\003\015\137\365\263\062\050\012\212\300\341\371\270\243\046\356
\334\033\127\317\166\032\117\123\276\366\112\213\127\027\053\057
\231\206\252\336\214\332\266\250\154\337\150\066\326\141\213\156
\300\163\116\267\071\105\364\175\316\111\304\363\035\371\251\167
\154\357\357\222\025\023\047\231\106\350\237\251\212\033\237\051
\057\242\035\076\326\053\307\344\125\020\072\030\367\263\173\117
\056\307\000\042\355\344\061\320\347\270\344\124\117\301\200\105
\045\156
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Halcom Root CA"

# Issuer: CN=Halcom Root CA,O=Halcom,C=SI

# Serial Number: 504275 (0x7b1d3)

# Subject: CN=Halcom Root CA,O=Halcom,C=SI

# Not Valid Before: Wed Feb 08 09:55:41 2012

# Not Valid After: Sun Feb 08 09:55:41 2032

# Fingerprint (MD5): c3:8b:d2:53:ac:00:ec:d1:db:97:61:a5:38:d9:7d:87

#

Fingerprint (SHA1): 53:5b:00:16:72:ab:bf:7b:6c:c2:54:05:ae:4d:24:fe:03:3f:d1:cc

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Halcom Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\123\133\000\026\162\253\277\173\154\302\124\005\256\115\044\376
```

```
\003\077\321\314
```

```

END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\303\213\322\123\254\000\354\321\333\227\141\245\070\331\175\207
END
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\007\261\323
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Swisscom Root EV CA 2"
Issuer: CN=Swisscom Root EV CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
Serial Number:f2:fa:64:e2:74:63:d3:8d:fd:10:1d:04:1f:76:ca:58
Subject: CN=Swisscom Root EV CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
Not Valid Before: Fri Jun 24 09:45:08 2011
Not Valid After: Wed Jun 25 08:45:08 2031
Fingerprint (MD5): 7b:30:34:9f:dd:0a:4b:6b:35:ca:31:51:28:5d:ae:ec
Fingerprint (SHA1): e7:a1:90:29:d3:d5:52:dc:0d:0f:c6:92:d3:ea:88:0d:15:2e:1a:6b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swisscom Root EV CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\036\060\034\006\003\125
\004\003\023\025\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\105\126\040\103\101\040\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143

```

\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147  
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145  
\040\123\145\162\166\151\143\145\163\061\036\060\034\006\003\125  
\004\003\023\025\123\167\151\163\163\143\157\155\040\122\157\157  
\164\040\105\126\040\103\101\040\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\021\000\362\372\144\342\164\143\323\215\375\020\035\004\037  
\166\312\130

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\340\060\202\003\310\240\003\002\001\002\002\021\000  
\362\372\144\342\164\143\323\215\375\020\035\004\037\166\312\130  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\147\061\013\060\011\006\003\125\004\006\023\002\143\150\061\021  
\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143\157  
\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147\151  
\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145\040  
\123\145\162\166\151\143\145\163\061\036\060\034\006\003\125\004  
\003\023\025\123\167\151\163\163\143\157\155\040\122\157\157\164  
\040\105\126\040\103\101\040\062\060\036\027\015\061\061\060\066  
\062\064\060\071\064\065\060\070\132\027\015\063\061\060\066\062  
\065\060\070\064\065\060\070\132\060\147\061\013\060\011\006\003  
\125\004\006\023\002\143\150\061\021\060\017\006\003\125\004\012  
\023\010\123\167\151\163\163\143\157\155\061\045\060\043\006\003  
\125\004\013\023\034\104\151\147\151\164\141\154\040\103\145\162  
\164\151\146\151\143\141\164\145\040\123\145\162\166\151\143\145  
\163\061\036\060\034\006\003\125\004\003\023\025\123\167\151\163  
\163\143\157\155\040\122\157\157\164\040\105\126\040\103\101\040  
\062\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002  
\001\000\304\367\035\057\127\352\127\154\367\160\135\143\260\161  
\122\011\140\104\050\063\243\172\116\012\372\330\352\154\213\121  
\026\032\125\256\124\046\304\314\105\007\101\117\020\171\177\161  
\322\172\116\077\070\116\263\000\306\225\312\133\315\301\052\203  
\327\047\037\061\016\043\026\267\045\313\034\264\271\200\062\136  
\032\235\223\361\350\074\140\054\247\136\127\031\130\121\136\274  
\054\126\013\270\330\357\213\202\264\074\270\302\044\250\023\307  
\240\041\066\033\172\127\051\050\247\056\277\161\045\220\363\104  
\203\151\120\244\344\341\033\142\031\224\011\243\363\303\274\357  
\364\275\354\333\023\235\317\235\110\011\122\147\300\067\051\021  
\036\373\322\021\247\205\030\164\171\344\117\205\024\353\122\067  
\342\261\105\330\314\015\103\177\256\023\322\153\053\077\247\302  
\342\250\155\166\133\103\237\276\264\235\263\046\206\073\037\177  
\345\362\350\146\050\026\045\320\113\227\070\247\344\317\011\321  
\066\303\013\276\332\073\104\130\215\276\361\236\011\153\076\363  
\062\307\053\207\306\354\136\234\366\207\145\255\063\051\304\057  
\211\331\271\313\311\003\235\373\154\224\121\227\020\033\206\013

\032\033\077\366\002\176\173\324\305\121\144\050\235\365\323\254  
\203\201\210\323\164\264\131\235\301\353\141\063\132\105\321\313  
\071\320\006\152\123\140\035\257\366\373\151\274\152\334\001\317  
\275\371\217\331\275\133\301\072\137\216\332\017\113\251\233\235  
\052\050\153\032\012\174\074\253\042\013\345\167\055\161\366\202  
\065\201\256\370\173\201\346\352\376\254\364\032\233\164\134\350  
\217\044\366\135\235\106\304\054\322\036\053\041\152\203\047\147  
\125\112\244\343\310\062\227\146\220\162\332\343\324\144\056\137  
\343\241\152\366\140\324\347\065\315\312\304\150\215\327\161\310  
\323\044\063\163\261\154\371\152\341\050\333\137\306\075\350\276  
\125\346\067\033\355\044\331\017\031\217\137\143\030\130\120\201  
\121\145\157\362\237\176\152\004\347\064\044\161\272\166\113\130  
\036\031\275\025\140\105\252\014\022\100\001\235\020\342\307\070  
\007\162\012\145\300\266\273\045\051\332\026\236\213\065\213\141  
\355\345\161\127\203\265\074\161\237\343\117\277\176\036\201\237  
\101\227\002\003\001\000\001\243\201\206\060\201\203\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\035\006  
\003\125\035\041\004\026\060\024\060\022\006\007\140\205\164\001  
\123\002\002\006\007\140\205\164\001\123\002\002\060\022\006\003  
\125\035\023\001\001\377\004\010\060\006\001\001\377\002\001\003  
\060\035\006\003\125\035\016\004\026\004\024\105\331\245\201\156  
\075\210\115\215\161\322\106\301\156\105\036\363\304\200\235\060  
\037\006\003\125\035\043\004\030\060\026\200\024\105\331\245\201  
\156\075\210\115\215\161\322\106\301\156\105\036\363\304\200\235  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003  
\202\002\001\000\224\072\163\006\237\122\113\060\134\324\376\261  
\134\045\371\327\216\157\365\207\144\237\355\024\216\270\004\216  
\050\113\217\252\173\216\071\264\331\130\366\173\241\065\012\241  
\235\212\367\143\345\353\275\071\202\324\343\172\055\157\337\023  
\074\272\376\176\126\230\013\363\124\237\315\104\116\156\074\341  
\076\025\277\006\046\235\344\360\220\266\324\302\236\060\056\037  
\357\307\172\304\120\307\352\173\332\120\313\172\046\313\000\264  
\132\253\265\223\037\200\211\204\004\225\215\215\177\011\223\277  
\324\250\250\344\143\155\331\144\344\270\051\132\010\277\120\341  
\204\017\125\173\137\010\042\033\365\275\231\036\024\366\316\364  
\130\020\202\263\012\075\031\301\277\133\253\252\231\330\362\061  
\275\345\070\146\334\130\005\307\355\143\032\056\012\227\174\207  
\223\053\262\212\343\361\354\030\345\165\266\051\207\347\334\213  
\032\176\264\330\311\323\212\027\154\175\051\104\276\212\252\365  
\176\072\056\150\061\223\271\152\332\232\340\333\351\056\245\204  
\315\034\012\270\112\010\371\234\361\141\046\230\223\267\173\146  
\354\221\136\335\121\077\333\163\017\255\004\130\011\335\004\002  
\225\012\076\323\166\337\246\020\036\200\075\350\315\244\144\321  
\063\307\222\307\342\116\104\343\011\311\116\302\135\207\016\022  
\236\277\017\311\005\020\336\172\243\261\074\362\077\245\252\047  
\171\255\061\175\037\375\374\031\151\305\335\271\077\174\315\306  
\264\302\060\036\176\156\222\327\177\141\166\132\217\353\225\115  
\274\021\156\041\174\131\067\231\320\006\274\371\006\155\062\026

```
\245\331\151\250\341\334\074\200\036\140\121\334\327\124\041\036
\312\142\167\117\372\330\217\263\053\072\015\170\162\311\150\101
\132\107\112\302\243\353\032\327\012\253\074\062\125\310\012\021
\234\337\164\326\360\100\025\035\310\271\217\265\066\305\257\370
\042\270\312\035\363\326\266\031\017\237\141\145\152\352\164\310
\174\217\303\117\135\145\202\037\331\015\211\332\165\162\373\357
\361\107\147\023\263\310\321\031\210\047\046\232\231\171\177\036
\344\054\077\173\356\361\336\115\213\226\227\303\325\077\174\033
\043\355\244\263\035\026\162\103\113\040\341\131\176\302\350\255
\046\277\242\367
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Swisscom Root EV CA 2"

# Issuer: CN=Swisscom Root EV CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch

# Serial Number:f2:fa:64:e2:74:63:d3:8d:fd:10:1d:04:1f:76:ca:58

# Subject: CN=Swisscom Root EV CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch

# Not Valid Before: Fri Jun 24 09:45:08 2011

# Not Valid After: Wed Jun 25 08:45:08 2031

# Fingerprint (MD5): 7b:30:34:9f:dd:0a:4b:6b:35:ca:31:51:28:5d:ae:ec

# Fingerprint (SHA1): e7:a1:90:29:d3:d5:52:dc:0d:0f:c6:92:d3:ea:88:0d:15:2e:1a:6b

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Swisscom Root EV CA 2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\347\241\220\051\323\325\122\334\015\017\306\222\323\352\210\015
\025\056\032\153
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\173\060\064\237\335\012\113\153\065\312\061\121\050\135\256\354
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\147\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\036\060\034\006\003\125
\004\003\023\025\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\105\126\040\103\101\040\062
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL



\002\021\000\362\372\144\342\164\143\323\215\375\020\035\004\037

\166\312\130

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "CFCA GT CA"

# Issuer: O=CFCA

GT CA,C=CN

# Serial Number:19:99:3c:3f

# Subject: O=CFCA GT CA,C=CN

# Not Valid Before: Mon Jun 13 08:15:09 2011

# Not Valid After: Tue Jun 09 08:15:09 2026

# Fingerprint (MD5): 2c:cd:f3:c5:59:a6:84:64:a0:67:50:ff:4b:4c:d6:14

# Fingerprint (SHA1): ea:bd:a2:40:44:0a:bb:d6:94:93:0a:01:d0:97:64:c6:c2:d7:79:66

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CFCA GT CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\042\061\013\060\011\006\003\125\004\006\023\002\103\116\061

\023\060\021\006\003\125\004\012\023\012\103\106\103\101\040\107

\124\040\103\101

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\042\061\013\060\011\006\003\125\004\006\023\002\103\116\061

\023\060\021\006\003\125\004\012\023\012\103\106\103\101\040\107

\124\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\004\031\231\074\077

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\037\060\202\002\007\240\003\002\001\002\002\004\031

\231\074\077\060\015\006\011\052\206\110\206\367\015\001\001\005

\005\000\060\042\061\013\060\011\006\003\125\004\006\023\002\103

\116\061\023\060\021\006\003\125\004\012\023\012\103\106\103\101

\040\107\124\040\103\101\060\036\027\015\061\061\060\066\061\063

\060\070\061\065\060\071\132\027\015\062\066\060\066\060\071\060

\070\061\065\060\071\132\060\042\061\013\060\011\006\003\125\004

\006\023\002\103\116\061\023\060\021\006\003\125\004\012\023\012

\103\106\103\101\040\107\124\040\103\101\060\202\001\042\060\015

\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001  
\017\000\060\202\001\012\002\202\001\001\000\277\163\306\132\053  
\214\170\366\130\267\374\322\027\220\245\053\164\354\201\054\223  
\315\122\314\156\344\052\313\044\241\061\344\255\060\156\343\230  
\042\061\327\041\233\237\325\017\067\057\132\273\070\242\267\171  
\046\147\326\015\305\027\052\234\271\124\004\341\015\165\206\156  
\330\314\305\200\147\033\310\214\055\000\046\206\074\172\171\076  
\266\251\302\116\040\260\067\227\306\205\166\022\202\012\347\124  
\273\213\376\075\256\343\354\153\130\103\366\245\067\353\130\242  
\275\220\304\345\373\312\153\312\060\154\267\173\211\366\061\322  
\214\377\117\302\226\045\103\251\161\065\045\013\030\341\254\310  
\243\044\266\161\223\214\361\135\374\234\020\005\173\377\300\133  
\340\261\227\255\037\330\376\105\365\300\037\235\133\107\071\034  
\006\372\333\146\205\333\044\043\352\173\322\071\040\370\353\052  
\262\032\121\363\224\132\050\002\116\247\134\107\156\317\374\331  
\350\346\141\132\026\047\307\025\015\230\331\350\323\003\065\220  
\051\337\262\057\215\020\167\043\310\270\172\323\021\141\152\363  
\377\201\222\245\354\102\113\150\116\200\327\002\003\001\000\001  
\243\135\060\133\060\037\006\003\125\035\043\004\030\060\026\200  
\024\214\166\120\316\045\323\171\053\074\364\155\235\232\341\236  
\005\117\350\075\045\060\014\006\003\125\035\023\004\005\060\003  
\001\001\377\060\013\006\003\125\035\017\004\004\003\002\001\306  
\060\035\006\003\125\035\016\004\026\004\024\214\166\120\316\045  
\323\171\053\074\364\155\235\232\341\236\005\117\350\075\045\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202  
\001\001\000\276\273\226\130\324\335\211\211\017\054\315\372\143  
\105\166\015\071\200\232\215\372\250\105\141\075\041\125\350\316  
\150\307\031\351\302\261\007\302\213\073\057\317\141\205\220\247  
\122\027\062\072\257\012\005\025\310\306\316\335\216\224\046\006  
\370\320\140\356\263\156\324\015\272\132\335\253\240\174\120\162  
\246\325\220\223\126\327\131\071\333\350\177\263\225\170\123\201  
\122\122\137\364\222\201\002\301\373\042\271\321\003\127\247\176  
\313\373\300\106\274\023\164\114\050\053\166\222\151\037\301\120  
\221\021\305\114\336\013\224\214\027\203\214\257\067\207\264\352  
\153\157\242\132\065\101\141\205\057\234\027\300\373\271\016\242  
\141\006\107\166\274\220\011\230\164\015\322\010\057\275\344\015  
\162\361\246\137\303\174\300\175\352\274\323\253\040\221\313\134  
\005\214\235\250\065\372\066\126\273\011\363\204\135\326\361\342  
\054\236\331\176\361\202\240\341\267\057\176\355\371\173\240\000  
\270\262\336\035\171\341\201\363\122\131\232\024\135\347\302\021  
\363\232\303\072\170\043\276\116\146\336\244\071\151\362\230\072  
\054\012\000

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```

Microsoft Code Signing Only Certificate
Trust for "CFCA GT CA"
Issuer: O=CFCA GT CA,C=CN
Serial Number:19:99:3c:3f
Subject: O=CFCA GT CA,C=CN
Not Valid Before: Mon Jun 13 08:15:09 2011
Not Valid After: Tue Jun 09 08:15:09 2026
Fingerprint (MD5): 2c:cd:f3:c5:59:a6:84:64:a0:67:50:ff:4b:4c:d6:14
Fingerprint (SHA1): ea:bd:a2:40:44:0a:bb:d6:94:93:0a:01:d0:97:64:c6:c2:d7:79:66
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CFCA GT CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\352\275\242\100\104\012\273\326\224\223\012\001\320\227\144\306
\302\327\171\146
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\054\315\363\305\131\246\204\144\240\147\120\377\113\114\326\024
END
CKA_ISSUER MULTILINE_OCTAL
\060\042\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\023\060\021\006\003\125\004\012\023\012\103\106\103\101\040\107
\124\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\031\231\074\077
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "Digidentity L3 Root CA - G2"
Issuer: CN=Digidentity L3 Root CA - G2,O=Digidentity B.V.,C=NL
Serial Number: 1 (0x1)
Subject: CN=Digidentity L3 Root CA - G2,O=Digidentity B.V.,C=NL
Not Valid Before: Fri Apr 29 10:44:19 2011
Not Valid After: Mon Nov 10 10:44:19 2031
Fingerprint (MD5): 26:8f:5b:c8:b6:3f:88:8c:4c:49:08:2e:18:c1:02:10
#
Fingerprint (SHA1): f1:38:a3:30:a4:ea:98:6b:eb:52:0b:b1:10:35:87:6e:fb:9d:7f:1c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Digidentity L3 Root CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\031\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145
\156\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003
\125\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171
\040\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\031\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145
\156\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003
\125\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171
\040\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\241\060\202\003\211\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061\031
\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145\156
\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003\125
\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171\040
\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062\060
\036\027\015\061\061\060\064\062\071\061\060\064\064\061\071\132
\027\015\063\061\061\061\061\060\061\060\064\064\061\071\132\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061\031
\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145\156
\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003\125
\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171\040
\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\270\021\243\105\336\001\107\126\015\142\270\216\272\130\146\134
\372\062\306\153\200\156\270\177\370\123\337\176\337\142\250\301
\127\117\232\105\045\310\112\105\055\123\070\044\263\040\254\117
\352\255\377\232\020\257\177\342\016\312\264\016\044\045\221\316
\166\216\020\251\057\231\123\247\220\113\004\213\155\172\271\101
\033\323\001\171\214\237\101\153\271\220\327\201\022\032\007\226
\320\011\257\351\344\152\041\123\200\270\206\236\142\150\103\255
\263\152\025\372\366\155\003\062\152\065\261\120\023\110\307\172
\265\041\023\234\004\234\332\223\371\152\053\301\247\030\375\366
```

\300\176\131\366\373\347\016\021\265\334\043\352\034\357\147\005  
\127\316\027\351\361\173\261\321\062\044\214\317\145\347\324\274  
\066\031\160\174\242\047\041\326\200\322\055\025\117\112\265\340  
\125\220\225\121\223\041\200\363\234\104\037\377\035\125\125\344  
\342\020\021\224\026\123\320\376\257\363\357\227\272\106\342\167  
\133\313\326\242\131\021\210\246\347\125\101\303\222\145\035\043  
\024\142\024\177\045\162\040\366\244\207\051\157\007\374\376\340  
\320\030\322\227\371\024\216\066\306\350\014\030\227\361\166\034  
\364\044\332\343\112\371\267\114\022\031\147\363\360\341\123\373  
\135\344\300\164\143\137\045\221\012\331\076\364\063\254\344\013  
\165\137\316\346\230\274\124\015\235\242\061\305\025\124\135\042  
\034\213\072\124\246\015\321\327\043\072\254\076\252\112\027\144  
\166\055\015\373\124\345\353\202\074\071\101\103\235\341\256\171  
\140\317\146\356\307\161\203\173\014\153\011\333\236\242\115\116  
\106\223\150\267\372\147\341\332\277\337\221\200\332\243\242\211  
\255\136\154\314\113\167\165\144\157\215\044\343\210\210\013\343  
\077\351\277\247\345\126\142\015\203\177\275\152\141\310\220\211  
\170\133\014\257\022\052\342\223\255\144\347\331\105\056\366\260  
\310\253\105\356\160\070\157\273\065\076\026\376\253\236\303\146  
\057\363\276\011\140\325\157\200\275\115\333\257\215\376\014\140  
\063\153\017\350\235\153\304\060\167\237\054\120\070\320\230\151  
\354\067\350\236\017\344\142\352\372\377\021\104\124\331\357\315  
\223\165\221\114\341\211\145\246\224\271\123\371\371\111\143\305  
\002\003\001\000\001\243\201\211\060\201\206\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003  
\125\035\016\004\026\004\024\053\043\040\140\275\055\212\210\107  
\254\255\053\276\002\071\272\230\324\354\230\060\104\006\003\125  
\035\040\004\075\060\073\060\071\006\004\125\035\040\000\060\061  
\060\057\006\010\053\006\001\005\005\007\002\001\026\043\150\164  
\164\160\072\057\057\160\153\151\056\144\151\147\151\144\145\156  
\164\151\164\171\056\145\165\057\166\141\154\151\144\141\164\151  
\145\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000  
\003\202\002\001\000\251\375\357\272\217\033\176\062\022\147\035  
\101\015\055\246\213\317\362\364\255\126\170\176\012\230\330\233  
\250\321\264\113\054\046\254\344\322\177\147\067\275\011\215\345  
\271\163\021\072\156\011\307\127\144\007\041\064\370\016\135\052  
\330\221\174\361\124\121\274\234\360\014\152\102\364\074\001\116  
\223\105\101\075\254\363\230\113\036\161\036\063\131\062\377\174  
\060\360\134\344\341\276\055\056\265\352\335\142\041\016\075\264  
\015\225\374\311\270\331\272\240\367\142\247\355\303\003\256\010  
\054\101\325\357\103\161\070\267\024\162\256\077\364\024\164\107  
\330\336\214\121\171\316\357\261\124\254\160\107\226\176\055\056  
\335\233\356\241\001\056\031\357\276\130\140\161\055\255\227\133  
\132\140\060\313\062\202\142\116\126\345\147\152\264\322\061\124  
\162\077\002\320\274\060\071\217\267\103\011\052\037\046\073\014  
\307\174\035\233\200\140\204\016\351\056\322\371\025\273\133\340  
\212\244\000\351\343\051\373\050\133\275\066\105\140\041\103\061

```
\377\160\241\137\134\203\133\227\174\015\267\123\131\354\230\265
\116\342\051\261\324\174\106\343\350\343\103\352\072\226\065\037
\123\361\004\026\045\343\054\363\150\241\246\221\337\025\373\275
\237\346\116\236\302\124\153\176\042\127\343\244\234\134\042\045
\037\201\257\231\310\337\021\025\110\103\370\263\063\251\043\177
\016\063\217\274\106\035\103\264\073\140\365\227\205\031\242\026
\260\125\334\032\160\051\145\332\331\176\011\027\064\353\211\272
\351\141\222\330\336\064\143\074\112\125\152\277\332\206\355\316
\063\336\273\123\157\317\034\332\224\117\166\124\254\145\125\020
\123\232\310\270\153\334\006\346\272\345\121\325\101\177\037\304
\300\101\241\140\221\064\363\023\202\321\241\167\323\367\114\344
\031\377\327\104\232\260\265\274\334\312\136\217\334\316\361\240
\151\066\340\104\222\056\231\372\274\257\263\307\170\072\125\146
\307\153\245\344\151\046\351\064\035\037\052\227\012\351\167\251
\167\133\163\110\062\201\277\377\321\354\203\305\160\203\151\236
\230\033\303\127\337\221\225\034\200\374\215\350\226\203\005\323
\237\172\210\173\372\350\127\361\301\204\050\275\315\326\034\314
\245\342\111\012\163
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Digidentity L3 Root CA - G2"

# Issuer: CN=Digidentity L3 Root CA - G2,O=Digidentity B.V.,C=NL

# Serial Number: 1 (0x1)

# Subject: CN=Digidentity L3 Root CA - G2,O=Digidentity B.V.,C=NL

# Not Valid Before: Fri Apr 29 10:44:19 2011

# Not Valid After: Mon Nov 10 10:44:19 2031

# Fingerprint (MD5): 26:8f:5b:c8:b6:3f:88:8c:4c:49:08:2e:18:c1:02:10

# Fingerprint (SHA1): f1:38:a3:30:a4:ea:98:6b:eb:52:0b:b1:10:35:87:6e:fb:9d:7f:1c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Digidentity L3 Root CA - G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\361\070\243\060\244\352\230\153\353\122\013\261\020\065\207\156
\373\235\177\034
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\046\217\133\310\266\077\210\214\114\111\010\056\030\301\002\020
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061
```

```
\031\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145
\156\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003
\125\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171
\040\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\001\001
```

END

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

# Microsoft Code Signing Only Certificate

# Certificate "SITHS Root CA v1"

# Issuer: CN=SITHS Root CA v1,O=Inera AB,C=SE

# Serial Number:90:66:61:a8:62:3d:65:44:77:04:3f:71:9a:c3:97:0c

# Subject: CN=SITHS Root CA v1,O=Inera AB,C=SE

# Not Valid Before: Thu Mar 29 07:54:49 2012

# Not Valid After: Mon Mar 29 07:54:49 2032

# Fingerprint

(MD5): 7f:7b:02:6c:68:9f:32:03:c7:af:04:9d:ec:23:df:f3

# Fingerprint (SHA1): 58:5f:78:75:be:e7:43:3e:b0:79:ea:ab:7d:05:bb:0f:7a:f2:bc:cc

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SITHS Root CA v1"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\073\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\021\060\017\006\003\125\004\012\014\010\111\156\145\162\141\040
\101\102\061\031\060\027\006\003\125\004\003\014\020\123\111\124
\110\123\040\122\157\157\164\040\103\101\040\166\061
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\073\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\021\060\017\006\003\125\004\012\014\010\111\156\145\162\141\040
\101\102\061\031\060\027\006\003\125\004\003\014\020\123\111\124
\110\123\040\122\157\157\164\040\103\101\040\166\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\021\000\220\146\141\250\142\075\145\104\167\004\077\161\232
\303\227\014
```

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\005\223\060\202\003\173\240\003\002\001\002\002\021\000  
\220\146\141\250\142\075\145\104\167\004\077\161\232\303\227\014  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\073\061\013\060\011\006\003\125\004\006\023\002\123\105\061\021  
\060\017\006\003\125\004\012\014\010\111\156\145\162\141\040\101  
\102\061\031\060\027\006\003\125\004\003\014\020\123\111\124\110  
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\352\042\303\352\272\314\102\151\236\270\205\237\160\300\154\247  
\276\157\243\134\335\103\210\007\315\312\051\337\151\172\037\055  
\237\126\152\033\142\040\041\141\306\120\113\145\165\111\106\277  
\134\327\051\036\302\036\205\102\341\016\070\115\303\066\161\102  
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\115\327\252\260\332\331\154\312\060\104\055\335\262\050\142\212  
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\256\121\207\003\216\231\177\331\150\242\366\234\015\171\202\262  
\237\337\044\310\146\140\350\266\110\104\047\310\153\126\267\104  
\205\316\002\267\323\212\161\134\127\121\127\041\214\352\302\121  
\017\120\077\200\253\004\115\311\122\335\344\245\362\056\037\155  
\165\272\207\035\220\013\356\030\204\200\163\273\213\225\204\212  
\141\015\116\135\142\237\343\146\014\373\066\016\047\323\110\370  
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\201\335\154\334\155\261\157\015\164\236\054\057\302\005\362\104  
\021\262\063\372\201\305\112\155\076\105\326\054\342\153\137\056  
\344\103\225\121\033\231\061\005\337\045\033\163\321\173\234\304  
\163\111\373\142\140\331\151\143\335\321\076\145\155\107\372\144  
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\341\312\227\304\270\267\120\071\314\061\116\375\055\034\032\366  
\107\343\154\354\033\005\350\177\027\065\020\204\332\063\347\064  
\346\265\244\353\304\042\007\112\366\233\130\330\017\234\100\373  
\261\213\137\242\375\231\352\242\173\131\142\321\136\256\321\112  
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Trust for "SITHS Root CA v1"  
# Issuer: CN=SITHS Root CA v1,O=Inera AB,C=SE  
# Serial Number:90:66:61:a8:62:3d:65:44:77:04:3f:71:9a:c3:97:0c  
# Subject: CN=SITHS Root CA v1,O=Inera AB,C=SE  
# Not Valid Before: Thu Mar 29 07:54:49 2012  
# Not Valid After: Mon Mar 29 07:54:49 2032  
# Fingerprint (MD5): 7f:7b:02:6c:68:9f:32:03:c7:af:04:9d:ec:23:df:f3  
# Fingerprint (SHA1): 58:5f:78:75:be:e7:43:3e:b0:79:ea:ab:7d:05:bb:0f:7a:f2:bc:cc

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SITHS Root CA v1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\130\137\170\165\276\347\103\076\260\171\352\253\175\005\273\017  
\172\362\274\314

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\177\173\002\154\150\237\062\003\307\257\004\235\354\043\337\363

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\073\061\013\060\011\006\003\125\004\006\023\002\123\105\061  
\021\060\017\006\003\125\004\012\014\010\111\156\145\162\141\040  
\101\102\061\031\060\027\006\003\125\004\003\014\020\123\111\124  
\110\123\040\122\157\157\164\040\103\101\040\166\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\021\000\220\146\141\250\142\075\145\104\167\004\077\161\232  
\303\227\014

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Macao Post eSignTrust Root Certification Authority (G02)"

# Issuer: CN=Macao Post eSignTrust Root Certification Authority (G02),O=Macao Post,C=MO

# Serial Number:52:ac:be:07:11:49:97:bb:1f:bf:87:1b:25:17:bf:a4

# Subject: CN=Macao Post eSignTrust Root Certification Authority (G02),O=Macao Post,C=MO

# Not Valid Before: Wed Jan 06 00:00:00 2010

# Not Valid After: Sun Jan 05 23:59:59 2020

# Fingerprint (MD5): a1:2d:ed:eb:8a:3b:88:2f:fa:38:f3:86:a4:fb:bc:f2

#

Fingerprint (SHA1): 06:14:31:51:e0:2b:45:dd:ba:dd:5d:8e:56:53:0d:aa:e3:28:cf:90

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Macao Post eSignTrust Root Certification Authority (G02)"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\115\117\061  
\023\060\021\006\003\125\004\012\023\012\115\141\143\141\157\040  
\120\157\163\164\061\101\060\077\006\003\125\004\003\023\070\115  
\141\143\141\157\040\120\157\163\164\040\145\123\151\147\156\124  
\162\165\163\164\040\122\157\157\164\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
\171\040\050\107\060\062\051

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\115\117\061  
\023\060\021\006\003\125\004\012\023\012\115\141\143\141\157\040  
\120\157\163\164\061\101\060\077\006\003\125\004\003\023\070\115  
\141\143\141\157\040\120\157\163\164\040\145\123\151\147\156\124  
\162\165\163\164\040\122\157\157\164\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\122\254\276\007\021\111\227\273\037\277\207\033\045\027  
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END

CKA\_VALUE MULTILINE\_OCTAL

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\021\006\003\125\004\012\023\012\115\141\143\141\157\040\120\157  
\163\164\061\101\060\077\006\003\125\004\003\023\070\115\141\143  
\141\157\040\120\157\163\164\040\145\123\151\147\156\124\162\165  
\163\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040  
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\060\060\060\060\060\132\027\015\062\060\060\061\060\065\062\063  
\065\071\065\071\132\060\145\061\013\060\011\006\003\125\004\006  
\023\002\115\117\061\023\060\021\006\003\125\004\012\023\012\115  
\141\143\141\157\040\120\157\163\164\061\101\060\077\006\003\125  
\004\003\023\070\115\141\143\141\157\040\120\157\163\164\040\145  
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\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
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\202\002\017\000\060\202\002\012\002\202\002\001\000\266\370\207  
\247\164\314\135\043\136\256\253\226\334\327\044\050\035\244\024  
\146\327\240\150\214\136\235\105\324\324\051\323\263\013\353\255  
\026\352\235\122\021\311\244\341\160\345\335\276\016\034\021\167  
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\216\126\325\127\071\320\047\333\237\111\117\250\026\124\277\170  
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\234\052\016\213\166\231\223\324\113\260\350\124\077\015\330\212  
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\136\324\205\362\013\043\004\230\324\053\232\126\162\106\114\101  
\232\063\360\222\264\277\101\324\275\233\260\263\361\365\023\326  
\257\133\324\362\321\101\360\107\135\172\274\172\131\361\175\140  
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\046\251\160\373\361\211\226\142\025\134\131\240\265\043\372\226  
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\230\144\033\217\123\360\050\235\254\024\272\137\151\317\226\043  
\356\126\254\231\315\072\217\325\136\031\346\142\023\072\137\353  
\213\137\026\300\073\341\321\223\217\126\141\067\005\320\171\033  
\375\250\274\017\171\322\263\346\323\146

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Macao Post eSignTrust Root Certification Authority (G02)"

# Issuer: CN=Macao Post eSignTrust Root Certification Authority (G02),O=Macao Post,C=MO

# Serial Number:52:ac:be:07:11:49:97:bb:1f:bf:87:1b:25:17:bf:a4

# Subject: CN=Macao Post eSignTrust Root Certification Authority (G02),O=Macao Post,C=MO

# Not Valid Before: Wed Jan 06 00:00:00 2010

# Not Valid After: Sun Jan 05 23:59:59 2020

# Fingerprint (MD5): a1:2d:ed:eb:8a:3b:88:2f:fa:38:f3:86:a4:fb:bc:f2

# Fingerprint (SHA1): 06:14:31:51:e0:2b:45:dd:ba:dd:5d:8e:56:53:0d:aa:e3:28:cf:90

CKA\_CLASS CK\_OBJECT\_CLASS

CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Macao Post eSignTrust Root Certification Authority (G02)"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\006\024\061\121\340\053\105\335\272\335\135\216\126\123\015\252
\343\050\317\220
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\241\055\355\353\212\073\210\057\372\070\363\206\244\373\274\362
END
```

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\145\061\013\060\011\006\003\125\004\006\023\002\115\117\061
\023\060\021\006\003\125\004\012\023\012\115\141\143\141\157\040
\120\157\163\164\061\101\060\077\006\003\125\004\003\023\070\115
\141\143\141\157\040\120\157\163\164\040\145\123\151\147\156\124
\162\165\163\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\050\107\060\062\051
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\020\122\254\276\007\021\111\227\273\037\277\207\033\045\027
\277\244
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST

CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Autoridade Certificadora Raiz Brasileira v2"

# Issuer: CN=Autoridade Certificadora Raiz Brasileira v2,OU=Instituto Nacional de Tecnologia da Informacao - ITI,O=ICP-Brasil,C=BR

# Serial Number: 1 (0x1)

# Subject: CN=Autoridade Certificadora Raiz Brasileira v2,OU=Instituto Nacional de Tecnologia da Informacao - ITI,O=ICP-Brasil,C=BR

# Not Valid Before: Mon Jun 21 19:04:57 2010

# Not Valid After: Wed Jun 21 19:04:57 2023

# Fingerprint (MD5): 00:11:ae:73:15:fb:2d:6d:88:d8:43:bd:b4:b6:4c:5f

# Fingerprint (SHA1): a9:82:2e:6c:69:33:c6:3c:14:8c:2d:ca:a4:4a:5c:f1:aa:d2:c4:2e

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Autoridade Certificadora Raiz  
Brasileira v2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156
```

\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141  
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055  
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101  
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146  
\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141  
\163\151\154\145\151\162\141\040\166\062

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122  
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102  
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064  
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156  
\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141  
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055  
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101  
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146  
\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141  
\163\151\154\145\151\162\141\040\166\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\241\060\202\004\211\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060  
\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122\061  
\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102\162  
\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064\111  
\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156\141  
\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141\040  
\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055\040  
\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101\165  
\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146\151  
\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141\163  
\151\154\145\151\162\141\040\166\062\060\036\027\015\061\060\060  
\066\062\061\061\071\060\064\065\067\132\027\015\062\063\060\066  
\062\061\061\071\060\064\065\067\132\060\201\227\061\013\060\011  
\006\003\125\004\006\023\002\102\122\061\023\060\021\006\003\125  
\004\012\023\012\111\103\120\055\102\162\141\163\151\154\061\075  
\060\073\006\003\125\004\013\023\064\111\156\163\164\151\164\165  
\164\157\040\116\141\143\151\157\156\141\154\040\144\145\040\124  
\145\143\156\157\154\157\147\151\141\040\144\141\040\111\156\146  
\157\162\155\141\143\141\157\040\055\040\111\124\111\061\064\060  
\062\006\003\125\004\003\023\053\101\165\164\157\162\151\144\141  
\144\145\040\103\145\162\164\151\146\151\143\141\144\157\162\141  
\040\122\141\151\172\040\102\162\141\163\151\154\145\151\162\141

\040\166\062\060\202\002\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002  
\202\002\001\000\272\106\244\016\335\347\100\362\265\240\174\122  
\225\127\105\374\155\204\363\206\001\311\205\003\255\230\253\322  
\362\136\005\231\311\273\157\142\147\375\167\104\271\003\007\074  
\322\033\000\142\324\160\054\102\203\171\146\253\231\126\256\201  
\274\152\111\275\363\164\017\142\267\353\133\007\146\224\102\044  
\235\106\254\232\102\030\060\360\044\250\121\101\352\253\225\361  
\250\053\002\170\151\265\051\047\136\234\056\163\306\376\043\245  
\343\246\316\375\154\033\153\000\124\353\000\255\117\072\114\074  
\347\012\210\133\332\136\232\013\126\344\265\124\070\035\362\012  
\223\144\116\303\101\222\123\040\052\317\374\164\156\324\333\063  
\070\142\344\376\216\114\130\034\367\217\052\115\377\305\222\331  
\011\122\275\317\160\000\235\151\232\063\152\210\207\105\041\231  
\026\121\015\064\337\202\275\264\151\250\174\174\324\335\323\362  
\025\134\113\305\130\020\352\205\031\313\066\042\130\052\162\014  
\232\226\336\312\317\010\121\141\277\264\005\051\006\053\206\220  
\376\351\115\303\004\005\107\313\317\166\331\177\161\246\207\173  
\025\100\344\063\200\170\007\035\244\362\216\233\100\073\311\162  
\120\337\151\276\360\054\226\037\220\265\325\256\164\343\145\264  
\214\032\351\152\033\373\162\134\305\202\124\352\340\123\007\304  
\314\022\351\367\336\327\057\324\110\057\107\077\046\141\004\261  
\022\232\063\153\265\206\113\023\053\320\206\235\107\355\151\373  
\374\204\022\146\370\126\345\016\212\154\166\304\153\032\172\302  
\240\132\022\321\043\211\130\001\174\010\130\332\025\216\025\331  
\176\175\067\266\244\105\365\003\205\314\107\372\213\171\105\270  
\146\142\063\323\046\112\336\034\351\324\177\346\155\046\271\074  
\175\315\017\050\012\051\017\233\335\143\253\271\246\107\032\204  
\327\205\244\003\145\006\004\113\122\215\203\064\102\177\061\216  
\021\056\346\263\147\225\100\176\227\172\100\000\371\021\154\203  
\070\130\255\003\063\133\246\304\301\305\260\254\015\251\006\360  
\246\151\001\064\266\351\370\224\110\117\076\246\165\011\354\112  
\305\073\340\311\136\260\062\377\237\151\131\317\074\060\157\015  
\316\047\127\354\132\033\150\377\354\117\157\170\062\076\171\305  
\264\135\225\177\002\003\001\000\001\243\201\365\060\201\362\060  
\116\006\003\125\035\040\004\107\060\105\060\103\006\005\140\114  
\001\001\000\060\072\060\070\006\010\053\006\001\005\005\007\002  
\001\026\054\150\164\164\160\072\057\057\141\143\162\141\151\172  
\056\151\143\160\142\162\141\163\151\154\056\147\157\166\056\142  
\162\057\104\120\103\141\143\162\141\151\172\056\160\144\146\060  
\077\006\003\125\035\037\004\070\060\066\060\064\240\062\240\060  
\206\056\150\164\164\160\072\057\057\141\143\162\141\151\172\056  
\151\143\160\142\162\141\163\151\154\056\147\157\166\056\142\162  
\057\114\103\122\141\143\162\141\151\172\166\062\056\143\162\154  
\060\037\006\003\125\035\043\004\030\060\026\200\024\014\071\040  
\072\267\001\037\313\327\050\175\101\240\307\372\112\255\062\044  
\276\060\035\006\003\125\035\016\004\026\004\024\014\071\040\072  
\267\001\037\313\327\050\175\101\240\307\372\112\255\062\044\276



\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000  
\003\202\002\001\000\131\232\024\151\030\155\175\051\103\160\175  
\166\233\141\337\167\216\032\166\344\251\326\313\166\244\026\014  
\114\224\022\306\220\321\201\003\305\255\006\331\055\104\274\262  
\011\166\011\200\071\147\000\030\064\155\006\012\346\265\020\131  
\110\272\165\140\374\077\216\035\030\125\160\053\236\113\225\254  
\211\253\012\167\044\173\141\304\307\221\046\216\106\023\121\067  
\266\214\047\012\323\015\360\232\053\042\203\203\263\275\203\065  
\255\233\074\274\170\203\051\065\141\066\370\021\161\063\040\124  
\143\123\105\001\330\023\132\204\073\327\146\023\044\267\304\106  
\305\042\330\163\044\356\034\023\027\226\310\045\350\033\036\317  
\337\205\120\155\074\352\367\120\236\033\227\336\247\153\333\326  
\163\322\317\174\120\300\260\214\345\123\022\172\206\071\254\065  
\133\147\307\352\324\373\321\302\135\352\016\227\163\230\256\051  
\277\344\072\363\004\066\120\054\355\336\036\333\205\350\035\204  
\011\356\363\246\203\063\133\157\107\171\117\110\265\374\270\046  
\023\253\252\263\364\141\021\373\105\147\363\035\076\156\376\052  
\113\046\104\032\237\261\242\340\074\332\340\344\005\072\170\254  
\373\250\241\115\277\135\054\167\051\220\315\023\035\357\006\050  
\330\267\024\363\133\310\311\236\247\176\061\022\212\170\142\304  
\321\005\274\006\002\143\004\053\015\211\335\344\134\133\062\200  
\104\324\102\354\052\363\362\100\207\061\325\076\342\012\062\014  
\024\215\325\162\155\013\346\375\215\344\250\363\005\215\165\027  
\167\233\012\271\372\220\222\231\145\210\062\147\103\005\216\055  
\013\025\273\065\361\141\350\331\147\167\355\026\345\350\001\055  
\153\064\077\216\203\263\367\352\017\112\036\076\065\204\235\214  
\200\064\077\251\225\350\303\255\304\315\236\312\024\026\054\031  
\236\344\066\213\271\271\243\102\045\007\076\303\345\325\150\117  
\240\146\034\246\263\266\163\034\220\032\077\100\271\032\126\102  
\160\207\377\157\055\017\021\375\036\377\367\205\060\025\016\343  
\027\061\356\047\225\314\311\351\231\036\227\307\155\133\007\265  
\005\152\075\362\105\337\272\202\171\044\160\056\233\202\037\146  
\251\245\155\047\314\366\052\242\321\137\205\157\340\106\235\252  
\322\245\116\125\016

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Autoridade Certificadora Raiz Brasileira v2"

# Issuer: CN=Autoridade Certificadora Raiz Brasileira v2,OU=Instituto Nacional de Tecnologia da Informacao - ITI,O=ICP-Brasil,C=BR

# Serial Number: 1 (0x1)

# Subject: CN=Autoridade Certificadora Raiz Brasileira v2,OU=Instituto Nacional de Tecnologia da Informacao -

```

ITI,O=ICP-Brasil,C=BR
Not Valid Before: Mon Jun 21 19:04:57 2010
Not Valid After: Wed Jun 21 19:04:57
2023
Fingerprint (MD5): 00:11:ae:73:15:fb:2d:6d:88:d8:43:bd:b4:b6:4c:5f
Fingerprint (SHA1): a9:82:2e:6c:69:33:c6:3c:14:8c:2d:ca:a4:4a:5c:f1:aa:d2:c4:2e
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridade Certificadora Raiz Brasileira v2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\251\202\056\154\151\063\306\074\024\214\055\312\244\112\134\361
\252\322\304\056
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\000\021\256\163\025\373\055\155\210\330\103\275\264\266\114\137
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156
\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146
\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141
\163\151\154\145\151\162\141\040\166\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Swisscom Root CA 2"
Issuer: CN=Swisscom Root CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
Serial Number: 1e:9e:28:e8:48:f2:e5:ef:c3:7c:4a:1e:5a:18:67:b6
Subject: CN=Swisscom Root CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
Not Valid Before: Fri Jun 24 08:38:14 2011
Not Valid After: Wed Jun 25 07:38:14 2031
Fingerprint (MD5): 5b:04:69:ec:a5:83:94:63:18:a7:86:d0:e4:f2:6e:19
Fingerprint (SHA1): 77:47:4f:c6:30:e4:0f:4c:47:64:3f:84:ba:b8:c6:95:4a:8a:41:ec

```

```
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swisscom Root CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\036\236\050\350\110\362\345\357\303\174\112\036\132\030
\147\266
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\331\060\202\003\301\240\003\002\001\002\002\020\036
\236\050\350\110\362\345\357\303\174\112\036\132\030\147\266\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\144
\061\013\060\011\006\003\125\004\006\023\002\143\150\061\021\060
\017\006\003\125\004\012\023\010\123\167\151\163\163\143\157\155
\061\045\060\043\006\003\125\004\013\023\034\104\151\147\151\164
\141\154\040\103\145\162\164\151\146\151\143\141\164\145\040\123
\145\162\166\151\143\145\163\061\033\060\031\006\003\125\004\003
\023\022\123\167\151\163\163\143\157\155\040\122\157\157\164\040
\103\101\040\062\060\036\027\015\061\061\060\066\062\064\060\070
\063\070\061\064\132\027\015\063\061\060\066\062\065\060\067\063
\070\061\064\132\060\144\061\013\060\011\006\003\125\004\006\023
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Swisscom Root CA 2"

# Issuer: CN=Swisscom Root CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch

# Serial Number: 1e:9e:28:e8:f2:e5:ef:c3:7c:4a:1e:5a:18:67:b6

# Subject: CN=Swisscom Root CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch

# Not Valid Before: Fri Jun 24 08:38:14 2011

# Not Valid After: Wed Jun 25 07:38:14 2031

# Fingerprint (MD5): 5b:04:69:ec:a5:83:94:63:18:a7:86:d0:e4:f2:6e:19

#

Fingerprint (SHA1): 77:47:4f:c6:30:e4:0f:4c:47:64:3f:84:ba:b8:c6:95:4a:8a:41:ec

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

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CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
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\167\107\117\306\060\344\017\114\107\144\077\204\272\270\306\225
\112\212\101\354
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\133\004\151\354\245\203\224\143\030\247\206\320\344\362\156\031
END
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\062
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\147\266
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CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "IGC/A AC racine Etat francais"
Issuer: CN=IGC/A AC racine Etat francais,OU=0002 130007669,O=ANSSI,C=FR
Serial Number:11:21:85:0c:b3:9c:6a:32:fa:be:67:1b:81:3f:a4:86:15:8f
Subject: CN=IGC/A AC racine Etat francais,OU=0002 130007669,O=ANSSI,C=FR
Not Valid Before: Fri Jul 08 09:00:00 2011
Not Valid After: Sat Apr 15 09:00:00 2028
Fingerprint (MD5): f4:f5:81:33:de:2e:15:b5:70:3a:57:3c:26:0a:72:8d
Fingerprint (SHA1): 1a:c9:2f:09:ea:89:e2:8b:12:6d:fa:c5:1e:3a:f7:ea:90:95:a3:ee
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IGC/A AC racine Etat francais"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\016\060\014\006\003\125\004\012\023\005\101\116\123\123\111\061

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\156\145\040\105\164\141\164\040\146\162\141\156\143\141\151\163  
END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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\027\060\025\006\003\125\004\013\023\016\060\060\060\062\040\061  
\063\060\060\060\067\066\066\071\061\046\060\044\006\003\125\004  
\003\023\035\111\107\103\057\101\040\101\103\040\162\141\143\151  
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CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

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CKA\_VALUE  
MULTILINE\_OCTAL

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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "IGC/A AC racine Etat francais"

# Issuer: CN=IGC/A AC racine Etat francais,OU=0002 130007669,O=ANSSI,C=FR

# Serial Number:11:21:85:0c:b3:9c:6a:32:fa:be:67:1b:81:3f:a4:86:15:8f

# Subject: CN=IGC/A AC racine Etat francais,OU=0002 130007669,O=ANSSI,C=FR

# Not Valid Before: Fri Jul 08 09:00:00 2011

# Not Valid After: Sat Apr 15 09:00:00 2028

# Fingerprint (MD5): f4:f5:81:33:de:2e:15:b5:70:3a:57:3c:26:0a:72:8d

# Fingerprint (SHA1): 1a:c9:2f:09:ea:89:e2:8b:12:6d:fa:c5:1e:3a:f7:ea:90:95:a3:ee

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "IGC/A AC racine Etat francais"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\032\311\057\011\352\211\342\213\022\155\372\305\036\072\367\352
\220\225\243\356
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\364\365\201\063\336\056\025\265\160\072\127\074\046\012\162\215
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\136\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\016\060\014\006\003\125\004\012\023\005\101\116\123\123\111\061
```

```
\027\060\025\006\003\125\004\013\023\016\060\060\060\062\040\061
\063\060\060\060\067\066\066\071\061\046\060\044\006\003\125\004
\003\023\035\111\107\103\057\101\040\101\103\040\162\141\143\151
\156\145\040\105\164\141\164\040\146\162\141\156\143\141\151\163
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\022\021\041\205\014\263\234\152\062\372\276\147\033\201\077
\244\206\025\217
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "PersonalID Trustworthy RootCA 2011"

#

Issuer: CN=PersonalID Trustworthy RootCA 2011,OU=Certificate Services,O=PersonalID Ltd.,C=IL

# Serial Number:58:cb:f9:64:96:71:74:95:40:f4:ad:08:ac:64:e4:e3

# Subject: CN=PersonalID Trustworthy RootCA 2011,OU=Certificate Services,O=PersonalID Ltd.,C=IL

# Not Valid Before: Thu Sep 01 08:35:21 2011

# Not Valid After: Sun Sep 01 08:45:16 2041

# Fingerprint (MD5): 20:3c:23:dc:f6:7a:97:14:0e:5f:48:b4:7d:ad:ac:c8

# Fingerprint (SHA1): 43:94:ce:31:26:ff:1a:22:4c:dd:4d:ee:b4:f4:ec:1d:a3:68:ef:6a

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "PersonalID Trustworthy RootCA 2011"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\163\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\030\060\026\006\003\125\004\012\014\017\120\145\162\163\157\156
\141\154\111\104\040\114\164\144\056\061\035\060\033\006\003\125
\004\013\014\024\103\145\162\164\151\146\151\143\141\164\145\040
\123\145\162\166\151\143\145\163\061\053\060\051\006\003\125\004
\003\014\042\120\145\162\163\157\156\141\154\111\104\040\124\162
\165\163\164\167\157\162\164\150\171\040\122\157\157\164\103\101
\040\062\060\061\061
```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\163\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\030\060\026\006\003\125\004\012\014\017\120\145\162\163\157\156
\141\154\111\104\040\114\164\144\056\061\035\060\033\006\003\125
\004\013\014\024\103\145\162\164\151\146\151\143\141\164\145\040
\123\145\162\166\151\143\145\163\061\053\060\051\006\003\125\004
```

\003\014\042\120\145\162\163\157\156\141\154\111\104\040\124\162  
\165\163\164\167\157\162\164\150\171\040\122\157\157\164\103\101  
\040\062\060\061\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\130\313\371\144\226\161\164\225\100\364\255\010\254\144  
\344\343

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\062\060\202\004\032\240\003\002\001\002\002\020\130  
\313\371\144\226\161\164\225\100\364\255\010\254\144\344\343\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\163  
\061\013\060\011\006\003\125\004\006\023\002\111\114\061\030\060  
\026\006\003\125\004\012\014\017\120\145\162\163\157\156\141\154  
\111\104\040\114\164\144\056\061\035\060\033\006\003\125\004\013  
\014\024\103\145\162\164\151\146\151\143\141\164\145\040\123\145  
\162\166\151\143\145\163\061\053\060\051\006\003\125\004\003\014  
\042\120\145\162\163\157\156\141\154\111\104\040\124\162\165\163  
\164\167\157\162\164\150\171\040\122\157\157\164\103\101\040\062  
\060\061\061\060\036\027\015\061\061\060\071\060\061\060\070\063  
\065\062\061\132\027\015\064\061\060\071\060\061\060\070\064\065  
\061\066\132\060\163\061\013\060\011\006\003\125\004\006\023\002  
\111\114\061\030\060\026\006\003\125\004\012\014\017\120\145\162  
\163\157\156\141\154\111\104\040\114\164\144\056\061\035\060\033  
\006\003\125\004\013\014\024\103\145\162\164\151\146\151\143\141  
\164\145\040\123\145\162\166\151\143\145\163\061\053\060\051\006  
\003\125\004\003\014\042\120\145\162\163\157\156\141\154\111\104  
\040\124\162\165\163\164\167\157\162\164\150\171\040\122\157\157  
\164\103\101\040\062\060\061\061\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\260\225\214\140\376\005\016  
\152\063\355\367\213\343\362\325\362\174\323\126\102\124\367\053  
\362\210\245\365\347\267\154\207\001\053\151\276\005\111\104\330  
\333\041\172\052\327\212\061\241\041\020\236\323\342\156\143\202  
\205\124\204\115\050\046\033\342\023\367\121\373\057\353\022\325  
\075\071\214\144\237\244\023\207\303\330\311\372\051\043\216\011  
\217\111\106\304\324\311\127\130\151\237\027\317\163\164\245\356  
\312\030\271\307\301\060\315\117\072\065\010\123\370\354\032\373  
\157\060\355\366\237\011\360\360\320\304\216\073\171\116\056\205  
\042\134\324\175\160\321\377\222\272\037\324\125\123\147\272\050  
\130\055\367\023\214\374\245\013\234\070\246\106\034\016\350\252  
\170\053\365\012\060\323\073\140\206\310\177\245\233\242\143\001  
\057\320\323\022\045\205\176\226\315\061\261\344\233\216\352\054  
\223\244\142\250\067\325\366\217\337\041\232\323\076\035\341\120  
\021\160\124\233\004\027\235\115\253\141\316\217\052\054\357\171  
\346\167\105\131\326\150\325\266\113\232\253\221\113\016\141\027  
\271\130\302\236\146\241\217\211\301\103\040\102\260\177\200\234  
\112\052\267\172\040\101\306\115\304\222\157\172\176\135\133\271

\243\311\116\312\345\120\145\274\000\000\171\107\360\105\004\260  
\042\373\016\230\252\141\035\117\140\143\162\217\265\260\004\224  
\177\020\254\031\077\047\142\151\326\034\127\335\071\117\070\352  
\000\232\375\050\235\100\046\300\100\235\304\240\111\310\101\265  
\147\075\240\113\224\051\022\251\130\047\131\004\177\217\321\214  
\176\014\263\010\027\064\254\217\271\134\275\351\160\241\176\302  
\245\145\141\351\266\020\120\217\334\344\164\141\361\137\162\173  
\177\134\057\055\174\253\326\103\061\020\034\131\167\312\110\112  
\030\242\144\013\000\131\147\307\324\312\303\233\032\010\122\025  
\276\327\305\306\267\057\346\142\234\246\307\330\336\360\025\373  
\256\071\125\055\157\120\165\056\375\240\007\264\137\172\176\004  
\213\366\231\242\165\355\311\073\325\075\317\147\122\075\076\357  
\037\160\232\030\074\247\040\006\111\014\261\145\254\063\273\324  
\177\107\151\210\366\212\201\356\235\324\264\307\057\003\350\256  
\032\311\126\005\147\151\250\310\201\002\003\001\000\001\243\201  
\301\060\201\276\060\013\006\003\125\035\017\004\004\003\002\001  
\206\060\022\006\003\125\035\023\001\001\377\004\010\060\006\001  
\001\377\002\001\002\060\035\006\003\125\035\016\004\026\004\024  
\307\177\013\310\057\127\216\051\362\366\001\213\353\047\245\126  
\216\375\244\036\060\020\006\011\053\006\001\004\001\202\067\025  
\001\004\003\002\001\000\060\152\006\003\125\035\040\004\143\060  
\141\060\137\006\010\053\006\001\004\001\341\030\001\060\123\060  
\121\006\010\053\006\001\005\005\007\002\001\026\105\150\164\164  
\160\072\057\057\167\167\167\056\151\143\141\056\143\157\056\151  
\154\057\162\145\160\157\163\151\164\157\162\171\057\143\160\163  
\057\120\145\162\163\157\156\141\154\111\104\137\120\162\141\143  
\164\151\143\145\137\123\164\141\164\145\155\145\156\164\056\160  
\144\146\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\003\202\002\001\000\102\145\213\044\372\222\025\064\032\034  
\372\310\316\115\172\057\173\337\320\003\101\034\324\244\341\373  
\350\314\255\011\335\035\244\010\331\250\040\175\227\237\014\111  
\361\245\302\346\325\167\106\227\176\244\220\242\171\351\275\032  
\136\064\202\146\011\122\374\120\321\217\320\253\034\242\377\377  
\075\356\376\043\370\277\043\263\315\276\341\367\317\344\330\022  
\343\224\310\116\314\327\173\260\067\233\167\352\355\134\201\310  
\314\217\316\071\343\344\145\135\336\202\330\217\043\151\341\121  
\257\137\267\117\220\151\244\231\145\123\272\346\375\257\170\147  
\224\112\310\303\177\214\002\117\112\346\207\230\366\070\267\110  
\370\155\050\177\367\306\154\045\124\375\056\326\352\332\006\342  
\261\375\007\150\360\257\200\214\264\302\351\164\025\244\032\277  
\271\312\103\133\022\347\205\107\136\122\003\360\221\340\351\120  
\161\324\041\002\054\173\206\221\160\066\306\234\266\164\371\052  
\125\367\041\373\157\240\006\135\327\060\022\362\121\361\311\070  
\066\217\310\146\141\101\331\307\113\202\150\122\243\365\211\014  
\025\274\116\052\225\254\061\151\247\033\342\324\327\110\364\221  
\365\003\174\171\026\076\054\015\151\341\212\067\036\237\174\030  
\125\101\057\137\347\244\162\233\125\363\343\001\260\002\245\204  
\022\152\100\246\253\344\241\254\353\003\331\274\137\044\126\047

```
\255\040\340\146\065\105\075\107\011\360\005\261\157\161\176\100
\260\320\025\136\053\254\122\201\250\373\203\365\054\127\104\206
\064\344\024\152\343\317\175\232\167\330\154\110\134\313\232\341
\246\373\277\021\242\006\345\037\161\275\064\265\317\275\304\102
\026\305\051\370\324\300\114\212\262\336\305\224\202\206\233\314
\340\251\006\104\061\044\044\115\372\355\341\102\045\146\242\301
\327\200\027\357\172\225\145\103\076\146\323\005\361\001\344\102
\126\104\000\170\153\235\066\040\373\145\377\100\134\350\150\065
\037\341\046\240\202\003\166\003\313\160\106\021\044\256\337\057
\140\375\361\047\000\003\275\113\047\333\274\234\227\067\121\053
\345\170\264\301\066\220\020\214\377\075\000\324\272\110\237\110
\312\207\061\232\355\304\232\123\322\335\163\024\077\011\202\241
\135\145\116\115\046\342
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "PersonalID Trustworthy RootCA 2011"

# Issuer: CN=PersonalID Trustworthy RootCA 2011,OU=Certificate Services,O=PersonalID Ltd.,C=IL

# Serial Number:58:cb:f9:64:96:71:74:95:40:f4:ad:08:ac:64:e4:e3

# Subject: CN=PersonalID Trustworthy RootCA 2011,OU=Certificate Services,O=PersonalID Ltd.,C=IL

# Not Valid Before: Thu Sep 01 08:35:21 2011

# Not Valid After: Sun Sep 01 08:45:16 2041

# Fingerprint (MD5): 20:3c:23:dc:f6:7a:97:14:0e:5f:48:b4:7d:ad:ac:c8

#

Fingerprint (SHA1): 43:94:ce:31:26:ff:1a:22:4c:dd:4d:ee:b4:f4:ec:1d:a3:68:ef:6a

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "PersonalID Trustworthy RootCA 2011"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\103\224\316\061\046\377\032\042\114\335\115\356\264\364\354\035
\243\150\357\152
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\040\074\043\334\366\172\227\024\016\137\110\264\175\255\254\310
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\163\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\030\060\026\006\003\125\004\012\014\017\120\145\162\163\157\156
\141\154\111\104\040\114\164\144\056\061\035\060\033\006\003\125
\004\013\014\024\103\145\162\164\151\146\151\143\141\164\145\040
\123\145\162\166\151\143\145\163\061\053\060\051\006\003\125\004
\003\014\042\120\145\162\163\157\156\141\154\111\104\040\124\162
```

\165\163\164\167\157\162\164\150\171\040\122\157\157\164\103\101  
\040\062\060\061\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\130\313\371\144\226\161\164\225\100\364\255\010\254\144  
\344\343

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Swiss Government Root CA II"

# Issuer: CN=Swiss Government Root CA II,OU=Certification Authorities,OU=Services,O=The Federal Authorities  
of the Swiss Confederation,C=CH

# Serial Number:0e:9f:17:99:a5:b1:3d:9c:cb:ec:06:eb:a3:f0:0e:69

# Subject: CN=Swiss Government Root CA II,OU=Certification Authorities,OU=Services,O=The Federal  
Authorities of the Swiss Confederation,C=CH

# Not Valid Before: Wed Feb 16 09:00:00 2011

# Not Valid After: Fri Feb 16 08:59:59 2035

# Fingerprint (MD5): 30:b0:e4:cf:bf:f5:89:dc:bf:52:2d:88:1c:cb:aa:b3

# Fingerprint (SHA1): c7:f7:cb:e2:02:36:66:f9:86:02:5d:4a:3e:31:3f:29:eb:0c:5b:38

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Swiss Government Root CA II"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\247\061\013\060\011\006\003\125\004\006\023\002\103\110  
\061\073\060\071\006\003\125\004\012\023\062\124\150\145\040\106  
\145\144\145\162\141\154\040\101\165\164\150\157\162\151\164\151  
\145\163\040\157\146\040\164\150\145\040\123\167\151\163\163\040  
\103\157\156\146\145\144\145\162\141\164\151\157\156\061\021\060  
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163  
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\151\145\163\061\044\060\042\006\003\125\004\003\023\033\123  
\167\151\163\163\040\107\157\166\145\162\156\155\145\156\164\040  
\122\157\157\164\040\103\101\040\111\111

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\247\061\013\060\011\006\003\125\004\006\023\002\103\110  
\061\073\060\071\006\003\125\004\012\023\062\124\150\145\040\106

\145\144\145\162\141\154\040\101\165\164\150\157\162\151\164\151  
\145\163\040\157\146\040\164\150\145\040\123\167\151\163\163\040  
\103\157\156\146\145\144\145\162\141\164\151\157\156\061\021\060  
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163  
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\151\145\163\061\044\060\042\006\003\125\004\003\023\033\123  
\167\151\163\163\040\107\157\166\145\162\156\155\145\156\164\040  
\122\157\157\164\040\103\101\040\111\111

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\016\237\027\231\245\261\075\234\313\354\006\353\243\360  
\016\151

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\010\070\060\202\006\040\240\003\002\001\002\002\020\016  
\237\027\231\245\261\075\234\313\354\006\353\243\360\016\151\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201  
\247\061\013\060\011\006\003\125\004\006\023\002\103\110\061\073  
\060\071\006\003\125\004\012\023\062\124\150\145\040\106\145\144  
\145\162\141\154\040\101\165\164\150\157\162\151\164\151\145\163  
\040\157\146\040\164\150\145\040\123\167\151\163\163\040\103\157  
\156\146\145\144\145\162\141\164\151\157\156\061\021\060\017\006  
\003\125\004\013\023\010\123\145\162\166\151\143\145\163\061\042  
\060\040\006\003\125\004\013\023\031\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\151  
\145\163\061\044\060\042\006\003\125\004\003\023\033\123\167\151  
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CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

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# Microsoft Code Signing Only Certificate

# Trust for "Swiss Government Root CA II"

# Issuer: CN=Swiss Government Root CA II,OU=Certification Authorities,OU=Services,O=The Federal Authorities of the Swiss Confederation,C=CH

# Serial Number:0e:9f:17:99:a5:b1:3d:9c:cb:ec:06:eb:a3:f0:0e:69

# Subject: CN=Swiss Government Root CA II,OU=Certification Authorities,OU=Services,O=The Federal Authorities of the Swiss Confederation,C=CH

# Not Valid Before: Wed

Feb 16 09:00:00 2011

# Not Valid After: Fri Feb 16 08:59:59 2035

# Fingerprint (MD5): 30:b0:e4:cf:bf:f5:89:dc:bf:52:2d:88:1c:cb:aa:b3

# Fingerprint (SHA1): c7:f7:cb:e2:02:36:66:f9:86:02:5d:4a:3e:31:3f:29:eb:0c:5b:38

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Microsoft Code Signing Only Certificate
Certificate "Swiss Government Root CA I"
Issuer: CN=Swiss Government Root CA I,OU=Certification Authorities,OU=Services,O=The Federal Authorities
of the Swiss Confederation,C=CH
Serial Number:fd:75:04:8d:7a:60:86:93:69:4c:aa:00:3c:65:d3:3d
Subject: CN=Swiss Government Root CA
I,OU=Certification Authorities,OU=Services,O=The Federal Authorities of the Swiss Confederation,C=CH
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Not Valid After: Thu Feb 15 08:59:59 2035
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Fingerprint (SHA1): a1:58:51:87:15:65:86:ce:f9:c4:54:e2:2a:b1:5c:58:74:56:07:b4
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\242\226\076\074\333\002\266\235\224\346\002\116\363\360\031\202  
\262\010\043\023\353\221\315\121\323\252\106\302\163\230\230\077  
\272\303\356\232\374\372\315\257\162\012\067\023\217\371\240\120  
\263\352\373\077\054\274\372\143\125\065\364\322\274\270\161\322  
\221\353\351\312\312\134\354\121\146\250\236\131\005\042\057\243  
\032\333\117\340\105\142\043\074\135\125\373\060\225\053\064\242  
\317\247\264\113\300\063\311\064\121\235\323\263\053\337\305\352  
\054\054\307\337\104\037\266\215\271\376\363\134\315\067\057\260  
\154\234\112\010\275\350\365\326\372\160\345\151\062\067\134\137  
\013\313\077\344\210\002\314\312\263\170\057\175\277\110\263\041  
\260\037\210\171\233\132\212\161\330\041\204\051\017\112\004\061  
\052\275\015\041\104\316\164\235\046\323\111\035\370\206\250\345  
\022\167\305\300\163\014\120\203\152\220\153\241\312\370\320\225  
\331\065\206\307\021\243\073\024\307\313\206\130\126\015\373\203  
\367\001\002\003\001\000\001\243\202\002\131\060\202\002\125\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\201\233\006\003\125\035\040\004\201\223\060\201\220\060\201  
\215\006\010\140\205\164\001\021\003\001\000\060\201\200\060\103  
\006\010\053\006\001\005\005\007\002\001\026\067\150\164\164\160  
\072\057\057\167\167\167\056\160\153\151\056\141\144\155\151\156  
\056\143\150\057\143\160\163\057\103\120\123\137\062\137\061\066  
\137\067\065\066\137\061\137\061\067\137\063\137\061\137\060\056  
\160\144\146\060\071\006\010\053\006\001\005\005\007\002\002\060  
\055\032\053\124\150\151\163\040\151\163\040\164\150\145\040\123  
\167\151\163\163\040\107\157\166\145\162\156\155\145\156\164\040  
\122\157\157\164\040\103\101\040\111\040\103\120\123\056\060\201  
\216\006\003\125\035\037\004\201\206\060\201\203\060\201\200\240  
\176\240\174\206\172\154\144\141\160\072\057\057\141\144\155\151  
\156\144\151\162\056\141\144\155\151\156\056\143\150\072\063\070  
\071\057\143\156\075\123\167\151\163\163\045\062\060\107\157\166  
\145\162\156\155\145\156\164\045\062\060\122\157\157\164\045\062  
\060\103\101\045\062\060\111\054\157\165\075\103\145\162\164\151  
\146\151\143\141\164\151\157\156\045\062\060\101\165\164\150\157  
\162\151\164\151\145\163\054\157\165\075\123\145\162\166\151\143  
\145\163\054\157\075\101\144\155\151\156\054\143\075\103\110\060  
\035\006\003\125\035\016\004\026\004\024\265\033\203\273\073\117  
\262\322\373\345\003\216\324\141\135\321\032\216\260\242\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\201

\343\006\003\125\035\043\004\201\333\060\201\330\200\024\265\033  
\203\273\073\117\262\322\373\345\003\216\324\141\135\321\032\216  
\260\242\241\201\254\244\201\251\060\201\246\061\013\060\011\006  
\003\125\004\006\023\002\103\110\061\073\060\071\006\003\125\004  
\012\023\062\124\150\145\040\106\145\144\145\162\141\154\040\101  
\165\164\150\157\162\151\164\151\145\163\040\157\146\040\164\150  
\145\040\123\167\151\163\163\040\103\157\156\146\145\144\145\162  
\141\164\151\157\156\061\021\060\017\006\003\125\004\013\023\010  
\123\145\162\166\151\143\145\163\061\042\060\040\006\003\125\004  
\013\023\031\103\145\162\164\151\146\151\143\141\164\151\157\156  
\040\101\165\164\150\157\162\151\164\151\145\163\061\043\060\041  
\006\003\125\004\003\023\032\123\167\151\163\163\040\107\157\166  
\145\162\156\155\145\156\164\040\122\157\157\164\040\103\101\040  
\111\202\021\000\375\165\004\215\172\140\206\223\151\114\252\000  
\074\145\323\075\060\015\006\011\052\206\110\206\367\015\001\001  
\013\005\000\003\202\002\001\000\045\332\337\170\260\046\334\237  
\231\353\063\234\311\105\272\134\143\122\215\156\003\163\252\164  
\110\305\015\013\322\027\014\054\013\322\306\045\203\324\124\315  
\007\201\124\057\147\166\045\247\351\327\177\226\107\167\244\035  
\233\105\377\361\330\366\236\107\016\164\214\023\304\362\276\326  
\007\050\030\074\230\165\301\333\353\222\210\046\346\006\144\216  
\371\322\375\342\231\065\201\321\330\165\027\265\163\352\335\350  
\030\042\225\026\031\012\131\052\042\334\206\132\103\117\045\150  
\066\251\330\223\000\217\136\305\303\141\206\360\322\024\011\225  
\121\304\176\330\122\356\260\215\212\210\161\245\327\050\247\364  
\334\006\130\045\136\304\125\030\010\225\164\174\270\001\347\116  
\330\326\366\174\040\103\110\015\243\340\336\124\304\250\137\000  
\111\103\323\105\073\202\145\156\356\213\243\001\042\126\232\361  
\316\051\345\014\304\153\355\347\116\370\261\125\201\255\161\377  
\204\373\010\127\346\107\312\255\207\370\106\370\372\360\065\204  
\355\264\330\210\227\042\167\244\217\026\310\074\147\321\341\156  
\004\254\173\217\066\315\336\245\010\254\052\215\365\247\035\237  
\307\303\221\041\102\243\206\201\271\052\330\261\351\070\035\124  
\010\230\071\012\021\312\062\016\063\315\364\114\352\250\112\006  
\351\030\076\101\306\317\240\366\340\053\153\040\216\247\040\002  
\353\060\101\201\260\350\344\256\244\030\211\053\337\024\360\022  
\051\155\170\372\115\104\373\262\064\345\257\363\216\065\367\303  
\316\054\013\030\264\320\171\217\023\277\003\213\146\270\265\141  
\324\254\016\375\170\075\011\255\265\322\054\117\126\101\231\210  
\104\014\176\147\343\144\237\372\132\052\130\167\121\151\261\315  
\054\232\247\064\020\005\164\372\156\105\143\313\213\122\255\107  
\221\242\022\310\242\046\004\305\320\042\036\003\263\262\222\067  
\124\127\375\211\203\165\003\155\055\073\263\361\244\242\020\174  
\234\223\215\243\120\204\071\213\225\131\101\366\002\166\006\212  
\274\016\220\347\331\072\353\255\046\136\127\123\321\157\310\165  
\340\253\221\173\153\241\177\371\033\120\250\334\376\115\006\341  
\025\212\244\020\353\036\006\317\124\110\025\226\050\266\043\037  
\032\343\174\245\217\372\067\127

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "Swiss Government Root CA I"
Issuer: CN=Swiss Government Root CA I,OU=Certification Authorities,OU=Services,O=The
Federal Authorities of the Swiss Confederation,C=CH
Serial Number:fd:75:04:8d:7a:60:86:93:69:4c:aa:00:3c:65:d3:3d
Subject: CN=Swiss Government Root CA I,OU=Certification Authorities,OU=Services,O=The Federal
Authorities of the Swiss Confederation,C=CH
Not Valid Before: Tue Feb 15 09:00:00 2011
Not Valid After: Thu Feb 15 08:59:59 2035
Fingerprint (MD5): c7:c9:da:9b:76:e1:ac:86:6b:34:bd:03:3f:e3:cf:d2
Fingerprint (SHA1): a1:58:51:87:15:65:86:ce:f9:c4:54:e2:2a:b1:5c:58:74:56:07:b4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swiss Government Root CA I"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\241\130\121\207\025\145\206\316\371\304\124\342\052\261\134\130
\164\126\007\264
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\307\311\332\233\166\341\254\206\153\064\275\003\077\343\317\322
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\073\060\071\006\003\125\004\012\023\062\124\150\145\040\106
\145\144\145\162\141\154\040\101\165\164\150\157\162\151\164\151
\145\163\040\157\146\040\164\150\145\040\123\167\151\163\163\040
\103\157\156\146\145\144\145\162\141\164\151\157\156\061\021\060
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\151\145\163\061\043\060\041\006\003\125\004\003\023\032\123
\167\151\163\163\040\107\157\166\145\162\156\155\145\156\164\040
\122\157\157\164\040\103\101\040\111
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\375\165\004\215\172\140\206\223\151\114\252\000\074
\145\323\075
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing

Only Certificate

# Certificate "Network Solutions Certificate Authority"

# Issuer: CN=Network Solutions Certificate Authority,O=Network Solutions L.L.C.,C=US

# Serial Number:1c:a0:2d:c1:52:3b:6a:6d:8b:5c:1f:95:4a:ed:ac:30

# Subject: CN=Network Solutions Certificate Authority,O=Network Solutions L.L.C.,C=US

# Not Valid Before: Sat Jan 01 00:00:00 2011

# Not Valid After: Tue Dec 31 23:59:59 2030

# Fingerprint (MD5): bd:a4:1d:36:de:c2:7a:8a:04:37:cb:f2:00:a6:65:54

# Fingerprint (SHA1): 71:89:9a:67:bf:33:af:31:be:fd:c0:71:f8:f7:33:b1:83:85:63:32

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Network Solutions Certificate Authority"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\041\060\037\006\003\125\004\012\023\030\116\145\164\167\157\162  
\153\040\123\157\154\165\164\151\157\156\163\040\114\056\114\056  
\103\056\061\060\060\056\006\003\125\004\003\023\047\116\145\164  
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\103  
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157  
\162\151\164\171

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\041\060\037\006\003\125\004\012\023\030\116\145\164\167\157\162  
\153\040\123\157\154\165\164\151\157\156\163\040\114\056\114\056  
\103\056\061\060\060\056\006\003\125\004\003\023\047\116\145\164  
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\103  
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157  
\162\151\164\171

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\034\240\055\301\122\073\152\155\213\134\037\225\112\355  
\254\060

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\220\060\202\002\170\240\003\002\001\002\002\020\034  
\240\055\301\122\073\152\155\213\134\037\225\112\355\254\060\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\142



\061\013\060\011\006\003\125\004\006\023\002\125\123\061\041\060  
\037\006\003\125\004\012\023\030\116\145\164\167\157\162\153\040  
\123\157\154\165\164\151\157\156\163\040\114\056\114\056\103\056  
\061\060\060\056\006\003\125\004\003\023\047\116\145\164\167\157  
\162\153\040\123\157\154\165\164\151\157\156\163\040\103\145\162  
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151  
\164\171\060\036\027\015\061\061\060\061\060\061\060\060\060\060  
\060\060\132\027\015\063\060\061\062\063\061\062\063\065\071\065  
\071\132\060\142\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\041\060\037\006\003\125\004\012\023\030\116\145\164\167  
\157\162\153\040\123\157\154\165\164\151\157\156\163\040\114\056  
\114\056\103\056\061\060\060\056\006\003\125\004\003\023\047\116  
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163  
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164  
\150\157\162\151\164\171\060\202\001\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202  
\001\012\002\202\001\001\000\344\274\176\222\060\155\306\330\216  
\053\013\274\106\316\340\047\226\336\336\371\372\022\323\074\063  
\163\263\004\057\274\161\214\345\237\266\042\140\076\137\135\316  
\011\377\202\014\033\232\121\120\032\046\211\335\325\141\135\031  
\334\022\017\055\012\242\103\135\027\320\064\222\040\352\163\317  
\070\054\006\046\011\172\162\367\372\120\062\370\302\223\323\151  
\242\043\316\101\261\314\344\325\037\066\321\212\072\370\214\143  
\342\024\131\151\355\015\323\177\153\350\270\003\345\117\152\345  
\230\143\151\110\005\276\056\377\063\266\351\227\131\151\370\147  
\031\256\223\141\226\104\025\323\162\260\077\274\152\175\354\110  
\177\215\303\253\252\161\053\123\151\101\123\064\265\260\271\305  
\006\012\304\260\105\365\101\135\156\211\105\173\075\073\046\214  
\164\302\345\322\321\175\262\021\324\373\130\062\042\232\200\311  
\334\375\014\351\177\136\003\227\316\073\000\024\207\047\160\070  
\251\216\156\263\047\166\230\121\340\005\343\041\253\032\325\205  
\042\074\051\265\232\026\305\200\250\364\273\153\060\217\057\106  
\002\242\261\014\042\340\323\002\003\001\000\001\243\102\060\100  
\060\035\006\003\125\035\016\004\026\004\024\041\060\311\373\000  
\327\116\230\332\207\252\052\320\247\056\261\100\061\247\114\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\302\211\204\240\350\214\146\375\377\023\005\033  
\303\072\216\230\111\212\370\252\000\134\046\375\162\152\243\176  
\022\033\224\256\124\370\041\217\247\223\117\367\026\357\271\271  
\263\062\300\045\041\061\146\067\054\011\260\376\062\260\067\354  
\074\270\316\217\010\252\010\220\007\134\165\325\341\116\054\313  
\002\044\351\242\136\351\365\170\065\042\006\034\362\037\210\261  
\341\134\314\226\124\372\157\111\314\215\361\126\003\355\317\054  
\237\047\336\345\312\203\104\276\106\100\371\127\056\322\177\061  
\055\316\203\334\376\160\153\204\320\243\237\377\227\320\250\327  
\002\354\261\054\360\357\163\070\075\231\254\304\117\001\277\325

```
\152\352\306\056\062\051\027\012\313\346\151\236\321\112\265\366
\337\216\031\370\225\351\105\251\016\315\155\101\131\040\236\163
\306\154\161\034\234\324\115\060\250\163\011\240\025\363\240\105
\046\303\133\375\273\271\330\055\327\037\365\005\060\031\366\256
\017\216\142\217\337\310\117\206\331\035\141\026\263\311\360\273
\373\307\365\257\001\042\107\354\330\332\317\034\363\123\146\272
\123\011\001\371
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Network Solutions Certificate Authority"

# Issuer: CN=Network Solutions Certificate Authority,O=Network Solutions L.L.C.,C=US

# Serial Number:1c:a0:2d:c1:52:3b:6a:6d:8b:5c:1f:95:4a:ed:ac:30

# Subject: CN=Network Solutions Certificate Authority,O=Network Solutions  
L.L.C.,C=US

# Not Valid Before: Sat Jan 01 00:00:00 2011

# Not Valid After: Tue Dec 31 23:59:59 2030

# Fingerprint (MD5): bd:a4:1d:36:de:c2:7a:8a:04:37:cb:f2:00:a6:65:54

# Fingerprint (SHA1): 71:89:9a:67:bf:33:af:31:be:fd:c0:71:f8:f7:33:b1:83:85:63:32

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Network Solutions Certificate Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\161\211\232\147\277\063\257\061\276\375\300\161\370\367\063\261
\203\205\143\062
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\275\244\035\066\336\302\172\212\004\067\313\362\000\246\145\124
```

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\116\145\164\167\157\162
\153\040\123\157\154\165\164\151\157\156\163\040\114\056\114\056
\103\056\061\060\060\056\006\003\125\004\003\023\047\116\145\164
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\034\240\055\301\122\073\152\155\213\134\037\225\112\355
\254\060
```

```
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "LuxTrust Global Root"
Issuer: CN=LuxTrust Global Root,O=LuxTrust s.a.,C=LU
Serial Number: 3000 (0xbb8)
Subject: CN=LuxTrust Global Root,O=LuxTrust s.a.,C=LU
Not Valid Before: Thu Mar 17 09:51:37 2011
Not Valid After: Wed Mar 17 09:51:37 2021
Fingerprint (MD5): 42:a5:21:7a:4c:af:c7:bf:fd:a7:f5:b2:10:4c:3e:be
Fingerprint (SHA1): c9:3c:34:ea:90:d9:13:0c:0f:03:00:4b:98:bd:8b:35:70:91:56:11
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LuxTrust Global Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\104\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\023\015\114\165\170\124\162\165
\163\164\040\163\056\141\056\061\035\060\033\006\003\125\004\003
\023\024\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164
```

```
END
```

```
CKA_ID UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\023\015\114\165\170\124\162\165
\163\164\040\163\056\141\056\061\035\060\033\006\003\125\004\003
\023\024\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164
```

```
END
```

```
CKA_SERIAL_NUMBER MULTILINE_OCTAL
```

```
\002\002\013\270
```

```
END
```

```
CKA_VALUE MULTILINE_OCTAL
\060\202\003\144\060\202\002\114\240\003\002\001\002\002\002\013
\270\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\060\104\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\023\015\114\165\170\124\162\165
\163\164\040\163\056\141\056\061\035\060\033\006\003\125\004\003
\023\024\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164\060\036\027\015\061\061\060\063\061\067
```

\060\071\065\061\063\067\132\027\015\062\061\060\063\061\067\060  
\071\065\061\063\067\132\060\104\061\013\060\011\006\003\125\004  
\006\023\002\114\125\061\026\060\024\006\003\125\004\012\023\015  
\114\165\170\124\162\165\163\164\040\163\056\141\056\061\035\060  
\033\006\003\125\004\003\023\024\114\165\170\124\162\165\163\164  
\040\107\154\157\142\141\154\040\122\157\157\164\060\202\001\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\001\017\000\060\202\001\012\002\202\001\001\000\262\177\247  
\100\360\042\312\014\366\353\261\361\313\016\225\127\100\165\257  
\240\077\076\316\354\252\062\127\346\031\261\147\103\230\132\153  
\174\263\270\372\170\234\252\246\204\262\140\033\200\101\316\143  
\315\037\027\010\231\244\365\357\076\022\307\114\260\127\232\134  
\170\100\170\374\105\215\332\221\147\334\072\121\271\155\163\346  
\267\071\216\166\072\264\037\005\365\151\125\371\223\317\170\210  
\112\276\252\233\327\173\107\133\106\004\114\202\026\246\065\366  
\374\164\337\326\264\257\330\342\265\047\021\164\131\242\302\146  
\054\150\012\341\230\210\210\074\212\005\165\024\343\270\256\363  
\010\204\233\152\301\077\061\030\257\047\245\113\233\244\375\171  
\061\336\230\075\016\141\312\207\230\301\370\212\060\234\372\076  
\063\325\245\304\003\007\341\367\226\164\030\000\047\070\047\321  
\053\252\252\341\101\105\213\157\361\045\302\334\242\227\225\307  
\102\024\063\135\171\204\043\152\347\145\300\127\240\330\135\251  
\143\001\347\260\344\213\350\370\305\143\270\345\154\164\220\075  
\307\167\374\053\272\171\351\244\306\022\170\247\377\002\003\001  
\000\001\243\140\060\136\060\014\006\003\125\035\023\004\005\060  
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\037\006\003\125\035\043\004\030\060\026\200  
\024\027\025\205\211\011\057\044\207\157\077\035\033\344\362\226  
\171\203\110\023\316\060\035\006\003\125\035\016\004\026\004\024  
\027\025\205\211\011\057\044\207\157\077\035\033\344\362\226\171  
\203\110\023\316\060\015\006\011\052\206\110\206\367\015\001\001  
\013\005\000\003\202\001\001\000\132\360\034\320\324\120\317\101  
\176\346\270\235\175\303\160\320\136\066\377\156\216\172\057\336  
\110\021\325\064\056\074\267\105\302\124\045\247\341\301\036\067  
\203\266\224\256\266\105\110\003\352\225\276\353\234\152\264\067  
\134\037\056\323\153\202\201\103\133\012\077\021\125\143\254\372  
\174\010\002\067\240\074\071\004\063\376\227\062\310\122\345\331  
\045\115\260\306\356\150\037\160\252\163\316\127\003\334\175\012  
\015\063\362\322\132\337\012\154\073\314\021\121\227\032\244\041  
\242\205\065\002\327\200\042\322\204\262\370\300\252\150\277\325  
\353\252\303\013\253\241\174\053\367\365\073\207\341\124\127\354  
\005\044\357\171\102\116\363\213\150\237\344\156\313\202\231\311  
\314\052\334\123\302\037\160\203\253\041\017\126\264\110\377\337  
\007\042\263\214\371\035\246\004\337\055\003\066\271\335\157\376  
\061\210\146\377\154\155\104\064\257\010\167\076\046\322\162\364  
\273\107\126\223\074\230\143\341\063\273\231\043\222\265\203\171  
\350\035\237\147\255\142\326\211\326\366\374\047\336\062\047\313  
\204\332\167\205\041\241\022\041

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "LuxTrust Global Root"
Issuer: CN=LuxTrust Global Root,O=LuxTrust s.a.,C=LU
Serial Number: 3000 (0xbb8)
Subject: CN=LuxTrust Global Root,O=LuxTrust s.a.,C=LU
Not Valid Before: Thu Mar 17 09:51:37 2011
Not Valid After: Wed Mar 17 09:51:37 2021
Fingerprint (MD5): 42:a5:21:7a:4c:af:c7:bf:fd:a7:f5:b2:10:4c:3e:be
Fingerprint (SHA1): c9:3c:34:ea:90:d9:13:0c:0f:03:00:4b:98:bd:8b:35:70:91:56:11
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LuxTrust Global Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\311\074\064\352\220\331\023\014\017\003\000\113\230\275\213\065
\160\221\126\021
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\102\245\041\172\114\257\307\277\375\247\365\262\020\114\076\276
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\023\015\114\165\170\124\162\165
\163\164\040\163\056\141\056\061\035\060\033\006\003\125\004\003
\023\024\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\013\270
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code
 Signing Only Certificate
Certificate "AC1 RAIZ MTIN"
Issuer: C=ES,L=MADRID,O=MINISTERIO DE TRABAJO E INMIGRACION,OU=SUBDIRECCION
GENERAL DE PROCESO DE DATOS,OU=PRESTADOR DE SERVICIOS DE CERTIFICACION

```

```
MTIN,2.5.4.5=S2819001E,CN=AC1 RAIZ MTIN
Serial Number:05:0b:41:5e:82:7b
Subject: C=ES,L=MADRID,O=MINISTERIO DE TRABAJO E INMIGRACION,OU=SUBDIRECCION
GENERAL DE PROCESO DE DATOS,OU=PRESTADOR DE SERVICIOS DE CERTIFICACION
MTIN,2.5.4.5=S2819001E,CN=AC1 RAIZ MTIN
Not Valid Before: Thu Nov 05 16:17:45 2009
Not Valid After: Sun Nov 03 16:17:45 2019
Fingerprint (MD5): 27:13:d5:2c:70:06:3e:15:7b:d3:62:59:32:ea:01:05
Fingerprint (SHA1): 6a:d2:3b:9d:c4:8e:37:5f:85:9a:d9:ca:b5:85:32:5c:23:89:40:71
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC1 RAIZ MTIN"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\342\061\026\060\024\006\003\125\004\003\023\015\101\103
\061\040\122\101\111\132\040\115\124\111\116\061\022\060\020\006
\003\125\004\005\023\011\123\062\070\061\071\060\060\061\105\061
\065\060\063\006\003\125\004\013\023\054\120\122\105\123\124\101
\104\117\122\040\104\105\040\123\105\122\126\111\103\111\117\123
\040\104\105\040\103\105\122\124\111\106\111\103\101\103\111\117
\116\040\115\124\111\116\061\061\060\057\006\003\125\004\013\023
\050\123\125\102\104\111\122\105\103\103\111\117\116\040\107\105
\116\105\122\101\114\040\104\105\040\120\122\117\103\105\123\117
\040\104\105\040\104\101\124\117\123\061\054\060\052\006\003\125
\004\012\023\043\115\111\116\111\123\124\105\122\111\117\040\104
\105\040\124\122\101\102\101\112\117\040\105\040\111\116\115\111
\107\122\101\103\111\117\116\061\017\060\015\006\003\125\004\007
\023\006\115\101\104\122\111\104\061\013\060\011\006\003\125\004
\006\023\002\105\123
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\342\061\026\060\024\006\003\125\004\003\023\015\101\103
\061\040\122\101\111\132\040\115\124\111\116\061\022\060\020\006
\003\125\004\005\023\011\123\062\070\061\071\060\060\061\105\061
\065\060\063\006\003\125\004\013\023\054\120\122\105\123\124\101
\104\117\122\040\104\105\040\123\105\122\126\111\103\111\117\123
\040\104\105\040\103\105\122\124\111\106\111\103\101\103\111\117
\116\040\115\124\111\116\061\061\060\057\006\003\125\004\013\023
\050\123\125\102\104\111\122\105\103\103\111\117\116\040\107\105
\116\105\122\101\114\040\104\105\040\120\122\117\103\105\123\117
\040\104\105\040\104\101\124\117\123\061\054\060\052\006\003\125
\004\012\023\043\115\111\116\111\123\124\105\122\111\117\040\104
\105\040\124\122\101\102\101\112\117\040\105\040\111\116\115\111
\107\122\101\103\111\117\116\061\017\060\015\006\003\125\004\007
```

\023\006\115\101\104\122\111\104\061\013\060\011\006\003\125\004  
\006\023\002\105\123  
END  
CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\006\005\013\101\136\202\173  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\011\111\060\202\007\061\240\003\002\001\002\002\006\005  
\013\101\136\202\173\060\015\006\011\052\206\110\206\367\015\001  
\001\005\005\000\060\201\342\061\026\060\024\006\003\125\004\003  
\023\015\101\103\061\040\122\101\111\132\040\115\124\111\116\061  
\022\060\020\006\003\125\004\005\023\011\123\062\070\061\071\060  
\060\061\105\061\065\060\063\006\003\125\004\013\023\054\120\122  
\105\123\124\101\104\117\122\040\104\105\040\123\105\122\126\111  
\103\111\117\123\040\104\105\040\103\105\122\124\111\106\111\103  
\101\103\111\117\116\040\115\124\111\116\061\061\060\057\006\003  
\125\004\013\023\050\123\125\102\104\111\122\105\103\103\111\117  
\116\040\107\105\116\105\122\101\114\040\104\105\040\120\122\117  
\103\105\123\117\040\104\105\040\104\101\124\117\123\061\054\060  
\052\006\003\125\004\012\023\043\115\111\116\111\123\124\105\122  
\111\117\040\104\105\040\124\122\101\102\101\112\117\040\105\040  
\111\116\115\111\107\122\101\103\111\117\116\061\017\060\015\006  
\003\125\004\007\023\006\115\101\104\122\111\104\061\013\060\011  
\006\003\125\004\006\023\002\105\123\060\036\027\015\060\071\061  
\061\060\065\061\066\061\067\064\065\132\027\015\061\071\061\061  
\060\063\061\066\061\067\064\065\132\060\201\342\061\026\060\024  
\006\003\125\004\003\023\015\101\103\061\040\122\101\111\132\040  
\115\124\111\116\061\022\060\020\006\003\125\004\005\023\011\123  
\062\070\061\071\060\060\061\105\061\065\060\063\006\003\125\004  
\013\023\054\120\122\105\123\124\101\104\117\122\040\104\105\040  
\123\105\122\126\111\103\111\117\123\040\104\105\040\103\105\122  
\124\111\106\111\103\101\103\111\117\116\040\115\124\111\116\061  
\061\060\057\006\003\125\004\013\023\050\123\125\102\104\111\122  
\105\103\103\111\117\116\040\107\105\116\105\122\101\114\040\104  
\105\040\120\122\117\103\105\123\117\040\104\105\040\104\101\124  
\117\123\061\054\060\052\006\003\125\004\012\023\043\115\111\116  
\111\123\124\105\122\111\117\040\104\105\040\124\122\101\102\101  
\112\117\040\105\040\111\116\115\111\107\122\101\103\111\117\116  
\061\017\060\015\006\003\125\004\007\023\006\115\101\104\122\111  
\104\061\013\060\011\006\003\125\004\006\023\002\105\123\060\202  
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\334  
\315\315\261\277\336\045\365\377\034\063\163\231\074\033\241\155  
\365\240\304\175\233\070\146\215\011\337\003\154\127\065\264\023  
\101\376\343\137\346\042\004\130\030\271\116\151\063\004\077\225  
\307\331\116\377\063\064\247\062\100\062\223\127\376\201\257\045  
\103\134\035\375\173\127\013\142\010\147\147\142\264\343\345\130

\045\200\346\252\206\142\100\347\117\020\141\051\111\046\253\115  
\174\241\253\133\141\061\201\006\152\144\224\115\047\370\113\036  
\321\325\103\342\327\261\155\366\366\377\264\160\125\366\010\231  
\267\164\001\340\363\236\265\174\344\004\210\010\120\131\170\037  
\032\224\333\357\310\311\211\323\067\270\363\075\206\321\031\313  
\203\132\020\007\010\117\231\164\002\007\360\062\121\310\373\346  
\320\074\046\166\175\162\176\254\166\067\301\212\165\040\134\100  
\334\204\077\320\111\174\115\147\256\071\357\344\316\200\341\312  
\235\346\055\253\056\346\022\225\332\371\373\337\343\342\214\075  
\207\373\105\156\104\253\366\170\222\047\024\241\135\153\117\160  
\173\127\163\357\371\135\250\017\165\237\357\021\140\031\204\260  
\144\100\356\330\251\206\372\245\327\105\364\021\157\361\206\310  
\064\133\210\110\316\272\335\315\233\335\210\343\001\066\350\254  
\152\350\022\013\260\340\173\220\036\205\013\111\211\001\366\377  
\202\337\130\145\042\203\110\326\007\320\034\146\374\146\050\072  
\304\303\345\370\231\145\047\122\130\363\153\361\157\002\104\204  
\165\320\244\343\150\123\141\162\357\366\057\251\263\254\365\364  
\366\320\134\334\151\114\314\171\322\244\033\310\163\006\064\164  
\264\361\152\312\051\050\307\064\204\133\043\330\272\000\214\314  
\011\301\307\157\135\004\253\267\117\046\167\251\065\317\040\326  
\263\377\061\151\320\064\373\045\354\150\226\012\242\335\203\037  
\312\074\217\164\066\045\124\357\365\030\173\302\044\061\321\373  
\202\004\256\004\202\326\365\002\051\161\341\222\161\164\216\333  
\252\161\035\304\073\306\142\046\154\206\074\043\125\353\051\321  
\037\253\312\036\143\347\263\163\264\247\270\052\072\366\037\373  
\207\145\210\374\363\237\376\277\353\325\035\266\250\003\351\145  
\203\031\214\340\030\355\027\330\034\015\075\234\212\130\177\002  
\003\001\000\001\243\202\003\001\060\202\002\375\060\067\006\010  
\053\006\001\005\005\007\001\001\004\053\060\051\060\047\006\010  
\053\006\001\005\005\007\060\001\206\033\150\164\164\160\072\057  
\057\143\141\056\155\164\151\156\056\145\163\057\155\164\151\156  
\057\157\143\163\160\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\033\006\003\125\035\021\004\024\060\022  
\201\020\141\144\155\151\156\137\143\141\100\155\164\151\156\056  
\145\163\060\033\006\003\125\035\022\004\024\060\022\201\020\141  
\144\155\151\156\137\143\141\100\155\164\151\156\056\145\163\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\162\006\003\125\035\037\004\153\060\151\060\062\240\060\240  
\056\206\054\150\164\164\160\072\057\057\143\141\056\155\164\151  
\156\056\145\163\057\155\164\151\156\057\143\162\154\057\115\124  
\111\116\101\165\164\157\162\151\144\141\144\122\141\151\172\060  
\063\240\061\240\057\206\055\150\164\164\160\072\057\057\143\141  
\062\056\155\164\151\156\056\145\163\057\155\164\151\156\057\143  
\162\154\057\115\124\111\116\101\165\164\157\162\151\144\141\144  
\122\141\151\172\060\201\271\006\003\125\035\040\004\201\261\060  
\201\256\060\201\253\006\013\053\006\001\004\001\201\331\005\002  
\004\001\060\201\233\060\060\006\010\053\006\001\005\005\007\002  
\001\026\044\150\164\164\160\072\057\057\143\141\056\155\164\151



\156\056\145\163\057\155\164\151\156\057\104\120\103\171\120\157  
\154\151\164\151\143\141\163\060\147\006\010\053\006\001\005\005  
\007\002\002\060\133\032\131\103\145\162\164\151\146\151\143\141  
\144\157\040\162\141\355\172\056\040\103\157\156\163\165\154\164  
\145\040\154\141\163\040\143\157\156\144\151\143\151\157\156\145  
\163\040\144\145\040\165\163\157\040\145\156\040\150\164\164\160  
\072\057\057\143\141\056\155\164\151\156\056\145\163\057\155\164  
\151\156\057\104\120\103\171\120\157\154\151\164\151\143\141\163  
\060\035\006\003\125\035\016\004\026\004\024\063\103\030\263\304  
\113\035\313\037\371\360\116\374\337\112\344\025\140\310\203\060  
\202\001\026\006\003\125\035\043\004\202\001\015\060\202\001\011  
\200\024\063\103\030\263\304\113\035\313\037\371\360\116\374\337  
\112\344\025\140\310\203\241\201\350\244\201\345\060\201\342\061  
\026\060\024\006\003\125\004\003\023\015\101\103\061\040\122\101  
\111\132\040\115\124\111\116\061\022\060\020\006\003\125\004\005  
\023\011\123\062\070\061\071\060\060\061\105\061\065\060\063\006  
\003\125\004\013\023\054\120\122\105\123\124\101\104\117\122\040  
\104\105\040\123\105\122\126\111\103\111\117\123\040\104\105\040  
\103\105\122\124\111\106\111\103\101\103\111\117\116\040\115\124  
\111\116\061\061\060\057\006\003\125\004\013\023\050\123\125\102  
\104\111\122\105\103\103\111\117\116\040\107\105\116\105\122\101  
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\104\101\124\117\123\061\054\060\052\006\003\125\004\012\023\043  
\115\111\116\111\123\124\105\122\111\117\040\104\105\040\124\122  
\101\102\101\112\117\040\105\040\111\116\115\111\107\122\101\103  
\111\117\116\061\017\060\015\006\003\125\004\007\023\006\115\101  
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\123\202\006\005\013\101\136\202\173\060\015\006\011\052\206\110  
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\016\221\323\222\251\352\377\104\147\323\240\055\040\147\363\020  
\017\032\067\167\135\122\106\346\152\270\367\210\363\202\303\052  
\364\141\015\054\237\057\206\055\141\351\140\131\275\267\117\257  
\223\011\034\371\063\167\100\234\241\174\145\334\136\220\225\251  
\364\276\202\364\374\202\035\036\305\075\340\134\256\336\055\325  
\143\166\253\361\354\044\247\040\370\036\350\317\161\202\003\335  
\216\166\142\052\265\051\210\023\044\255\134\364\240\112\270\352  
\023\212\126\215\152\057\150\071\162\206\130\304\244\253\165\174  
\104\347\032\204\014\215\021\334\031\271\034\066\356\363\377\121  
\233\263\103\310\045\176\347\016\110\243\344\117\006\055\025\036  
\240\246\107\220\127\073\370\057\055\333\043\272\353\043\223\260  
\270\122\033\140\034\324\031\260\155\170\217\113\235\247\013\050  
\147\112\335\170\110\275\261\076\230\324\273\025\376\263\137\155  
\035\165\310\036\317\017\256\112\032\135\207\054\006\164\154\012  
\205\123\044\136\172\311\240\174\161\233\222\135\157\110\177\266  
\130\161\262\114\246\032\011\043\064\120\161\025\153\107\333\373  
\276\032\155\302\214\224\057\007\147\040\042\147\143\267\253\306  
\031\234\226\015\142\352\010\244\032\160\357\251\271\357\116\305  
\100\274\342\207\127\363\003\312\050\231\032\300\125\140\165\173

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\143\276\144\077\226\116\113\217\375\055\246\164\300\337\111\072
\354\125\176\146\323\272\375\357\223\261\143\362\133\077\355\166
\241\331\323\014\376\056\157\012\246\123\113\357\321\363\107\255
\271\036\354\114\037\276\320\203\123\303\233\025\105\377\056\007
\321\332\152\222\105\346\154\127\133\044\056\121\151\311\060\317
\327\373\244\001\065\132\315\247\353\024\157\264\267\140\042\010
\305\161\310\223\342\276\045\137\365\014\372\130\121\075\173\310
\057\067\371\223\034\052\011\340\147\375\226\211\102\312\353\066
\260\326\033\246\120\017\132\235\166\377\244\117\306\354\015\304
\341\320\347\130\076\326\171\300\167\115\014\325\263\344\230\115
\335\106\056\122\260\342\017\015\102\066\245\020\044\122\050\276
\142\065\102\071\311\172\226\037\356\346\113\131\077\044\163\213
\277\042\113\146\362\333\017\065\361\067\235\240\044
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "AC1 RAIZ MTIN"

# Issuer: C=ES,L=MADRID,O=MINISTERIO DE TRABAJO E INMIGRACION,OU=SUBDIRECCION  
GENERAL DE PROCESO DE DATOS,OU=PRESTADOR DE SERVICIOS DE CERTIFICACION  
MTIN,2.5.4.5=S2819001E,CN=AC1

RAIZ MTIN

# Serial Number:05:0b:41:5e:82:7b

# Subject: C=ES,L=MADRID,O=MINISTERIO DE TRABAJO E INMIGRACION,OU=SUBDIRECCION  
GENERAL DE PROCESO DE DATOS,OU=PRESTADOR DE SERVICIOS DE CERTIFICACION  
MTIN,2.5.4.5=S2819001E,CN=AC1 RAIZ MTIN

# Not Valid Before: Thu Nov 05 16:17:45 2009

# Not Valid After: Sun Nov 03 16:17:45 2019

# Fingerprint (MD5): 27:13:d5:2c:70:06:3e:15:7b:d3:62:59:32:ea:01:05

# Fingerprint (SHA1): 6a:d2:3b:9d:c4:8e:37:5f:85:9a:d9:ca:b5:85:32:5c:23:89:40:71

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "AC1 RAIZ MTIN"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\152\322\073\235\304\216\067\137\205\232\331\312\265\205\062\134
\043\211\100\161
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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\047\023\325\054\160\006\076\025\173\323\142\131\062\352\001\005
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\342\061\026\060\024\006\003\125\004\003\023\015\101\103
\061\040\122\101\111\132\040\115\124\111\116\061\022\060\020\006
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\003\125\004\005\023\011\123\062\070\061\071\060\060\061\105\061
\065\060\063\006\003\125\004\013\023\054\120\122\105\123\124\101
\104\117\122\040\104\105\040\123\105\122\126\111\103\111\117\123
\040\104\105\040\103\105\122\124\111\106\111\103\101\103\111\117
\116\040\115\124\111\116\061\061\060\057\006\003\125\004\013\023
\050\123\125\102\104\111\122\105\103\103\111\117\116\040\107\105
\116\105\122\101\114\040\104\105\040\120\122\117\103\105\123\117
\040\104\105\040\104\101\124\117\123\061\054\060\052\006\003\125
\004\012\023\043\115\111\116\111\123\124\105\122\111\117\040\104
\105\040\124\122\101\102\101\112\117\040\105\040\111\116\115\111
\107\122\101\103\111\117\116\061\017\060\015\006\003\125\004\007
\023\006\115\101\104\122\111\104\061\013\060\011\006\003\125\004
\006\023\002\105\123
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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\002\006\005\013\101\136\202\173
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END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Microsoft Root Certificate Authority 2011"

# Issuer: CN=Microsoft Root Certificate Authority 2011,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US

# Serial Number:3f:8b:c8:b5:fc:9f:b2:96:43:b5:69:d6:6c:42:e1:44

# Subject: CN=Microsoft Root Certificate Authority 2011,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US

# Not Valid Before: Tue Mar 22 22:05:28 2011

# Not Valid After: Sat Mar 22 22:13:04 2036

# Fingerprint (MD5): ce:04:90:d5:e5:6c:34:a5:ae:0b:e9:8b:e5:81:18:5d

# Fingerprint (SHA1): 8f:43:28:8a:d2:72:f3:10:3b:6f:b1:42:84:85:ea:30:14:c0:bc:fe

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Microsoft Root Certificate Authority 2011"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT

MULTILINE\_OCTAL

```
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
```

\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003  
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164  
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164  
\150\157\162\151\164\171\040\062\060\061\061

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151  
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007  
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012  
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160  
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003  
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164  
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164  
\150\157\162\151\164\171\040\062\060\061\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\077\213\310\265\374\237\262\226\103\265\151\326\154\102  
\341\104

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\355\060\202\003\325\240\003\002\001\002\002\020\077  
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\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201  
\210\061\013\060\011\006\003\125\004\006\023\002\125\123\061\023  
\060\021\006\003\125\004\010\023\012\127\141\163\150\151\156\147  
\164\157\156\061\020\060\016\006\003\125\004\007\023\007\122\145  
\144\155\157\156\144\061\036\060\034\006\003\125\004\012\023\025  
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\157\162  
\141\164\151\157\156\061\062\060\060\006\003\125\004\003\023\051  
\115\151\143\162\157\163\157\146\164\040\122\157\157\164\040\103  
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\162\151\164\171\040\062\060\061\061\060\036\027\015\061\061\060  
\063\062\062\062\062\060\065\062\070\132\027\015\063\066\060\063  
\062\062\062\062\061\063\060\064\132\060\201\210\061\013\060\011  
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\163\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156  
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\163\157\146\164\040\122\157\157\164\040\103\145\162\164\151\146  
\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171\040  
\062\060\061\061\060\202\002\042\060\015\006\011\052\206\110\206  
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\002\202\002\001\000\262\200\101\252\065\070\115\023\162\062\150

\042\115\270\262\361\377\325\122\274\154\307\365\322\112\214\066  
\356\321\302\134\176\214\212\256\257\023\050\157\300\163\343\072  
\316\320\045\250\132\072\155\357\250\270\131\253\023\043\150\315  
\014\051\207\321\157\200\134\217\104\177\135\220\001\122\130\254  
\121\305\137\052\207\334\334\330\012\035\301\003\271\173\260\126  
\350\243\336\144\141\302\236\370\363\174\271\354\015\265\124\376  
\114\266\145\117\210\360\234\110\231\014\102\013\011\174\061\131  
\027\171\006\170\050\215\211\072\114\003\045\276\161\152\134\013  
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\014\251\336\224\211\341\016\240\334\300\316\231\075\352\010\122  
\273\126\171\344\037\204\272\036\270\264\304\111\134\117\061\113  
\207\335\335\005\147\046\231\200\340\161\021\243\270\245\101\342  
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\107\057\153\342\221\036\323\230\117\335\102\007\310\350\035\022  
\374\231\251\153\076\222\176\310\326\151\072\374\144\275\266\011  
\235\312\375\014\013\242\233\167\140\113\003\224\244\060\151\022  
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\374\261\321\343\263\311\177\110\172\315\044\360\101\217\134\164  
\320\254\260\020\040\006\111\267\307\055\041\310\127\343\320\206  
\363\003\150\373\320\316\161\301\211\231\112\144\001\154\375\354  
\060\221\317\101\074\222\307\345\272\206\035\141\204\307\137\203  
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\273\164\233\036\320\166\346\362\351\006\327\020\350\372\144\336  
\151\306\065\226\210\002\360\106\270\077\047\231\157\313\161\211  
\051\065\367\110\026\002\065\217\325\171\174\115\002\317\137\353  
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\111\033\116\004\016\143\121\214\136\330\000\301\125\054\266\306  
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\354\070\366\160\355\253\134\023\301\331\017\015\307\200\262\125  
\355\064\367\254\233\344\303\332\347\107\074\246\265\217\061\337  
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\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003  
\125\035\016\004\026\004\024\162\055\072\002\061\220\103\271\024  
\005\116\341\352\247\307\061\321\043\211\064\060\020\006\011\053  
\006\001\004\001\202\067\025\001\004\003\002\001\000\060\015\006  
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001  
\000\177\162\317\017\267\305\025\333\233\300\111\312\046\133\376  
\236\023\346\323\360\322\333\227\137\362\113\077\115\263\256\031  
\256\355\327\227\240\254\357\251\072\243\302\101\260\345\270\221  
\236\023\201\044\003\346\011\375\077\127\100\071\041\044\126\321  
\020\057\113\100\251\066\206\113\264\123\127\232\373\361\176\211  
\217\021\376\030\154\121\252\350\355\011\225\265\345\161\311\241  
\351\207\165\246\025\177\311\176\067\124\136\164\223\305\303\147  
\314\015\117\153\250\027\014\155\010\222\176\213\335\201\252\055  
\160\041\303\075\006\024\273\277\044\136\247\204\327\077\017\041  
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\120\244\350\303\070\244\373\313\054\305\222\146\233\205\136\313  
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\144\142\025\235\207\226\105\265\146\043\040\003\213\034\163\240  
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\237\000\024\310\066\307\222\073\351\116\000\354\330\126\011\271  
\063\111\022\322\124\013\001\253\254\107\266\221\051\175\114\264  
\165\200\122\001\350\312\202\366\237\314\254\234\217\027\352\057  
\046\260\253\162\254\013\376\236\121\036\307\103\125\147\117\121  
\263\127\326\266\354\356\122\267\072\351\116\341\327\201\210\274  
\117\216\165\273\113\250\360\065\252\046\324\147\147\111\262\160  
\114\073\223\334\035\337\170\220\206\162\262\070\244\321\334\222  
\115\311\130\353\053\022\134\324\073\256\214\153\260\203\345\001  
\077\370\011\062\366\223\065\064\042\257\335\067\015\167\011\200  
\053\315\110\000\361\214\231\031\107\005\001\351\321\277\321\116  
\320\346\050\103\067\231\244\012\112\010\331\232\161\163\322\252  
\315\061\023\143\166\241\067\157\222\070\036\175\022\074\146\062  
\347\313\155\341\374\122\211\335\312\326\146\005\232\226\141\276  
\242\050\307\034\243\247\066\120\074\072\244\337\112\156\346\207  
\073\316\353\360\340\201\067\235\023\074\122\216\275\271\035\064  
\306\035\325\012\152\075\230\051\160\214\211\052\321\253\202\020  
\110\037\334\364\357\245\305\273\125\032\070\143\204\116\267\154  
\255\225\124\354\145\042\020\111\027\270\300\036\307\017\254\124  
\107

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Microsoft Root Certificate Authority 2011"

# Issuer: CN=Microsoft Root Certificate Authority 2011,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US

# Serial Number:3f:8b:c8:b5:fc:9f:b2:96:43:b5:69:d6:6c:42:e1:44

# Subject: CN=Microsoft Root Certificate Authority 2011,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US

# Not Valid Before: Tue Mar 22 22:05:28 2011

# Not Valid After: Sat Mar 22 22:13:04 2036

# Fingerprint (MD5): ce:04:90:d5:e5:6c:34:a5:ae:0b:e9:8b:e5:81:18:5d

# Fingerprint (SHA1): 8f:43:28:8a:d2:72:f3:10:3b:6f:b1:42:84:85:ea:30:14:c0:bc:fe

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Microsoft Root Certificate Authority 2011"

CKA\_CERT\_SHA1\_HASH MULTILINE OCTAL

\217\103\050\212\322\162\363\020\073\157\261\102\204\205\352\060  
\024\300\274\376

```

END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\316\004\220\325\345\154\064\245\256\013\351\213\345\201\030\135
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\062\060\061\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\077\213\310\265\374\237\262\226\103\265\151\326\154\102
\341\104
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "CCA India 2011"
Issuer: CN=CCA India 2011,O=India PKI,C=IN
Serial Number: 10126 (0x278e)
Subject: CN=CCA India 2011,O=India PKI,C=IN
Not Valid Before: Fri Mar 11 06:48:52 2011
Not Valid After: Fri Mar 11 06:48:52 2016
Fingerprint (MD5): 6e:3e:bc:f1:11:03:dc:4f:58:d5:2c:b0:74:f4:18:c8
Fingerprint
(SHA1): be:d5:25:d1:ac:63:a7:fc:6a:66:0b:a7:a8:95:81:8d:5e:8d:d5:64
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CCA India 2011"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\027\060\025\006\003\125\004\003\023\016\103\103
\101\040\111\156\144\151\141\040\062\060\061\061
END
CKA_ID UTF8 "0"

```

CKA\_ISSUER MULTILINE\_OCTAL

\060\072\061\013\060\011\006\003\125\004\006\023\002\111\116\061  
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040  
\120\113\111\061\027\060\025\006\003\125\004\003\023\016\103\103  
\101\040\111\156\144\151\141\040\062\060\061\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\002\047\216

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\043\060\202\002\013\240\003\002\001\002\002\002\047  
\216\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000  
\060\072\061\013\060\011\006\003\125\004\006\023\002\111\116\061  
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040  
\120\113\111\061\027\060\025\006\003\125\004\003\023\016\103\103  
\101\040\111\156\144\151\141\040\062\060\061\061\060\036\027\015  
\061\061\060\063\061\061\060\066\064\070\065\062\132\027\015\061  
\066\060\063\061\061\060\066\064\070\065\062\132\060\072\061\013  
\060\011\006\003\125\004\006\023\002\111\116\061\022\060\020\006  
\003\125\004\012\023\011\111\156\144\151\141\040\120\113\111\061  
\027\060\025\006\003\125\004\003\023\016\103\103\101\040\111\156  
\144\151\141\040\062\060\061\061\060\202\001\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000  
\060\202\001\012\002\202\001\001\000\207\012\036\016\271\240\250  
\040\230\032\270\172\025\366\107\361\277\322\306\047\344\022\152  
\226\004\147\165\315\214\306\343\364\335\312\325\304\034\065\356  
\115\351\344\042\324\227\070\327\254\143\151\110\300\174\171\142  
\277\307\042\111\133\106\301\361\030\024\116\030\035\054\245\132  
\222\270\205\025\257\027\126\023\216\237\026\016\042\226\201\204  
\171\043\102\354\117\336\257\366\277\211\117\000\136\346\327\010  
\322\225\224\232\023\054\004\021\203\357\221\217\010\125\254\172  
\126\104\233\305\364\324\027\353\344\167\115\224\341\101\130\021  
\351\242\252\011\206\055\046\041\040\365\300\314\303\025\314\114  
\011\273\335\334\365\122\003\171\140\217\074\171\072\045\064\043  
\207\110\165\362\101\160\115\032\060\010\206\165\316\130\031\250  
\327\025\176\043\362\347\111\276\377\376\127\122\170\102\363\046  
\167\335\172\367\142\345\313\135\226\063\224\223\273\304\032\026  
\257\010\127\353\234\345\367\043\164\215\351\035\013\261\212\224  
\163\231\021\221\305\150\240\361\212\015\201\255\264\121\150\156  
\111\206\000\006\122\116\051\103\347\002\003\001\000\001\243\063  
\060\061\060\017\006\003\125\035\023\001\001\377\004\005\060\003  
\001\001\377\060\021\006\003\125\035\016\004\012\004\010\115\007  
\250\143\362\333\034\337\060\013\006\003\125\035\017\004\004\003  
\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\001\001\000\156\024\332\040\362\110\153\144\377  
\052\164\315\126\265\305\071\017\176\141\037\065\131\033\035\050  
\155\043\164\235\170\277\253\255\211\000\271\160\205\365\350\024  
\076\344\354\237\226\144\134\322\261\042\040\243\010\234\350\014



```
\113\150\050\216\125\005\277\076\340\116\332\330\234\320\156\040
\354\376\172\073\302\066\107\227\330\053\010\263\256\302\321\346
\010\077\112\350\072\077\126\365\340\345\077\362\151\266\171\022
\340\360\071\267\030\354\322\351\204\016\030\070\026\212\111\073
\157\127\325\071\073\277\023\360\300\247\315\362\075\036\154\221
\247\167\143\274\253\331\126\070\017\112\271\031\300\053\214\373
\227\037\306\247\354\206\316\323\215\343\321\373\165\321\361\367
\246\143\304\317\350\261\244\222\105\150\362\350\214\261\255\176
\055\040\373\270\245\124\355\312\015\217\062\035\150\246\061\156
\260\310\236\325\372\277\006\233\157\051\175\172\003\111\277\053
\173\131\223\024\305\352\313\361\114\051\202\016\051\356\212\124
\174\074\315\125\202\045\162\016\161\116\045\170\115\323\116\131
\100\312\316\363\231\321\242
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CCA India 2011"

# Issuer: CN=CCA India 2011,O=India PKI,C=IN

# Serial Number: 10126 (0x278e)

# Subject: CN=CCA India 2011,O=India PKI,C=IN

# Not Valid Before: Fri Mar 11 06:48:52 2011

# Not Valid After: Fri Mar 11 06:48:52 2016

# Fingerprint (MD5): 6e:3e:bc:f1:11:03:dc:4f:58:d5:2c:b0:74:f4:18:c8

# Fingerprint (SHA1): be:d5:25:d1:ac:63:a7:fc:6a:66:0b:a7:a8:95:81:8d:5e:8d:d5:64

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CCA India 2011"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\276\325\045\321\254\143\247\374\152\146\013\247\250\225\201\215
\136\215\325\144
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\156\076\274\361\021\003\334\117\130\325\054\260\164\364\030\310
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\072\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\027\060\025\006\003\125\004\003\023\016\103\103
\101\040\111\156\144\151\141\040\062\060\061\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```

\002\002\047\216
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "ANCERT Certificados Notariales V2"
Issuer: CN=ANCERT Certificados Notariales V2,O=Agencia Notarial de Certificacion S.L.U. - CIF
B83395988,C=ES
Serial Number:09:bd:56:05:2a:13:16:f4:68:4f:74:0e:a9:7d:1c:48
#
Subject: CN=ANCERT Certificados Notariales V2,O=Agencia Notarial de Certificacion S.L.U. - CIF
B83395988,C=ES
Not Valid Before: Tue May 25 16:56:14 2010
Not Valid After: Sat May 25 16:56:14 2030
Fingerprint (MD5): 75:70:cb:6e:6b:d6:9b:7d:90:bb:69:5e:59:f0:62:b4
Fingerprint (SHA1): 6f:62:de:b8:6c:85:58:5a:e4:2e:47:8d:b4:d7:6d:b3:67:58:5a:e6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados Notariales V2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\052\060\050\006\003\125\004\003\023\041\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\116\157\164\141\162\151\141\154\145\163\040\126\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\052\060\050\006\003\125\004\003\023\041\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\116\157\164\141\162\151\141\154\145\163\040\126\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL

```

\002\020\011\275\126\005\052\023\026\364\150\117\164\016\251\175  
\034\110

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\007\022\060\202\004\372\240\003\002\001\002\002\020\011  
\275\126\005\052\023\026\364\150\117\164\016\251\175\034\110\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\174  
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\101\060  
\077\006\003\125\004\012\023\070\101\147\145\156\143\151\141\040  
\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164  
\151\146\151\143\141\143\151\157\156\040\123\056\114\056\125\056  
\040\055\040\103\111\106\040\102\070\063\063\071\065\071\070\070  
\061\052\060\050\006\003\125\004\003\023\041\101\116\103\105\122  
\124\040\103\145\162\164\151\146\151\143\141\144\157\163\040\116  
\157\164\141\162\151\141\154\145\163\040\126\062\060\036\027\015  
\061\060\060\065\062\065\061\066\065\066\061\064\132\027\015\063  
\060\060\065\062\065\061\066\065\066\061\064\132\060\174\061\013  
\060\011\006\003\125\004\006\023\002\105\123\061\101\060\077\006  
\003\125\004\012\023\070\101\147\145\156\143\151\141\040\116\157  
\164\141\162\151\141\154\040\144\145\040\103\145\162\164\151\146  
\151\143\141\143\151\157\156\040\123\056\114\056\125\056\040\055  
\040\103\111\106\040\102\070\063\063\071\065\071\070\070\061\052  
\060\050\006\003\125\004\003\023\041\101\116\103\105\122\124\040  
\103\145\162\164\151\146\151\143\141\144\157\163\040\116\157\164  
\141\162\151\141\154\145\163\040\126\062\060\202\002\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002  
\017\000\060\202\002\012\002\202\002\001\000\262\346\271\306\035  
\152\052\055\111\305\374\374\324\144\100\320\340\024\056\367\240  
\302\377\222\363\101\246\264\077\332\276\031\024\221\224\166\323  
\025\314\136\177\170\120\172\333\332\305\105\252\313\034\043\171  
\163\220\250\273\147\001\163\216\316\100\371\032\251\252\207\344  
\223\222\017\134\150\134\136\360\006\140\053\130\334\074\155\074  
\307\172\060\153\005\252\222\206\163\052\322\362\032\210\304\333  
\345\132\146\216\165\311\102\077\233\210\050\100\036\365\251\134  
\036\372\310\101\241\060\253\013\234\356\026\242\301\055\245\205  
\372\355\240\014\350\177\226\112\173\275\217\232\242\030\166\322  
\257\335\267\075\020\253\122\020\210\256\035\353\270\062\164\226  
\364\267\252\047\367\245\007\015\343\224\127\152\124\040\167\315  
\035\274\171\055\344\234\264\336\121\210\376\126\326\075\213\241  
\317\372\122\036\214\005\163\167\326\005\317\143\000\121\207\141  
\343\120\276\231\227\341\374\036\021\171\153\116\152\317\234\205  
\012\034\226\052\300\040\066\024\305\011\027\142\073\364\255\352  
\325\327\375\320\071\052\170\323\320\242\317\310\163\060\011\107  
\305\116\031\375\270\060\324\017\200\230\210\206\301\114\101\172  
\043\305\103\375\136\022\270\076\017\261\267\201\142\014\176\157  
\343\173\232\302\302\107\021\041\037\317\236\321\060\316\203\301  
\020\115\100\167\327\265\302\113\062\100\102\372\233\260\254\317  
\353\041\330\031\353\144\305\153\335\125\055\200\207\104\174\114

\074\253\015\330\022\277\064\202\214\261\252\304\270\153\350\016  
\106\167\322\213\006\035\102\373\254\275\311\347\063\263\042\157  
\176\325\056\003\305\137\005\026\206\174\355\343\236\321\026\167  
\032\106\330\311\320\214\344\134\134\041\005\221\361\144\344\254  
\305\067\256\265\275\147\023\256\051\345\263\102\304\160\011\243  
\135\114\353\067\040\343\360\365\163\063\073\302\374\216\121\205  
\066\052\313\201\333\016\211\043\331\342\341\150\272\054\104\167  
\076\034\100\272\360\147\216\030\207\360\075\327\351\077\107\133  
\065\102\315\247\004\316\110\162\051\005\032\264\321\242\347\015  
\171\212\226\155\147\122\055\073\043\346\371\202\234\326\263\171  
\136\024\336\145\110\063\374\035\102\350\055\002\003\001\000\001  
\243\202\001\216\060\202\001\212\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\202\001\045\006\003\125  
\035\040\004\202\001\034\060\202\001\030\060\202\001\024\006\011  
\053\006\001\004\001\201\223\150\001\060\202\001\005\060\045\006  
\010\053\006\001\005\005\007\002\001\026\031\150\164\164\160\072  
\057\057\167\167\167\056\141\156\143\145\162\164\056\143\157\155  
\057\143\160\163\060\201\333\006\010\053\006\001\005\005\007\002  
\002\060\201\316\060\015\026\006\101\116\103\105\122\124\060\003  
\002\001\001\036\201\274\000\101\000\147\000\145\000\156\000\143  
\000\151\000\141\000\040\000\116\000\157\000\164\000\141\000\162  
\000\151\000\141\000\154\000\040\000\144\000\145\000\040\000\103  
\000\145\000\162\000\164\000\151\000\146\000\151\000\143\000\141  
\000\143\000\151\000\157\000\156\000\056\000\040\000\120\000\141  
\000\163\000\145\000\157\000\040\000\144\000\145\000\154\000\240  
\000\107\000\145\000\156\000\145\000\162\000\141\000\154\000\040  
\000\115\000\141\000\162\000\164\000\151\000\156\000\145\000\172  
\000\040\000\103\000\141\000\155\000\160\000\157\000\163\000\040  
\000\064\000\066\000\040\000\066\000\141\000\040\000\160\000\154  
\000\141\000\156\000\164\000\141\000\040\000\062\000\070\000\060  
\000\061\000\060\000\040\000\115\000\141\000\144\000\162\000\151  
\000\144\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\206\060\035\006\003\125\035\016\004\026\004\024\366\022\072  
\253\173\130\301\215\103\157\166\201\322\362\270\323\357\027\352  
\013\060\037\006\003\125\035\043\004\030\060\026\200\024\366\022  
\072\253\173\130\301\215\103\157\166\201\322\362\270\323\357\027  
\352\013\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\003\202\002\001\000\124\065\323\242\145\311\331\066\305\123  
\321\264\215\162\064\211\272\247\010\237\351\065\020\271\270\014  
\006\371\144\252\225\226\050\250\310\243\200\334\126\300\277\162  
\115\126\277\177\135\004\325\255\050\133\115\275\363\303\017\025  
\260\161\332\126\215\100\125\127\246\175\142\242\255\023\151\121  
\252\224\120\272\275\000\060\120\365\335\244\116\011\172\224\061  
\153\333\163\003\275\363\332\032\017\214\057\262\311\067\274\124  
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\337\242\114\355\366\017\036\246\111\260\015\121\263\061\261\121  
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\340\122\074\073\160\270\000\323\067\250\076\133\036\166\010\132  
\324\273\166\060\256\371\310\362\216\244\217\012\165\175\032\230  
\341\277\320\066\224\057\074\301\122\323\151\352\032\140\067\214  
\200\333\115\155\306\232\135\215\240\141\121\273\075\015\346\022  
\240\237\157\131\126\164\062\147\012\374\067\006\301\072\344\053  
\216\204\037\332\041\014\111\210\103\323\245\365\202\015\166\206  
\303\054\314\220\273\263\270\253\306\313\256\300\027\121\236\323  
\200\367\044\332\034\354\316\022\203\316\116\066\060\071\165\370  
\164\166\220\202\236\076\100\114\014\024\271\032\036\110\152\260  
\061\352\210\177\200\101\100\123\173\070\113\207\220\140\172\113  
\316\147\106\150\165\167\216\000\135\040\260\344\223\067\155\003  
\337\130\071\350\232\305\244\353\354\141\063\010\205\044\153\117  
\006\351\255\220\245\066\142\154\343\335\175\011\037\063\277\267  
\273\367\311\165\005\367\133\253\372\207\131\257\032\147\020\176  
\204\334\214\160\326\104\351\020\301\330\233\056\321\306\100\152  
\352\346\132\017\020\175\154\373\125\207\272\115\265\161\003\236  
\027\217\170\332\125\075\127\136\042\012\152\230\360\215\010\315  
\335\226\102\132\033\315\272\157\047\270\164\047\250\077\345\240  
\326\163\307\136\057\041

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ANCERT Certificados Notariales V2"

# Issuer: CN=ANCERT Certificados Notariales V2,O=Agencia Notarial de Certificacion S.L.U. - CIF  
B83395988,C=ES

# Serial Number:09:bd:56:05:2a:13:16:f4:68:4f:74:0e:a9:7d:1c:48

# Subject: CN=ANCERT Certificados Notariales V2,O=Agencia Notarial de Certificacion S.L.U. - CIF  
B83395988,C=ES

# Not Valid Before: Tue May 25 16:56:14 2010

# Not Valid After: Sat May 25 16:56:14 2030

# Fingerprint (MD5): 75:70:cb:6e:6b:d6:9b:7d:90:bb:69:5e:59:f0:62:b4

# Fingerprint (SHA1): 6f:62:de:b8:6c:85:58:5a:e4:2e:47:8d:b4:d7:6d:b3:67:58:5a:e6

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ANCERT Certificados Notariales V2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\157\142\336\270\154\205\130\132\344\056\107\215\264\327\155\263  
\147\130\132\346

```

END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\165\160\313\156\153\326\233\175\220\273\151\136\131\360\142\264
END
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\052\060\050\006\003\125\004\003\023\041\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\116\157\164\141\162\151\141\154\145\163\040\126\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\011\275\126\005\052\023\026\364\150\117\164\016\251\175
\034\110
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "ANCERT Certificados CGN V2"
Issuer: CN=ANCERT Certificados CGN V2,O=Agencia Notarial de Certificacion S.L.U. - CIF B83395988,C=ES
Serial Number:0f:38:8c:70:fe:a6:95:5d:e9:5d:9c:87:af:79:04:99
Subject: CN=ANCERT Certificados CGN V2,O=Agencia Notarial de Certificacion S.L.U. - CIF
B83395988,C=ES
Not Valid Before: Tue May 25 16:31:22 2010
Not Valid After: Sat May 25 16:31:23 2030
Fingerprint (MD5): 92:45:af:c3:89:71:e6:87:1d:8e:5a:20:a6:33:0e:93
Fingerprint (SHA1): 7e:b1:a0:42:9b:e5:f4:28:ac:2b:93:97:1d:7c:84:48:a5:36:07:0c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados
CGN V2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\043\060\041\006\003\125\004\003\023\032\101\116\103

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\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163  
\040\103\107\116\040\126\062  
END  
CKA\_ID UTF8 "0"  
CKA\_ISSUER MULTILINE\_OCTAL  
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\123\061  
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151  
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145  
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056  
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071  
\070\070\061\043\060\041\006\003\125\004\003\023\032\101\116\103  
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163  
\040\103\107\116\040\126\062  
END  
CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\020\017\070\214\160\376\246\225\135\351\135\234\207\257\171  
\004\231  
END  
CKA\_VALUE MULTILINE\_OCTAL  
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\070\214\160\376\246\225\135\351\135\234\207\257\171\004\231\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\165  
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\101\060  
\077\006\003\125\004\012\023\070\101\147\145\156\143\151\141\040  
\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164  
\151\146\151\143\141\143\151\157\156\040\123\056\114\056\125\056  
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\061\043\060\041\006\003\125\004\003\023\032\101\116\103\105\122  
\124\040\103\145\162\164\151\146\151\143\141\144\157\163\040\103  
\107\116\040\126\062\060\036\027\015\061\060\060\065\062\065\061  
\066\063\061\062\062\132\027\015\063\060\060\065\062\065\061\066  
\063\061\062\063\132\060\165\061\013\060\011\006\003\125\004\006  
\023\002\105\123\061\101\060\077\006\003\125\004\012\023\070\101  
\147\145\156\143\151\141\040\116\157\164\141\162\151\141\154\040  
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\040\123\056\114\056\125\056\040\055\040\103\111\106\040\102\070  
\063\063\071\065\071\070\070\061\043\060\041\006\003\125\004\003  
\023\032\101\116\103\105\122\124\040\103\145\162\164\151\146\151  
\143\141\144\157\163\040\103\107\116\040\126\062\060\202\002\042  
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\302\212\142\145\050\164\233\342\321\276\125\007\166\166\356\174  
\155\116\143\133\036\112\045\165\340\007\241\320\322\202\247\316  
\017\063\353\272\024\300\145\262\112\056\345\145\274\042\322\257  
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\376\146\372\301\117\113\067\120\214\077\363\336\231\172\116\207  
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\050\106\014\005\027\157\070\326\134\237\016\045\042\301\206\343  
\134\032\124\333\256\235\145\175\000\222\337\250\041\041\305\133  
\020\046\164\341\261\163\127\144\174\175\027\003\014\352\367\024  
\227\017\371\305\356\135\165\260\305\306\012\013\264\076\111\343  
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\213\355\104\077\326\032\250\066\070\341\235\057\247\167\304\172  
\263\300\162\262\162\315\036\077\020\136\032\210\164\215\360\022  
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\343\277\026\067\043\123\343\051\372\364\164\151\150\075\127\155  
\024\140\212\144\151\050\144\115\372\066\107\375\270\022\316\303  
\206\252\134\334\146\071\007\117\073\343\343\305\150\256\316\340  
\071\134\040\203\077\022\012\070\263\000\301\134\023\227\042\136  
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\000\240\000\107\000\145\000\156\000\145\000\162\000\141\000\154  
\000\040\000\115\000\141\000\162\000\164\000\151\000\156\000\145  
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\000\040\000\064\000\066\000\040\000\066\000\141\000\040\000\160  
\000\154\000\141\000\156\000\164\000\141\000\040\000\062\000\070  
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\003\002\001\206\060\035\006\003\125\035\016\004\026\004\024\005



\156\341\241\232\356\007\257\316\365\264\323\145\075\004\120\342  
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\005\156\341\241\232\356\007\257\316\365\264\323\145\075\004\120  
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\013\005\000\003\202\002\001\000\177\124\100\031\044\312\114\023  
\366\023\371\134\142\225\060\325\270\340\223\200\154\324\025\106  
\324\047\076\222\122\252\334\201\143\206\100\333\325\045\257\237  
\223\154\012\365\115\241\376\124\226\135\207\257\021\223\017\213  
\362\343\360\037\112\237\374\251\321\311\120\167\137\230\010\010  
\055\172\213\201\020\314\073\002\124\130\345\306\247\364\367\312  
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\045\142\004\244\362\142\123\234\107\264\247\144\273\201\345\326  
\136\126\021\276\105\021\141\302\146\351\364\015\164\250\253\371  
\133\277\202\262\221\246\120\373\207\176\157\273\310\353\005\242  
\271\020\327\033\102\007\125\317\211\346\277\373\271\360\152\071  
\127\123\160\214\275\113\243\151\277\037\213\246\134\115\145\212  
\271\000\011\350\150\277\011\047\007\115\136\332\122\011\214\345  
\161\223\212\314\205\216\322\067\136\123\334\202\155\013\126\112  
\204\171\012\364\020\045\104\365\157\135\032\146\265\315\325\020  
\113\207\132\116\324\177\344\161\254\356\150\237\274\372\056\130  
\301\304\236\177\244\131\205\340\122\016\362\307\107\165\025\055  
\054\166\214\017\105\005\065\140\370\173\073\167\062\177\050\200  
\011\332\061\274\161\175\341\254\221\315\140\012\171\040\354\156  
\073\267\204\340\162\363\251\112\320\057\344\133\343\322\032\324  
\112\274\365\166\371\177\052\031\110\353\335\016\317\231\126\105  
\270\175\326\011\216\016\316\263\204\150\111\204\124\065\113\344  
\231\033\257\363\250\024\363\124\230\012\200\176\117\274\362\146  
\055\046\377\060\215\247\366\275\333\232\217\345\341\337\273\267  
\062\016\371\222\157\151\343\344\166\323\000\066\361\055\136\307  
\023\137\325\331\152\055\350\321\033\153\166\313\030\156\016\005  
\020\365\132\362\111\033\131\264\205\352\312\031\164\314\273\122  
\342\067\214\302\152\002\045\302\322\161\244\222\333\216\311\326  
\251\156\320\205\050\155\134\155\010\170\002\260\171\014\127\157  
\013\132\001\343\204\204\002\366\317\362\253\143\353\002\152\271  
\313\112\030\325\071\042\074\126\112\252\225\210\346\060\000\037  
\215\041\041\311\127\356\271\267\104\051\210\117\266\053\247\024  
\356\216\356\157\276\026\320\023

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ANCERT Certificados CGN V2"

# Issuer: CN=ANCERT Certificados CGN V2,O=Agencia Notarial de Certificacion S.L.U. - CIF B83395988,C=ES

# Serial Number:0f:38:8c:70:fe:a6:95:5d:e9:5d:9c:87:af:79:04:99

# Subject: CN=ANCERT Certificados CGN V2,O=Agencia

```
Notarial de Certificacion S.L.U. - CIF B83395988,C=ES
Not Valid Before: Tue May 25 16:31:22 2010
Not Valid After: Sat May 25 16:31:23 2030
Fingerprint (MD5): 92:45:af:c3:89:71:e6:87:1d:8e:5a:20:a6:33:0e:93
Fingerprint (SHA1): 7e:b1:a0:42:9b:e5:f4:28:ac:2b:93:97:1d:7c:84:48:a5:36:07:0c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados CGN V2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\176\261\240\102\233\345\364\050\254\053\223\227\035\174\204\110
\245\066\007\014
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\222\105\257\303\211\161\346\207\035\216\132\040\246\063\016\223
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\043\060\041\006\003\125\004\003\023\032\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\103\107\116\040\126\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\017\070\214\160\376\246\225\135\351\135\234\207\257\171
\004\231
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "EE Certification Centre Root CA"
Issuer: 1.2.840.113549.1.9.1=pki@sk.ee,CN=EE Certification Centre Root CA,O=AS
Sertifitseerimiskeskus,C=EE
Serial Number:54:80:f9:a0:73:ed:3f:00:4c:ca:89:d8:e3:71:e6:4a
Subject: 1.2.840.113549.1.9.1=pki@sk.ee,CN=EE Certification Centre Root CA,O=AS
Sertifitseerimiskeskus,C=EE
Not Valid Before: Sat Oct 30 10:10:30 2010
Not Valid After: Tue Dec 17
23:59:59 2030
Fingerprint (MD5): 43:5e:88:d4:7d:1a:4a:7e:fd:84:2e:52:eb:01:d4:6f
```

# Fingerprint (SHA1): c9:a8:b9:e7:55:80:5e:58:e3:53:77:a7:25:eb:af:c3:7b:27:cc:d7

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "EE Certification Centre Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\105\061
\042\060\040\006\003\125\004\012\014\031\101\123\040\123\145\162
\164\151\146\151\164\163\145\145\162\151\155\151\163\153\145\163
\153\165\163\061\050\060\046\006\003\125\004\003\014\037\105\105
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\103
\145\156\164\162\145\040\122\157\157\164\040\103\101\061\030\060
\026\006\011\052\206\110\206\367\015\001\011\001\026\011\160\153
\151\100\163\153\056\145\145
```

END

CKA\_ID UTF8 "0"

```
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\105\061
\042\060\040\006\003\125\004\012\014\031\101\123\040\123\145\162
\164\151\146\151\164\163\145\145\162\151\155\151\163\153\145\163
\153\165\163\061\050\060\046\006\003\125\004\003\014\037\105\105
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\103
\145\156\164\162\145\040\122\157\157\164\040\103\101\061\030\060
\026\006\011\052\206\110\206\367\015\001\011\001\026\011\160\153
\151\100\163\153\056\145\145
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\124\200\371\240\163\355\077\000\114\312\211\330\343\161
\346\112
```

END

CKA\_VALUE MULTILINE\_OCTAL

```
\060\202\004\003\060\202\002\353\240\003\002\001\002\002\020\124
\200\371\240\163\355\077\000\114\312\211\330\343\161\346\112\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\165
\061\013\060\011\006\003\125\004\006\023\002\105\105\061\042\060
\040\006\003\125\004\012\014\031\101\123\040\123\145\162\164\151
\146\151\164\163\145\145\162\151\155\151\163\153\145\163\153\165
\163\061\050\060\046\006\003\125\004\003\014\037\105\105\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\103\145\156
\164\162\145\040\122\157\157\164\040\103\101\061\030\060\026\006
\011\052\206\110\206\367\015\001\011\001\026\011\160\153\151\100
\163\153\056\145\145\060\042\030\017\062\060\061\060\061\060\063
\060\061\060\061\060\063\060\132\030\017\062\060\063\060\061\062
\061\067\062\063\065\071\065\071\132\060\165\061\013\060\011\006
\003\125\004\006\023\002\105\105\061\042\060\040\006\003\125\004
```

\012\014\031\101\123\040\123\145\162\164\151\146\151\164\163\145  
\145\162\151\155\151\163\153\145\163\153\165\163\061\050\060\046  
\006\003\125\004\003\014\037\105\105\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\103\145\156\164\162\145\040\122  
\157\157\164\040\103\101\061\030\060\026\006\011\052\206\110\206  
\367\015\001\011\001\026\011\160\153\151\100\163\153\056\145\145  
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001  
\000\310\040\300\354\340\305\113\253\007\170\225\363\104\356\373  
\013\014\377\164\216\141\273\261\142\352\043\330\253\241\145\062  
\172\353\216\027\117\226\330\012\173\221\242\143\154\307\214\114  
\056\171\277\251\005\374\151\134\225\215\142\371\271\160\355\303  
\121\175\320\223\346\154\353\060\113\341\274\175\277\122\233\316  
\156\173\145\362\070\261\300\242\062\357\142\262\150\340\141\123  
\301\066\225\377\354\224\272\066\256\234\034\247\062\017\345\174  
\264\306\157\164\375\173\030\350\254\127\355\006\040\113\062\060  
\130\133\375\315\250\346\241\374\160\274\216\222\163\333\227\247  
\174\041\256\075\301\365\110\207\154\047\275\237\045\164\201\125  
\260\367\165\366\075\244\144\153\326\117\347\316\100\255\017\335  
\062\323\274\212\022\123\230\311\211\373\020\035\115\176\315\176  
\037\126\015\041\160\205\366\040\203\037\366\272\037\004\217\352  
\167\210\065\304\377\352\116\241\213\115\077\143\033\104\303\104  
\324\045\166\312\267\215\327\036\112\146\144\315\134\305\234\203  
\341\302\010\210\232\354\116\243\361\076\034\054\331\154\035\241  
\113\002\003\001\000\001\243\201\212\060\201\207\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006  
\003\125\035\016\004\026\004\024\022\362\132\076\352\126\034\277  
\315\006\254\361\361\045\311\251\113\324\024\231\060\105\006\003  
\125\035\045\004\076\060\074\006\010\053\006\001\005\005\007\003  
\002\006\010\053\006\001\005\005\007\003\001\006\010\053\006\001  
\005\005\007\003\003\006\010\053\006\001\005\005\007\003\004\006  
\010\053\006\001\005\005\007\003\010\006\010\053\006\001\005\005  
\007\003\011\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\003\202\001\001\000\173\366\344\300\015\252\031\107\267  
\115\127\243\376\255\273\261\152\325\017\236\333\344\143\305\216  
\241\120\126\223\226\270\070\300\044\042\146\274\123\024\141\225  
\277\320\307\052\226\071\077\175\050\263\020\100\041\152\304\257  
\260\122\167\030\341\226\330\126\135\343\335\066\136\035\247\120  
\124\240\305\052\344\252\214\224\212\117\235\065\377\166\244\006  
\023\221\242\242\175\000\104\077\125\323\202\074\032\325\133\274  
\126\114\042\056\106\103\212\044\100\055\363\022\270\073\160\032  
\244\226\271\032\257\207\101\032\152\030\015\006\117\307\076\156  
\271\051\115\015\111\211\021\207\062\133\346\113\004\310\344\134  
\346\164\163\224\135\026\230\023\225\376\373\333\261\104\345\072  
\160\254\067\153\346\263\063\162\050\311\263\127\240\366\002\026  
\210\006\013\266\246\113\040\050\324\336\075\213\255\067\005\123  
\164\376\156\314\274\103\027\161\136\371\305\314\032\251\141\356

```
\367\166\014\363\162\364\162\255\317\162\002\066\007\107\317\357
\031\120\211\140\314\351\044\225\017\302\313\035\362\157\166\220
\307\314\165\301\226\305\235
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "EE Certification Centre Root CA"

#

Issuer: 1.2.840.113549.1.9.1=pki@sk.ee,CN=EE Certification Centre Root CA,O=AS Sertifitseerimiskeskus,C=EE

# Serial Number:54:80:f9:a0:73:ed:3f:00:4c:ca:89:d8:e3:71:e6:4a

# Subject: 1.2.840.113549.1.9.1=pki@sk.ee,CN=EE Certification Centre Root CA,O=AS

Sertifitseerimiskeskus,C=EE

# Not Valid Before: Sat Oct 30 10:10:30 2010

# Not Valid After: Tue Dec 17 23:59:59 2030

# Fingerprint (MD5): 43:5e:88:d4:7d:1a:4a:7e:fd:84:2e:52:eb:01:d4:6f

# Fingerprint (SHA1): c9:a8:b9:e7:55:80:5e:58:e3:53:77:a7:25:eb:af:c3:7b:27:cc:d7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "EE Certification Centre Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\311\250\271\347\125\200\136\130\343\123\167\247\045\353\257\303
\173\047\314\327
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\103\136\210\324\175\032\112\176\375\204\056\122\353\001\324\157
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\105\061
\042\060\040\006\003\125\004\012\014\031\101\123\040\123\145\162
\164\151\146\151\164\163\145\145\162\151\155\151\163\153\145\163
\153\165\163\061\050\060\046\006\003\125\004\003\014\037\105\105
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\103
\145\156\164\162\145\040\122\157\157\164\040\103\101\061\030\060
\026\006\011\052\206\110\206\367\015\001\011\001\026\011\160\153
\151\100\163\153\056\145\145
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\124\200\371\240\163\355\077\000\114\312\211\330\343\161
\346\112
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

```
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
```

```
Certificate "Autoridad de Certificacion Raiz del Estado Venezolano"
```

```
Issuer: 1.2.840.113549.1.9.1=acraiz@suscerte.gob.ve,OU=Superintendencia de Servicios de Certificacion
Electronica,O=Sistema
```

```
Nacional de Certificacion Electronica,ST=Distrito Capital,L=Caracas,C=VE,CN=Autoridad de Certificacion Raiz
del Estado Venezolano
```

```
Serial Number: 10 (0xa)
```

```
Subject: 1.2.840.113549.1.9.1=acraiz@suscerte.gob.ve,OU=Superintendencia de Servicios de Certificacion
Electronica,O=Sistema Nacional de Certificacion Electronica,ST=Distrito Capital,L=Caracas,C=VE,CN=Autoridad
de Certificacion Raiz del Estado Venezolano
```

```
Not Valid Before: Tue Dec 28 16:41:36 2010
```

```
Not Valid After: Mon Dec 23 23:59:59 2030
```

```
Fingerprint (MD5): 96:14:69:08:a8:36:59:d7:a0:35:14:89:58:50:5b:ab
```

```
Fingerprint (SHA1): 39:8e:be:9c:0f:46:c0:79:c3:c7:af:e0:7a:2f:dd:9f:ae:5f:8a:5c
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

```
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

```
CKA_LABEL UTF8 "Autoridad de Certificacion Raiz del Estado Venezolano"
```

```
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

```
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\202\001\036\061\076\060\074\006\003\125\004\003\023\065\101
\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162\164
\151\146\151\143\141\143\151\157\156\040\122\141\151\172\040\144
\145\154\040\105\163\164\141\144\157\040\126\145\156\145\172\157
\154\141\156\157\061\013\060\011\006\003\125\004\006\023\002\126
\105\061\020\060\016\006\003\125\004\007\023\007\103\141\162\141
\143\141\163\061\031\060\027\006\003\125\004\010\023\020\104\151
\163\164\162\151\164\157\040\103\141\160\151\164\141\154\061\066
\060\064\006\003\125\004\012\023\055\123\151\163\164\145\155\141
\040\116\141\143\151\157\156\141\154\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\105\154\145\143\164
\162\157\156\151\143\141\061\103\060\101\006\003\125\004\013\023
\072\123\165\160\145\162\151\156\164\145\156\144\145\156\143\151
\141\040\144\145\040\123\145\162\166\151\143\151\157\163\040\144
\145\040\103\145\162\164\151\146\151\143\141\143\151\157\156\040
\105\154\145\143\164\162\157\156\151\143\141\061\045\060\043\006
\011\052\206\110\206\367\015\001\011\001\026\026\141\143\162\141
\151\172\100\163\165\163\143\145\162\164\145\056\147\157\142\056
\166\145
```

```
END
```

```
CKA_ID
```

```
UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
```

\060\202\001\036\061\076\060\074\006\003\125\004\003\023\065\101  
\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162\164  
\151\146\151\143\141\143\151\157\156\040\122\141\151\172\040\144  
\145\154\040\105\163\164\141\144\157\040\126\145\156\145\172\157  
\154\141\156\157\061\013\060\011\006\003\125\004\006\023\002\126  
\105\061\020\060\016\006\003\125\004\007\023\007\103\141\162\141  
\143\141\163\061\031\060\027\006\003\125\004\010\023\020\104\151  
\163\164\162\151\164\157\040\103\141\160\151\164\141\154\061\066  
\060\064\006\003\125\004\012\023\055\123\151\163\164\145\155\141  
\040\116\141\143\151\157\156\141\154\040\144\145\040\103\145\162  
\164\151\146\151\143\141\143\151\157\156\040\105\154\145\143\164  
\162\157\156\151\143\141\061\103\060\101\006\003\125\004\013\023  
\072\123\165\160\145\162\151\156\164\145\156\144\145\156\143\151  
\141\040\144\145\040\123\145\162\166\151\143\151\157\163\040\144  
\145\040\103\145\162\164\151\146\151\143\141\143\151\157\156\040  
\105\154\145\143\164\162\157\156\151\143\141\061\045\060\043\006  
\011\052\206\110\206\367\015\001\011\001\026\026\141\143\162\141  
\151\172\100\163\165\163\143\145\162\164\145\056\147\157\142\056  
\166\145

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\012

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\011\230\060\202\007\200\240\003\002\001\002\002\001\012  
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060  
\202\001\036\061\076\060\074\006\003\125\004\003\023\065\101\165  
\164\157\162\151\144\141\144\040\144\145\040\103\145\162\164\151  
\146\151\143\141\143\151\157\156\040\122\141\151\172\040\144\145  
\154\040\105\163\164\141\144\157\040\126\145\156\145\172\157\154  
\141\156\157\061\013\060\011\006\003\125\004\006\023\002\126\105  
\061\020\060\016\006\003\125\004\007\023\007\103\141\162\141\143  
\141\163\061\031\060\027\006\003\125\004\010\023\020\104\151\163  
\164\162\151\164\157\040\103\141\160\151\164\141\154\061\066\060  
\064\006\003\125\004\012\023\055\123\151\163\164\145\155\141\040  
\116\141\143\151\157\156\141\154\040\144\145\040\103\145\162\164  
\151\146\151\143\141\143\151\157\156\040\105\154\145\143\164\162  
\157\156\151\143\141\061\103\060\101\006\003\125\004\013\023\072  
\123\165\160\145\162\151\156\164\145\156\144\145\156\143\151\141  
\040\144\145\040\123\145\162\166\151\143\151\157\163\040\144\145  
\040\103\145\162\164\151\146\151\143\141\143\151\157\156\040\105  
\154\145\143\164\162\157\156\151\143\141\061\045\060\043\006\011  
\052\206\110\206\367\015\001\011\001\026\026\141\143\162\141\151  
\172\100\163\165\163\143\145\162\164\145\056\147\157\142\056\166  
\145\060\036\027\015\061\060\061\062\062\070\061\066\064\061\063  
\066\132\027\015\063\060\061\062\062\063\062\063\065\071\065\071  
\132\060\202\001\036\061\076\060\074\006\003\125\004\003\023\065

\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162  
\164\151\146\151\143\141\143\151\157\156\040\122\141\151\172\040  
\144\145\154\040\105\163\164\141\144\157\040\126\145\156\145\172  
\157\154\141\156\157\061\013\060\011\006\003\125\004\006\023\002  
\126\105\061\020\060\016\006\003\125\004\007\023\007\103\141\162  
\141\143\141\163\061\031\060\027\006\003\125\004\010\023\020\104  
\151\163\164\162\151\164\157\040\103\141\160\151\164\141\154\061  
\066\060\064\006\003\125\004\012\023\055\123\151\163\164\145\155  
\141\040\116\141\143\151\157\156\141\154\040\144\145\040\103\145  
\162\164\151\146\151\143\141\143\151\157\156\040\105\154\145\143  
\164\162\157\156\151\143\141\061\103\060\101\006\003\125\004\013  
\023\072\123\165\160\145\162\151\156\164\145\156\144\145\156\143  
\151\141\040\144\145\040\123\145\162\166\151\143\151\157\163\040  
\144\145\040\103\145\162\164\151\146\151\143\141\143\151\157\156  
\040\105\154\145\143\164\162\157\156\151\143\141\061\045\060\043  
\006\011\052\206\110\206\367\015\001\011\001\026\026\141\143\162  
\141\151\172\100\163\165\163\143\145\162\164\145\056\147\157\142  
\056\166\145\060\202\002\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002  
\202\002\001\000\301\073\357\023\122\361\231\126\343\264\154\005  
\341\032\151\026\141\046\206\170\257\016\374\345\100\005\012\343  
\331\070\005\114\250\324\265\300\306\052\317\057\171\253\241\244  
\120\357\065\021\037\356\202\044\027\374\243\034\253\376\007\006  
\177\067\177\007\130\133\023\331\177\000\137\053\260\117\332\237  
\311\260\130\063\141\341\117\320\025\316\056\153\350\044\214\345  
\045\276\205\133\355\114\077\001\201\216\346\231\030\122\046\131  
\233\022\230\145\034\225\276\165\231\026\014\144\104\341\367\362  
\171\010\264\341\107\127\261\112\334\107\102\233\160\113\072\332  
\314\321\151\221\006\077\316\150\373\371\206\115\003\334\203\242  
\272\025\026\376\254\311\266\016\147\263\261\064\072\073\316\104  
\213\243\216\110\356\003\060\267\032\226\147\305\144\045\231\002  
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CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Autoridad de Certificacion Raiz del Estado Venezolano"

# Issuer: 1.2.840.113549.1.9.1=acraiz@suscerte.gob.ve,OU=Superintendencia de Servicios de Certificacion Electronica,O=Sistema Nacional de Certificacion Electronica,ST=Distrito Capital,L=Caracas,C=VE,CN=Autoridad de Certificacion Raiz del Estado Venezolano

# Serial Number: 10 (0xa)

# Subject: 1.2.840.113549.1.9.1=acraiz@suscerte.gob.ve,OU=Superintendencia

de Servicios de Certificacion Electronica,O=Sistema Nacional de Certificacion Electronica,ST=Distrito  
Capital,L=Caracas,C=VE,CN=Autoridad de Certificacion Raiz del Estado Venezolano  
# Not Valid Before: Tue Dec 28 16:41:36 2010  
# Not Valid After: Mon Dec 23 23:59:59 2030  
# Fingerprint (MD5): 96:14:69:08:a8:36:59:d7:a0:35:14:89:58:50:5b:ab  
# Fingerprint (SHA1): 39:8e:be:9c:0f:46:c0:79:c3:c7:af:e0:7a:2f:dd:9f:ae:5f:8a:5c  
CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "Autoridad de Certificacion Raiz del Estado Venezolano"  
CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL  
\071\216\276\234\017\106\300\171\303\307\257\340\172\057\335\237  
\256\137\212\134  
END  
CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL  
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\151\146\151\143\141\143\151\157\156\040\122\141\151\172\040\144  
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\105\061\020\060\016\006\003\125\004\007\023\007\103\141\162\141  
\143\141\163\061\031\060\027\006\003\125\004\010\023\020\104\151  
\163\164\162\151\164\157\040\103\141\160\151\164\141\154\061\066  
\060\064\006\003\125\004\012\023\055\123\151\163\164\145\155\141  
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CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

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Microsoft Code Signing Only Certificate
Certificate "China Internet Network Information Center EV Certificates Root"
Issuer: CN=China Internet Network Information Center EV Certificates Root,O=China Internet Network
Information Center,C=CN
Serial Number:48:9f:00:01
Subject: CN=China Internet Network Information Center EV Certificates Root,O=China Internet Network
Information Center,C=CN
Not Valid Before: Tue Aug 31 07:11:25 2010
Not Valid After: Sat Aug 31 07:11:25 2030
Fingerprint (MD5): 55:5d:63:00:97:bd:6a:97:f5:67:ab:4b:fb:6e:63:15
Fingerprint (SHA1): 4f:99:aa:93:fb:2b:d1:37:26:a1:99:4a:ce:7f:f0:05:f2:93:5d:1e
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "China Internet Network Information Center EV Certificates Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\061\062\060\060\006\003\125\004\012\014\051\103\150\151\156\141
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MULTILINE_OCTAL
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\135\074\170\036\250\225\202\051\120\321\321\026\272\357\301\276
\172\331\264\330\314\036\114\106\341\167\261\061\253\275\052\310
\316\217\156\241\135\177\003\165\064\344\255\211\105\124\136\276
\256\050\245\273\077\170\171\353\163\263\012\015\375\276\311\367
\126\254\366\267\355\057\233\041\051\307\070\266\225\304\004\362
\303\055\375\024\052\220\231\271\007\314\237
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "China Internet Network Information Center EV Certificates Root"

# Issuer:

CN=China Internet Network Information Center EV Certificates Root,O=China Internet Network Information Center,C=CN

# Serial Number:48:9f:00:01

# Subject: CN=China Internet Network Information Center EV Certificates Root,O=China Internet Network Information Center,C=CN

# Not Valid Before: Tue Aug 31 07:11:25 2010

# Not Valid After: Sat Aug 31 07:11:25 2030

# Fingerprint (MD5): 55:5d:63:00:97:bd:6a:97:f5:67:ab:4b:fb:6e:63:15

# Fingerprint (SHA1): 4f:99:aa:93:fb:2b:d1:37:26:a1:99:4a:ce:7f:f0:05:f2:93:5d:1e

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "China Internet Network Information Center EV Certificates Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\117\231\252\223\373\053\321\067\046\241\231\112\316\177\360\005
\362\223\135\036
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\125\135\143\000\227\275\152\227\365\147\253\113\373\156\143\025
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\116
\061\062\060\060\006\003\125\004\012\014\051\103\150\151\156\141
\040\111\156\164\145\162\156\145\164\040\116\145\164\167\157\162
```

```
\153\040\111\156\146\157\162\155\141\164\151\157\156\040\103\145
\156\164\145\162\061\107\060\105\006\003\125\004\003\014\076\103
\150\151\156\141\040\111\156\164\145\162\156\145\164\040\116\145
\164\167\157\162\153\040\111\156\146\157\162\155\141\164\151\157
\156\040\103\145\156\164\145\162\040\105\126\040\103\145\162\164
\151\146\151\143\141\164\145\163\040\122\157\157\164
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\004\110\237\000\001
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Verizon Global Root CA"

# Issuer: CN=Verizon Global Root CA,OU=OmniRoot,O=Verizon Business,C=US

# Serial Number:

1 (0x1)

# Subject: CN=Verizon Global Root CA,OU=OmniRoot,O=Verizon Business,C=US

# Not Valid Before: Thu Jul 30 14:27:04 2009

# Not Valid After: Sun Jul 30 14:27:04 2034

# Fingerprint (MD5): f4:c3:f3:e9:53:c2:94:65:27:3d:52:89:f1:8e:5b:1c

# Fingerprint (SHA1): 91:21:98:ee:f2:3d:ca:c4:09:39:31:2f:ee:97:dd:56:0b:ae:49:b1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Verizon Global Root CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\134\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\031\060\027\006\003\125\004\012\014\020\126\145\162\151\172\157
\156\040\102\165\163\151\156\145\163\163\061\021\060\017\006\003
\125\004\013\014\010\117\155\156\151\122\157\157\164\061\037\060
\035\006\003\125\004\003\014\026\126\145\162\151\172\157\156\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\134\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\031\060\027\006\003\125\004\012\014\020\126\145\162\151\172\157
\156\040\102\165\163\151\156\145\163\163\061\021\060\017\006\003
\125\004\013\014\010\117\155\156\151\122\157\157\164\061\037\060
\035\006\003\125\004\003\014\026\126\145\162\151\172\157\156\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\165\060\202\002\135\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\134\061\013\060\011\006\003\125\004\006\023\002\125\123\061\031  
\060\027\006\003\125\004\012\014\020\126\145\162\151\172\157\156  
\040\102\165\163\151\156\145\163\163\061\021\060\017\006\003\125  
\004\013\014\010\117\155\156\151\122\157\157\164\061\037\060\035  
\006\003\125\004\003\014\026\126\145\162\151\172\157\156\040\107  
\154\157\142\141\154\040\122\157\157\164\040\103\101\060\036\027  
\015\060\071\060\067\063\060\061\064\062\067\060\064\132\027\015  
\063\064\060\067\063\060\061\064\062\067\060\064\132\060\134\061  
\013\060\011\006\003\125\004\006\023\002\125\123\061\031\060\027  
\006\003\125\004\012\014\020\126\145\162\151\172\157\156\040\102  
\165\163\151\156\145\163\163\061\021\060\017\006\003\125\004\013  
\014\010\117\155\156\151\122\157\157\164\061\037\060\035\006\003  
\125\004\003\014\026\126\145\162\151\172\157\156\040\107\154\157  
\142\141\154\040\122\157\157\164\040\103\101\060\202\001\042\060  
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202  
\001\017\000\060\202\001\012\002\202\001\001\000\212\000\014\160  
\035\277\353\064\206\303\231\105\065\036\177\103\367\253\157\044  
\055\315\031\302\020\273\260\312\051\133\251\040\253\253\162\054  
\304\342\002\071\155\202\270\305\021\352\370\373\263\236\142\370  
\063\036\260\037\311\343\366\067\333\004\310\073\143\117\066\342  
\205\244\045\035\307\151\037\004\275\150\105\023\226\007\037\224  
\120\365\076\305\047\124\236\300\111\127\104\216\007\143\324\246  
\256\355\042\231\314\115\226\151\004\023\156\166\211\237\164\026  
\224\371\035\124\275\242\271\322\203\001\042\014\115\104\200\252  
\376\065\211\047\045\247\206\211\306\325\032\222\343\217\305\225  
\240\024\162\232\350\126\305\002\125\034\227\371\040\056\320\365  
\074\023\031\132\366\341\371\013\003\202\151\247\214\267\326\157  
\234\126\076\235\350\052\011\140\155\113\346\373\213\231\024\367  
\064\117\145\131\200\215\271\127\310\242\065\041\330\210\161\126  
\135\356\202\127\055\046\220\030\237\232\234\234\217\357\324\305  
\143\247\124\175\107\221\207\175\032\022\250\033\030\157\251\157  
\261\047\272\344\004\164\316\067\036\177\146\305\002\003\001\000  
\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004  
\024\114\070\021\270\230\000\133\132\053\160\076\252\170\344\325  
\147\147\147\247\176\060\015\006\011\052\206\110\206\367\015\001  
\001\013\005\000\003\202\001\001\000\001\137\240\261\006\001\364  
\171\327\145\030\140\076\317\171\240\272\302\043\117\043\337\207  
\226\137\201\016\070\025\056\134\310\002\150\051\040\374\213\356



```
\245\212\030\201\144\134\230\065\176\071\060\202\244\202\212\120
\265\272\303\350\132\326\250\236\342\303\027\333\333\304\353\260
\012\040\015\351\236\343\377\140\124\107\361\073\235\324\050\074
\242\256\243\373\252\213\202\042\052\065\207\220\270\034\131\107
\220\325\235\056\372\111\343\145\250\066\353\307\344\034\150\334
\263\061\154\253\116\316\044\200\025\310\020\131\020\021\162\115
\172\234\230\234\304\374\141\340\263\262\235\116\240\306\302\131
\253\030\326\242\125\105\354\051\252\045\067\326\116\112\075\013
\100\301\344\223\344\374\315\221\013\370\346\253\314\263\166\304
\142\277\031\355\206\266\171\303\051\124\124\274\231\175\106\127
\317\246\317\364\124\052\232\003\145\107\001\241\102\052\313\045
\107\156\174\136\000\113\221\331\371\033\020\006\160\371\102\025
\246\137\252\327\100\036\375\311\110\235\227\201\352\134\150\302
\240\347\211\241\123\115\277\307\343
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Verizon Global Root CA"

# Issuer: CN=Verizon Global Root CA,OU=OmniRoot,O=Verizon Business,C=US

# Serial Number: 1 (0x1)

# Subject: CN=Verizon Global Root CA,OU=OmniRoot,O=Verizon Business,C=US

# Not Valid Before: Thu Jul 30 14:27:04 2009

# Not Valid After: Sun Jul 30 14:27:04 2034

# Fingerprint (MD5): f4:c3:f3:e9:53:c2:94:65:27:3d:52:89:f1:8e:5b:1c

# Fingerprint (SHA1): 91:21:98:ee:f2:3d:ca:c4:09:39:31:2f:ee:97:dd:56:0b:ae:49:b1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Verizon Global Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\221\041\230\356\362\075\312\304\011\071\061\057\356\227\335\126
\013\256\111\261
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\364\303\363\351\123\302\224\145\047\075\122\211\361\216\133\034
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\134\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\031\060\027\006\003\125\004\012\014\020\126\145\162\151\172\157
\156\040\102\165\163\151\156\145\163\163\061\021\060\017\006\003
\125\004\013\014\010\117\155\156\151\122\157\157\164\061\037\060
\035\006\003\125\004\003\014\026\126\145\162\151\172\157\156\040
```

```

\107\154\157\142\141\154\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "SwissSign Silver Root CA - G3"
Issuer: CN=SwissSign Silver Root CA - G3,O=SwissSign AG,C=CH
Serial Number:aa:88:b0:5a:0b:b1:76:9b
Subject: CN=SwissSign
Silver Root CA - G3,O=SwissSign AG,C=CH
Not Valid Before: Tue Aug 04 13:19:14 2009
Not Valid After: Tue Aug 04 13:19:14 2037
Fingerprint (MD5): 40:e4:e0:25:6e:96:e0:01:a1:c8:4c:43:4c:f9:dc:33
Fingerprint (SHA1): 8d:08:fc:43:c0:77:0c:a8:4f:4d:cc:b2:d4:1a:5d:95:6d:78:6d:c4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Silver Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\046\060\044\006\003\125\004\003\023
\035\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\046\060\044\006\003\125\004\003\023
\035\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\252\210\260\132\013\261\166\233
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\176\060\202\003\146\240\003\002\001\002\002\011\000
\252\210\260\132\013\261\166\233\060\015\006\011\052\206\110\206

```

\367\015\001\001\013\005\000\060\114\061\013\060\011\006\003\125  
\004\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023  
\014\123\167\151\163\163\123\151\147\156\040\101\107\061\046\060  
\044\006\003\125\004\003\023\035\123\167\151\163\163\123\151\147  
\156\040\123\151\154\166\145\162\040\122\157\157\164\040\103\101  
\040\055\040\107\063\060\036\027\015\060\071\060\070\060\064\061  
\063\061\071\061\064\132\027\015\063\067\060\070\060\064\061\063  
\061\071\061\064\132\060\114\061\013\060\011\006\003\125\004\006  
\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014\123  
\167\151\163\163\123\151\147\156\040\101\107\061\046\060\044\006  
\003\125\004\003\023\035\123\167\151\163\163\123\151\147\156\040  
\123\151\154\166\145\162\040\122\157\157\164\040\103\101\040\055  
\040\107\063\060\202\002\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002  
\202\002\001\000\276\207\233\005\346\161\174\122\157\155\354\067  
\251\351\263\334\314\137\177\323\120\352\041\233\004\360\075\277  
\276\216\311\245\024\026\062\020\317\231\374\354\160\255\110\066  
\147\044\014\027\062\326\051\345\112\071\261\067\353\246\170\014  
\154\157\031\312\116\367\121\332\032\350\372\041\070\154\225\234  
\057\326\213\314\073\002\233\277\046\233\021\105\266\270\064\132  
\035\246\124\110\122\310\235\170\161\316\110\112\314\247\170\203  
\334\150\253\146\036\167\007\323\066\030\010\327\324\155\140\370  
\360\171\323\063\066\011\222\143\267\004\232\365\247\226\332\105  
\257\164\032\374\202\343\250\133\016\072\077\122\127\230\176\274  
\234\214\301\300\262\132\337\304\176\376\014\246\124\166\203\176  
\272\335\347\052\364\112\066\117\207\145\056\245\272\071\215\131  
\141\051\363\323\216\044\160\214\123\233\021\245\107\007\262\165  
\005\134\015\204\331\104\331\315\311\046\104\127\156\002\175\225  
\001\324\253\044\206\356\075\160\373\127\372\260\051\024\320\235  
\362\305\227\313\011\312\361\362\075\347\330\113\226\351\210\057  
\236\107\121\212\124\145\230\110\322\022\344\124\167\014\007\346  
\276\133\234\361\335\003\176\215\204\374\276\311\142\325\374\311  
\072\350\211\265\137\302\005\122\141\360\234\076\354\056\115\214  
\162\221\216\310\103\301\242\050\136\365\200\044\334\342\057\207  
\073\123\000\345\313\360\262\174\215\171\031\240\210\315\170\370  
\305\212\132\167\345\006\254\335\112\336\346\160\156\276\257\276  
\365\261\253\016\010\260\333\240\077\224\305\276\022\271\274\173  
\047\171\265\062\051\135\256\305\040\043\222\003\173\124\071\260  
\211\042\124\155\022\343\303\170\352\072\100\375\244\223\254\351  
\055\210\074\333\246\107\146\114\337\330\027\355\026\336\032\326  
\327\101\146\277\035\200\361\244\340\144\021\051\136\014\047\005  
\142\353\345\304\004\142\321\304\237\014\152\125\326\130\070\234  
\146\017\235\373\253\124\200\231\234\354\111\326\202\237\332\105  
\326\077\123\006\003\267\375\037\354\206\175\164\340\244\264\350  
\062\266\252\007\043\370\357\044\101\236\143\060\170\364\124\335  
\216\360\132\070\216\022\177\170\307\157\002\126\041\063\316\270  
\270\255\151\125\002\003\001\000\001\243\143\060\141\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006

\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035  
\006\003\125\035\016\004\026\004\024\241\214\105\223\012\022\143  
\013\247\127\137\062\112\175\341\041\347\267\076\146\060\037\006  
\003\125\035\043\004\030\060\026\200\024\241\214\105\223\012\022  
\143\013\247\127\137\062\112\175\341\041\347\267\076\146\060\015  
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002  
\001\000\207\256\141\155\110\070\052\306\034\334\112\056\204\170  
\111\300\043\052\105\270\065\115\321\005\372\271\005\063\304\144  
\275\333\255\124\026\052\260\076\015\132\050\332\246\032\200\163  
\014\304\101\157\257\270\064\266\167\324\133\216\035\013\213\106  
\220\104\265\263\356\111\030\211\301\113\064\263\207\065\164\242  
\236\105\147\355\105\161\146\266\271\241\045\163\327\302\254\210  
\373\322\035\247\153\332\300\132\346\330\131\144\064\227\145\040  
\061\063\003\117\316\255\011\236\256\351\302\076\030\165\264\063  
\045\022\273\005\354\120\272\161\100\342\275\336\210\106\005\041  
\204\213\243\053\036\353\060\060\211\277\021\365\134\104\370\221  
\213\113\131\105\013\060\015\312\014\117\157\143\276\004\376\301  
\355\340\207\376\310\315\126\277\345\334\216\172\324\326\051\116  
\200\333\253\233\077\216\145\007\042\367\104\315\226\037\055\307  
\365\011\266\230\160\377\070\334\120\025\021\204\073\177\251\360  
\330\044\124\310\027\214\053\023\111\326\231\177\105\321\017\216  
\277\151\162\067\123\007\364\346\256\375\133\076\171\271\006\315  
\270\201\170\264\115\240\320\065\272\344\256\377\323\111\274\065  
\355\143\306\263\374\343\253\141\132\005\266\013\344\377\251\052  
\276\337\124\116\302\113\134\150\332\243\062\242\311\115\127\030  
\123\064\131\074\146\231\327\074\002\170\247\114\161\320\277\333  
\361\304\074\347\001\346\004\362\104\366\110\046\060\063\311\261  
\001\031\353\002\361\314\041\372\072\002\060\027\235\310\137\200  
\077\335\045\254\002\233\343\027\336\275\312\222\024\322\122\201  
\123\346\352\374\060\147\062\251\142\366\223\027\025\007\061\136  
\017\033\151\365\364\251\267\174\055\263\355\204\104\062\107\050  
\007\073\206\151\105\251\307\066\226\220\162\164\330\022\246\163  
\043\321\116\271\266\172\072\304\051\241\120\006\021\271\331\364  
\046\156\142\010\022\040\026\360\001\127\027\324\005\066\147\227  
\353\121\371\377\063\044\014\005\017\126\277\357\075\034\122\216  
\212\336\151\017\132\037\360\325\003\061\104\263\222\306\352\165  
\250\256\273\307\140\003\210\230\377\307\004\204\122\220\206\341  
\264\223\251\120\057\350\353\322\066\254\060\140\247\320\003\023  
\265\012

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SwissSign Silver Root CA - G3"

# Issuer: CN=SwissSign Silver Root CA - G3,O=SwissSign AG,C=CH

```

Serial Number:aa:88:b0:5a:0b:b1:76:9b
Subject: CN=SwissSign Silver Root CA - G3,O=SwissSign AG,C=CH
Not Valid Before: Tue Aug 04 13:19:14 2009
Not Valid After: Tue Aug 04 13:19:14 2037
Fingerprint (MD5): 40:e4:e0:25:6e:96:e0:01:a1:c8:4c:43:4c:f9:dc:33
Fingerprint (SHA1): 8d:08:fc:43:c0:77:0c:a8:4f:4d:cc:b2:d4:1a:5d:95:6d:78:6d:c4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Silver Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\215\010\374\103\300\167\014\250\117\115\314\262\324\032\135\225
\155\170\155\304
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\100\344\340\045\156\226\340\001\241\310\114\103\114\371\334\063
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\046\060\044\006\003\125\004\003\023
\035\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\252\210\260\132\013\261\166\233
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "SwissSign Platinum Root CA - G3"
Issuer: CN=SwissSign Platinum Root CA - G3,O=SwissSign AG,C=CH
Serial Number:22:3f:a9:17:20:de:81:94
Subject: CN=SwissSign Platinum Root CA
- G3,O=SwissSign AG,C=CH
Not Valid Before: Tue Aug 04 13:34:04 2009
Not Valid After: Tue Aug 04 13:34:04 2037
Fingerprint (MD5): 20:de:12:0b:a8:6e:d9:34:a8:4e:b2:0d:1e:a6:43:39
Fingerprint (SHA1): a1:e7:c6:00:aa:41:70:e5:b7:4b:c9:4f:9b:97:03:ed:c2:61:b4:b9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

```
CKA_LABEL UTF8 "SwissSign Platinum Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\050\060\046\006\003\125\004\003\023
\037\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151
\156\165\155\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\050\060\046\006\003\125\004\003\023
\037\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151
\156\165\155\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\042\077\251\027\040\336\201\224
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\201\060\202\003\151\240\003\002\001\002\002\010\042
\077\251\027\040\336\201\224\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\116\061\013\060\011\006\003\125\004
\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014
\123\167\151\163\163\123\151\147\156\040\101\107\061\050\060\046
\006\003\125\004\003\023\037\123\167\151\163\163\123\151\147\156
\040\120\154\141\164\151\156\165\155\040\122\157\157\164\040\103
\101\040\055\040\107\063\060\036\027\015\060\071\060\070\060\064
\061\063\063\064\060\064\132\027\015\063\067\060\070\060\064\061
\063\063\064\060\064\132\060\116\061\013\060\011\006\003\125\004
\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014
\123\167\151\163\163\123\151\147\156\040\101\107\061\050\060\046
\006\003\125\004\003\023\037\123\167\151\163\163\123\151\147\156
\040\120\154\141\164\151\156\165\155\040\122\157\157\164\040\103
\101\040\055\040\107\063\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\224\240\357\023\033\237\104\040\033
\315\305\252\042\273\331\362\122\076\172\132\130\167\346\215\241
\053\311\334\244\363\344\263\023\224\000\142\233\034\362\103\120
\103\201\176\257\060\066\111\254\030\211\014\030\105\270\076\307
\124\155\343\330\232\131\153\212\032\045\251\266\265\015\267\175
\043\360\137\175\250\007\251\367\076\206\056\310\001\115\334\346
\066\355\035\345\067\007\151\022\113\343\203\321\004\034\044\360
\037\160\161\347\031\355\163\110\156\225\053\025\266\126\346\002
\337\126\351\233\372\352\246\356\340\302\303\272\340\314\306\310
\173\327\157\072\225\233\072\217\276\133\054\322\251\240\070\076
```

\326\210\341\261\142\023\216\334\253\060\147\315\250\152\246\143  
\053\202\260\313\307\075\116\355\162\366\175\253\062\116\145\002  
\353\017\231\164\370\034\032\050\214\016\105\000\223\054\024\237  
\155\307\033\236\366\212\334\173\170\343\264\224\107\035\115\005  
\155\204\172\220\124\262\236\213\165\302\200\337\207\071\077\237  
\373\110\124\007\215\240\051\365\371\140\137\132\162\350\273\233  
\240\102\340\010\000\064\243\025\074\023\343\326\032\153\002\262  
\224\041\243\235\101\274\052\153\116\063\073\246\224\070\374\075  
\307\053\063\263\056\053\006\164\254\233\020\157\305\116\105\367  
\135\241\126\003\054\015\137\172\275\036\336\035\167\220\153\332  
\245\055\212\114\351\337\101\364\347\113\354\175\225\102\237\114  
\251\011\017\103\210\077\075\223\347\053\364\172\110\332\150\304  
\335\022\200\061\032\135\044\124\046\246\044\041\263\114\255\332  
\027\010\066\002\127\306\234\206\160\311\165\311\236\174\141\330  
\170\346\271\350\024\151\371\034\020\050\022\135\113\165\120\272  
\074\320\147\160\125\125\126\113\373\075\034\330\333\171\115\227  
\337\270\236\333\027\054\325\065\007\270\120\251\367\216\367\126  
\377\172\147\103\117\040\331\312\146\326\070\140\113\356\224\061  
\326\015\242\110\233\377\064\151\224\306\065\365\226\210\357\252  
\146\314\201\246\353\114\123\377\062\164\247\266\235\230\127\264  
\272\046\251\361\063\063\142\176\072\260\003\021\127\377\334\157  
\021\043\255\076\306\012\320\314\124\267\055\302\223\035\345\302  
\246\214\307\330\357\123\367\002\003\001\000\001\243\143\060\141  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\035\006\003\125\035\016\004\026\004\024\126\052\077\220  
\130\364\027\132\024\262\327\010\033\205\133\124\152\124\032\050  
\060\037\006\003\125\035\043\004\030\060\026\200\024\126\052\077  
\220\130\364\027\132\024\262\327\010\033\205\133\124\152\124\032  
\050\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000  
\003\202\002\001\000\154\355\212\347\103\250\171\047\233\270\317  
\207\076\144\070\030\214\021\102\222\206\067\340\130\303\033\356  
\004\056\367\204\354\203\020\150\014\177\170\055\234\302\227\216  
\066\116\026\330\016\352\153\110\255\117\236\135\015\314\015\251  
\076\030\205\176\314\150\231\071\065\326\330\237\206\301\062\373  
\115\145\263\042\024\113\310\205\146\332\027\377\161\221\254\234  
\126\127\336\161\054\126\102\277\370\315\016\360\242\323\377\322  
\042\025\373\320\170\012\176\341\260\132\316\216\067\333\251\236  
\347\225\317\143\362\054\015\322\372\157\363\310\325\373\000\267  
\367\065\147\020\323\173\122\354\020\062\370\277\335\136\311\246  
\202\244\361\260\277\035\056\335\045\344\275\115\360\065\251\221  
\001\107\370\020\002\224\133\353\076\353\015\272\325\035\143\054  
\245\056\253\347\343\036\243\356\113\252\137\261\146\001\264\202  
\132\371\106\113\307\361\370\337\054\276\375\165\335\226\070\232  
\067\072\156\245\346\062\025\156\263\220\300\071\212\164\245\225  
\240\276\015\056\211\171\315\051\126\216\303\136\127\121\304\005  
\157\004\125\217\201\351\114\275\131\106\313\052\274\115\311\035  
\362\306\117\005\344\310\004\015\367\156\117\332\303\072\234\322

```
\302\365\351\306\044\172\024\076\034\102\060\250\002\105\061\251
\374\120\251\334\334\206\070\017\133\223\077\177\010\116\152\015
\047\072\020\171\126\303\025\270\076\006\206\366\331\160\147\257
\165\172\213\342\130\314\306\165\117\062\125\305\154\024\011\050
\073\362\225\344\152\336\054\050\007\255\240\175\007\050\335\324
\132\243\351\246\174\023\214\231\013\122\170\333\331\321\337\076
\132\103\166\177\106\140\123\302\315\347\166\107\174\125\315\264
\071\144\020\133\225\113\065\135\104\203\044\325\340\056\044\014
\301\200\156\151\000\200\006\167\012\146\202\020\014\121\157\067
\211\127\333\363\114\345\270\271\356\043\146\227\140\267\122\335
\331\226\373\272\212\073\240\115\316\136\360\104\114\220\314\041
\117\033\072\230\153\216\061\203\371\203\010\122\313\031\301\065
\153\356\241\025\133\210\077\155\254\362\064\222\123\246\060\052
\023\327\346\206\250\135\331\102\322\307\235\251\172\213\313\337
\356\242\061\302\345
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SwissSign Platinum Root CA - G3"

# Issuer: CN=SwissSign Platinum Root CA - G3,O=SwissSign AG,C=CH

# Serial Number:22:3f:a9:17:20:de:81:94

# Subject: CN=SwissSign Platinum Root CA - G3,O=SwissSign AG,C=CH

# Not Valid Before: Tue Aug 04 13:34:04 2009

# Not Valid After: Tue Aug 04 13:34:04 2037

# Fingerprint (MD5): 20:de:12:0b:a8:6e:d9:34:a8:4e:b2:0d:1e:a6:43:39

# Fingerprint (SHA1): a1:e7:c6:00:aa:41:70:e5:b7:4b:c9:4f:9b:97:03:ed:c2:61:b4:b9

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SwissSign Platinum Root CA - G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\241\347\306\000\252\101\160\345\267\113\311\117\233\227\003\355
\302\141\264\271
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\040\336\022\013\250\156\331\064\250\116\262\015\036\246\103\071
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\116\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\050\060\046\006\003\125\004\003\023
\037\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151
```



```

\156\165\155\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\042\077\251\027\040\336\201\224
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "SwissSign Gold Root CA - G3"
Issuer: CN=SwissSign Gold Root CA - G3,O=SwissSign AG,C=CH
Serial Number:de:c4:f2:44:f3:1d:a6:fc
Subject: CN=SwissSign Gold Root CA
- G3,O=SwissSign AG,C=CH
Not Valid Before: Tue Aug 04 13:31:47 2009
Not Valid After: Tue Aug 04 13:31:47 2037
Fingerprint (MD5): c2:64:4c:e2:7d:eb:6c:7b:ec:36:e0:39:df:68:9c:67
Fingerprint (SHA1): 0b:71:99:a1:c7:f3:ad:df:7b:a7:ea:b8:eb:57:4a:e8:0d:60:dd:de
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Gold Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\044\060\042\006\003\125\004\003\023
\033\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\044\060\042\006\003\125\004\003\023
\033\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\336\304\362\104\363\035\246\374
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\172\060\202\003\142\240\003\002\001\002\002\011\000
\336\304\362\104\363\035\246\374\060\015\006\011\052\206\110\206

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\367\015\001\001\013\005\000\060\112\061\013\060\011\006\003\125  
\004\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023  
\014\123\167\151\163\163\123\151\147\156\040\101\107\061\044\060  
\042\006\003\125\004\003\023\033\123\167\151\163\163\123\151\147  
\156\040\107\157\154\144\040\122\157\157\164\040\103\101\040\055  
\040\107\063\060\036\027\015\060\071\060\070\060\064\061\063\063  
\061\064\067\132\027\015\063\067\060\070\060\064\061\063\063\061  
\064\067\132\060\112\061\013\060\011\006\003\125\004\006\023\002  
\103\110\061\025\060\023\006\003\125\004\012\023\014\123\167\151  
\163\163\123\151\147\156\040\101\107\061\044\060\042\006\003\125  
\004\003\023\033\123\167\151\163\163\123\151\147\156\040\107\157  
\154\144\040\122\157\157\164\040\103\101\040\055\040\107\063\060  
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001  
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000  
\303\350\237\310\145\132\235\147\033\301\105\227\264\264\207\103  
\133\141\140\200\236\362\177\136\371\147\104\335\104\372\253\265  
\253\167\377\052\031\114\316\157\304\217\101\237\340\342\315\162  
\340\321\324\122\141\101\011\012\277\012\160\373\340\203\151\141  
\051\312\333\042\232\133\245\346\335\027\225\260\157\204\216\072  
\076\144\132\101\373\033\130\374\375\053\076\262\244\346\254\311  
\202\274\316\366\225\370\227\167\355\046\366\130\256\236\047\342  
\017\203\354\305\066\130\310\173\317\325\207\241\251\207\032\023  
\147\141\001\155\246\151\234\342\220\361\053\150\145\363\350\260  
\174\374\202\075\336\255\330\012\000\011\104\171\023\234\360\376  
\156\165\173\302\274\263\131\001\013\174\305\325\055\360\277\377  
\155\127\322\111\201\353\264\263\120\254\133\371\013\025\025\214  
\151\377\243\071\001\355\374\334\334\047\227\216\173\213\325\152  
\246\326\340\035\137\315\001\221\346\365\042\230\272\056\011\030  
\070\157\023\250\201\322\373\041\067\347\055\264\142\347\201\220  
\260\306\171\131\267\147\165\376\276\217\073\372\066\354\257\255  
\322\117\164\066\001\345\127\253\043\004\314\112\136\227\317\176  
\306\357\214\314\225\043\151\215\313\070\307\031\366\326\212\000  
\024\036\064\075\157\332\014\013\303\272\227\374\021\113\122\141  
\076\277\063\147\123\020\277\170\033\011\302\107\272\036\257\130  
\365\165\201\177\275\126\361\353\126\327\331\151\014\007\351\067  
\061\260\022\034\062\357\126\331\276\172\053\174\275\323\075\274  
\152\063\115\072\074\120\020\207\047\307\172\012\147\123\333\177  
\200\233\350\236\043\372\371\010\072\213\241\216\064\132\110\063  
\137\144\323\227\206\007\031\175\210\224\316\052\174\305\152\337  
\257\274\251\237\315\072\246\272\273\124\371\177\217\337\317\016  
\132\304\255\232\274\263\072\167\163\203\114\223\074\220\150\265  
\174\120\225\021\310\202\136\224\161\320\101\030\373\311\306\145  
\354\316\211\266\316\042\263\021\133\077\340\235\076\033\030\150  
\015\252\003\241\147\131\277\153\235\274\370\362\145\057\232\101  
\072\105\330\136\320\066\154\157\073\036\143\264\216\230\114\023  
\333\041\016\237\173\355\352\240\252\161\303\353\243\240\322\045  
\002\003\001\000\001\243\143\060\141\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023

\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035  
\016\004\026\004\024\134\227\006\106\064\253\337\060\305\174\305  
\015\125\161\146\060\265\140\217\236\060\037\006\003\125\035\043  
\004\030\060\026\200\024\134\227\006\106\064\253\337\060\305\174  
\305\015\125\161\146\060\265\140\217\236\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\167\113  
\115\336\352\205\112\253\054\047\326\105\307\361\137\040\301\133  
\140\355\007\313\242\063\334\066\317\307\224\361\006\307\325\332  
\317\315\255\204\076\377\022\110\177\101\350\245\146\127\060\304  
\035\344\247\032\057\055\102\301\357\106\163\262\325\365\132\375  
\016\172\153\322\310\061\243\015\110\226\127\145\143\125\030\300  
\374\344\212\314\230\206\133\253\014\212\047\067\372\043\150\131  
\134\046\327\241\301\302\271\116\054\377\051\136\346\224\013\276  
\315\162\117\225\350\217\366\367\270\076\136\316\317\236\021\311  
\254\003\051\110\212\251\266\246\064\271\254\100\377\304\266\163  
\067\261\307\177\251\121\333\113\052\107\137\100\044\007\210\006  
\267\044\263\373\177\367\260\213\063\372\277\043\165\243\134\376  
\252\145\032\302\276\361\175\201\167\003\201\261\215\327\225\015  
\172\074\102\230\267\217\251\175\120\341\337\122\006\232\240\122  
\124\170\203\007\141\122\011\067\136\212\234\247\306\121\321\134  
\143\321\204\334\302\333\322\372\133\030\066\175\146\274\324\050  
\227\057\165\226\034\204\007\254\213\216\123\021\276\044\041\252  
\147\362\301\255\210\234\323\260\170\147\170\365\323\130\003\040  
\012\135\040\361\265\347\145\314\016\040\343\325\337\346\057\031  
\053\205\150\301\004\046\317\217\355\005\123\241\335\007\016\353  
\101\046\307\264\251\054\133\343\151\075\146\300\142\033\300\252  
\206\300\067\303\061\004\206\160\071\276\153\137\041\100\101\240  
\177\345\331\017\070\113\160\137\111\370\205\270\053\056\252\037  
\223\101\103\370\373\262\164\074\037\113\127\133\267\324\121\241  
\222\112\316\276\020\242\356\330\024\042\173\271\101\275\215\351  
\210\251\321\217\003\032\140\377\077\207\211\240\231\047\042\146  
\260\076\150\236\162\210\121\070\235\023\076\105\155\005\345\106  
\265\163\355\103\206\261\024\012\036\274\332\015\277\036\044\134  
\146\217\016\276\241\375\306\353\151\274\103\171\327\003\166\371  
\334\207\231\270\230\304\315\177\155\020\371\020\276\054\102\376  
\234\051\115\203\153\012\275\265\216\304\110\212\375\041\007\246  
\200\175\037\233\351\253\275\202\141\104\012\161\047\137\155\233  
\220\236\256\377\066\044\263\150\003\326\225\214\153\163

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SwissSign Gold Root CA - G3"

# Issuer: CN=SwissSign Gold Root CA - G3,O=SwissSign AG,C=CH

# Serial Number:de:c4:f2:44:f3:1d:a6:fc

```
Subject: CN=SwissSign Gold Root CA - G3,O=SwissSign AG,C=CH
Not Valid Before: Tue Aug 04 13:31:47 2009
Not Valid After: Tue Aug 04 13:31:47 2037
Fingerprint (MD5): c2:64:4c:e2:7d:eb:6c:7b:ec:36:e0:39:df:68:9c:67
Fingerprint (SHA1): 0b:71:99:a1:c7:f3:ad:df:7b:a7:ea:b8:eb:57:4a:e8:0d:60:dd:de
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Gold Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\013\161\231\241\307\363\255\337\173\247\352\270\353\127\112\350
\015\140\335\336
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\302\144\114\342\175\353\154\173\354\066\340\071\337\150\234\147
END
CKA_ISSUER
MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\044\060\042\006\003\125\004\003\023
\033\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\336\304\362\104\363\035\246\374
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "SITHS CA v3"
Issuer: CN=SITHS CA v3,O=Carelink,C=SE
Serial Number:1b:d4:0e:d4:34:d1:da:15:a6:00:30:15:02:4d:a4:6c
Subject: CN=SITHS CA v3,O=Carelink,C=SE
Not Valid Before: Mon Nov 28 10:27:50 2005
Not Valid After: Sat Nov 28 06:02:38 2015
Fingerprint
(MD5): 51:c6:bb:37:df:2c:7b:55:0f:84:d4:f3:68:5a:be:eb
Fingerprint (SHA1): 16:d8:66:35:af:13:41:cd:34:79:94:45:eb:60:3e:27:37:02:96:5d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SITHS CA v3"
```

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\066\061\013\060\011\006\003\125\004\006\023\002\123\105\061  
\021\060\017\006\003\125\004\012\014\010\103\141\162\145\154\151  
\156\153\061\024\060\022\006\003\125\004\003\014\013\123\111\124  
\110\123\040\103\101\040\166\063

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\066\061\013\060\011\006\003\125\004\006\023\002\123\105\061  
\021\060\017\006\003\125\004\012\014\010\103\141\162\145\154\151  
\156\153\061\024\060\022\006\003\125\004\003\014\013\123\111\124  
\110\123\040\103\101\040\166\063

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\033\324\016\324\064\321\332\025\246\000\060\025\002\115  
\244\154

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\003\141\060\202\002\111\240\003\002\001\002\002\020\033  
\324\016\324\064\321\332\025\246\000\060\025\002\115\244\154\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\066  
\061\013\060\011\006\003\125\004\006\023\002\123\105\061\021\060  
\017\006\003\125\004\012\014\010\103\141\162\145\154\151\156\153  
\061\024\060\022\006\003\125\004\003\014\013\123\111\124\110\123  
\040\103\101\040\166\063\060\036\027\015\060\065\061\061\062\070  
\061\060\062\067\065\060\132\027\015\061\065\061\061\062\070\060  
\066\060\062\063\070\132\060\066\061\013\060\011\006\003\125\004  
\006\023\002\123\105\061\021\060\017\006\003\125\004\012\014\010  
\103\141\162\145\154\151\156\153\061\024\060\022\006\003\125\004  
\003\014\013\123\111\124\110\123\040\103\101\040\166\063\060\202  
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\305  
\331\133\321\324\053\177\100\147\356\241\133\135\321\332\152\271  
\031\061\362\360\046\111\001\145\374\101\124\361\226\221\354\052  
\356\004\104\044\036\100\234\347\027\120\077\352\034\174\356\270  
\067\071\374\307\323\257\233\156\135\337\076\276\005\374\352\312  
\331\371\105\126\341\225\234\261\320\132\217\376\310\052\246\327  
\152\154\340\155\135\354\134\166\376\341\231\107\232\251\173\247  
\352\346\157\124\002\047\115\121\116\050\075\254\006\072\201\202  
\246\034\275\113\244\355\122\022\334\212\052\353\047\364\301\042  
\112\020\204\132\165\265\200\042\126\145\353\314\200\362\245\341  
\144\276\174\336\017\275\047\007\114\051\133\252\261\357\264\173  
\377\207\064\350\243\223\102\313\075\140\273\167\323\302\057\136  
\024\370\163\157\244\177\240\234\001\325\325\251\273\014\127\217  
\314\300\073\221\170\236\222\071\171\062\114\104\177\307\013\175  
\336\372\314\176\332\314\336\015\324\146\266\142\246\063\277\154

\371\325\335\107\122\160\224\313\145\340\105\267\015\327\257\225  
\110\327\101\243\073\040\120\015\074\024\125\223\314\352\015\002  
\003\001\000\001\243\153\060\151\060\022\006\003\125\035\023\001  
\001\377\004\010\060\006\001\001\377\002\001\000\060\021\006\011  
\140\206\110\001\206\370\102\001\001\004\004\003\002\002\004\060  
\024\006\003\125\035\040\004\015\060\013\060\011\006\007\052\205  
\160\112\001\001\003\060\013\006\003\125\035\017\004\004\003\002  
\001\006\060\035\006\003\125\035\016\004\026\004\024\174\056\071  
\043\062\104\350\017\116\146\362\015\050\376\100\276\302\266\342  
\240\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000  
\003\202\001\001\000\010\123\132\210\051\015\365\124\330\253\261  
\203\271\047\151\132\252\137\053\130\111\324\271\337\157\353\307  
\006\353\375\207\232\277\312\022\337\172\236\001\042\045\143\122  
\205\157\247\057\016\227\164\140\214\340\110\200\163\335\102\215  
\041\355\017\162\177\164\006\156\120\126\073\055\207\354\201\130  
\213\066\307\312\000\373\244\004\266\057\070\130\216\167\361\006  
\304\055\054\047\055\030\202\013\212\137\042\224\024\025\143\070  
\306\245\261\272\340\254\276\076\046\077\221\273\034\203\374\016  
\312\311\067\276\067\327\360\173\363\214\330\274\220\013\364\000  
\277\124\274\152\112\130\347\312\133\014\031\123\102\007\225\127  
\065\270\117\226\123\232\250\230\335\116\175\125\264\234\343\272  
\300\066\271\267\334\002\230\370\366\345\060\276\054\167\262\363  
\311\342\002\243\346\367\104\174\326\152\177\320\170\276\071\163  
\370\013\302\037\122\000\016\115\173\306\012\356\142\313\011\325  
\017\012\060\207\202\223\274\312\021\244\037\011\372\372\067\120  
\354\073\342\074\044\240\200\050\314\373\246\335\357\067\232\251  
\061\335\337\352\121

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SITHS CA v3"

# Issuer: CN=SITHS CA v3,O=Carelink,C=SE

# Serial Number:1b:d4:0e:d4:34:d1:da:15:a6:00:30:15:02:4d:a4:6c

# Subject: CN=SITHS CA v3,O=Carelink,C=SE

# Not Valid Before: Mon Nov 28 10:27:50 2005

# Not Valid After: Sat Nov 28 06:02:38

2015

# Fingerprint (MD5): 51:c6:bb:37:df:2c:7b:55:0f:84:d4:f3:68:5a:be:eb

# Fingerprint (SHA1): 16:d8:66:35:af:13:41:cd:34:79:94:45:eb:60:3e:27:37:02:96:5d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SITHS CA v3"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\026\330\146\065\257\023\101\315\064\171\224\105\353\140\076\047
\067\002\226\135
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\121\306\273\067\337\054\173\125\017\204\324\363\150\132\276\353
END
CKA_ISSUER MULTILINE_OCTAL
\060\066\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\021\060\017\006\003\125\004\012\014\010\103\141\162\145\154\151
\156\153\061\024\060\022\006\003\125\004\003\014\013\123\111\124
\110\123\040\103\101\040\166\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\033\324\016\324\064\321\332\025\246\000\060\025\002\115
\244\154
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST
CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Certinomis - Autorité Racine"
Issuer: CN=Certinomis - Autorité Racine,OU=0002 433998903,O=Certinomis,C=FR
Serial Number: 1 (0x1)
Subject: CN=Certinomis - Autorité Racine,OU=0002 433998903,O=Certinomis,C=FR
Not Valid Before: Wed Sep 17 08:28:59 2008
Not Valid After: Sun Sep 17 08:28:59 2028
Fingerprint (MD5): 7f:30:78:8c:03:e3:ca:c9:0a:e2:c9:ea:1e:aa:55:1a
Fingerprint (SHA1): 2e:14:da:ec:28:f0:fa:1e:8e:38:9a:4e:ab:eb:26:c0:0a:d3:83:c3
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certinomis - Autorité Racine"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\023\060\021\006\003\125\004\012\023\012\103\145\162\164\151\156
\157\155\151\163\061\027\060\025\006\003\125\004\013\023\016\060
\060\060\062\040\064\063\063\071\071\070\071\060\063\061\046\060
\044\006\003\125\004\003\014\035\103\145\162\164\151\156\157\155
\151\163\040\055\040\101\165\164\157\162\151\164\303\251\040\122
\141\143\151\156\145
END
CKA_ID

```

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\143\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\023\060\021\006\003\125\004\012\023\012\103\145\162\164\151\156  
\157\155\151\163\061\027\060\025\006\003\125\004\013\023\016\060  
\060\060\062\040\064\063\063\071\071\070\071\060\063\061\046\060  
\044\006\003\125\004\003\014\035\103\145\162\164\151\156\157\155  
\151\163\040\055\040\101\165\164\157\162\151\164\303\251\040\122  
\141\143\151\156\145

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\234\060\202\003\204\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\143\061\013\060\011\006\003\125\004\006\023\002\106\122\061\023  
\060\021\006\003\125\004\012\023\012\103\145\162\164\151\156\157  
\155\151\163\061\027\060\025\006\003\125\004\013\023\016\060\060  
\060\062\040\064\063\063\071\071\070\071\060\063\061\046\060\044  
\006\003\125\004\003\014\035\103\145\162\164\151\156\157\155\151  
\163\040\055\040\101\165\164\157\162\151\164\303\251\040\122\141  
\143\151\156\145\060\036\027\015\060\070\060\071\061\067\060\070  
\062\070\065\071\132\027\015\062\070\060\071\061\067\060\070\062  
\070\065\071\132\060\143\061\013\060\011\006\003\125\004\006\023  
\002\106\122\061\023\060\021\006\003\125\004\012\023\012\103\145  
\162\164\151\156\157\155\151\163\061\027\060\025\006\003\125\004  
\013\023\016\060\060\060\062\040\064\063\063\071\071\070\071\060  
\063\061\046\060\044\006\003\125\004\003\014\035\103\145\162\164  
\151\156\157\155\151\163\040\055\040\101\165\164\157\162\151\164  
\303\251\040\122\141\143\151\156\145\060\202\002\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017  
\000\060\202\002\012\002\202\002\001\000\235\205\237\206\323\343  
\257\307\262\153\156\063\340\236\267\102\064\125\235\371\201\276  
\143\330\043\166\016\227\124\315\231\114\032\361\071\307\210\330  
\027\120\014\236\141\332\300\116\125\336\347\132\270\172\116\167  
\207\015\345\270\353\372\236\136\173\036\304\317\050\164\307\223  
\365\024\306\042\050\004\371\221\303\253\047\163\152\016\056\115  
\363\056\050\037\160\337\125\057\116\355\307\161\157\011\162\056  
\355\325\062\227\320\361\130\167\321\140\274\116\136\333\232\204  
\366\107\141\105\053\366\120\246\177\152\161\047\110\204\065\236  
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CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Certinomis - Autorité Racine"

# Issuer: CN=Certinomis - Autorité Racine,OU=0002 433998903,O=Certinomis,C=FR

#

Serial Number: 1 (0x1)

# Subject: CN=Certinomis - Autorité Racine,OU=0002 433998903,O=Certinomis,C=FR

# Not Valid Before: Wed Sep 17 08:28:59 2008

# Not Valid After: Sun Sep 17 08:28:59 2028

# Fingerprint (MD5): 7f:30:78:8c:03:e3:ca:c9:0a:e2:c9:ea:1e:aa:55:1a

# Fingerprint (SHA1): 2e:14:da:ec:28:f0:fa:1e:8e:38:9a:4e:ab:eb:26:c0:0a:d3:83:c3

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CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certinomis - Autorité Racine"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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CKA\_ISSUER MULTILINE\_OCTAL

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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "ANF Server CA"
Issuer: CN=ANF Server CA,2.5.4.5=G63287510,OU=ANF Clase 1 CA,O=ANF Autoridad de
Certificación,L=Barcelona (see current address at https://www.anf.es/address/),ST=Barcelona,C=ES
Serial Number: 78923 (0x1344b)
Subject: CN=ANF Server CA,2.5.4.5=G63287510,OU=ANF Clase 1 CA,O=ANF Autoridad de
Certificación,L=Barcelona (see current address at https://www.anf.es/address/),ST=Barcelona,C=ES
Not Valid Before: Mon Nov 30 23:00:00 2009
Not Valid After: Tue
Nov 30 23:00:00 2021
Fingerprint (MD5): 8c:18:ed:28:bf:45:19:e6:49:98:e1:35:22:2f:54:c6
Fingerprint (SHA1): ce:a9:89:0d:85:d8:07:53:a6:26:28:6c:da:d7:8c:b5:66:d7:0c:f2
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANF Server CA"
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CKA_SUBJECT MULTILINE_OCTAL
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\154\157\156\141\061\107\060\105\006\003\125\004\007\014\076\102
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UTF8 "0"
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CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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CKA\_VALUE MULTILINE\_OCTAL

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\305\034\201\001\167\307\034\021\037\124\060\357\124\217\045\372  
\211\047\224\064\243\017\024\117\157\351\163\331\030\142\347\356  
\010\350\311\203\173\310\063\233\174\104\232\174\032\220\265\322  
\161\211\337\075\364\034\117\116\121\340\311\153\266\252\013\036  
\331\060\017\323\143\325\355\160\364\301\203\355\006\105\232\250  
\352\264\211\067\375\132\067\107\357\221\171\247\065\377\360\334  
\060\355\015\024\147\333\174\132\340\217\155\063\376\074\236\025  
\063\303\303\055\016\135\252\174\015\216\061\226\115\213\377\005  
\325

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ANF Server CA"

# Issuer: CN=ANF Server CA,2.5.4.5=G63287510,OU=ANF Clase 1 CA,O=ANF Autoridad de  
Certificación,L=Barcelona (see current address at <https://www.anf.es/address/>),ST=Barcelona,C=ES

# Serial Number: 78923 (0x1344b)

# Subject: CN=ANF Server CA,2.5.4.5=G63287510,OU=ANF Clase 1 CA,O=ANF Autoridad de  
Certificación,L=Barcelona (see current address at <https://www.anf.es/address/>),ST=Barcelona,C=ES

# Not Valid Before: Mon Nov 30 23:00:00 2009

# Not Valid After: Tue Nov 30 23:00:00 2021

# Fingerprint (MD5): 8c:18:ed:28:bf:45:19:e6:49:98:e1:35:22:2f:54:c6

#

Fingerprint (SHA1): ce:a9:89:0d:85:d8:07:53:a6:26:28:6c:da:d7:8c:b5:66:d7:0c:f2

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

```

CKA_LABEL UTF8 "ANF Server CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\316\251\211\015\205\330\007\123\246\046\050\154\332\327\214\265
\146\327\014\362
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\214\030\355\050\277\105\031\346\111\230\341\065\042\057\124\306
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\331\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\022\060\020\006\003\125\004\010\014\011\102\141\162\143\145
\154\157\156\141\061\107\060\105\006\003\125\004\007\014\076\102
\141\162\143\145\154\157\156\141\040\050\163\145\145\040\143\165
\162\162\145\156\164\040\141\144\144\162\145\163\163\040\141\164
\040\150\164\164\160\163\072\057\057\167\167\167\056\141\156\146
\056\145\163\057\141\144\144\162\145\163\163\057\051\061\050\060
\046\006\003\125\004\012\014\037\101\116\106\040\101\165\164\157
\162\151\144\141\144\040\144\145\040\103\145\162\164\151\146\151
\143\141\143\151\303\263\156\061\027\060\025\006\003\125\004\013
\014\016\101\116\106\040\103\154\141\163\145\040\061\040\103\101
\061\022\060\020\006\003\125\004\005\023\011\107\066\063\062\070
\067\065\061\060\061\026\060\024\006\003\125\004\003\014\015\101
\116\106\040\123\145\162\166\145\162\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\001\064\113
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "KEYNECTIS ROOT CA"
Issuer: CN=KEYNECTIS ROOT CA,OU=ROOT,O=KEYNECTIS,C=FR
Serial Number:11:21:bc:27:6c:55:47:af:58:4e:ef:d4:ce:d6:29:b2:a2:85
Subject: CN=KEYNECTIS ROOT CA,OU=ROOT,O=KEYNECTIS,C=FR
Not Valid Before: Tue May 26 00:00:00 2009
Not Valid After: Tue
 May 26 00:00:00 2020
Fingerprint (MD5): cc:4d:ae:fb:30:6b:d8:38:fe:50:eb:86:61:4b:d2:26
Fingerprint (SHA1): 9c:61:5c:4d:4d:85:10:3a:53:26:c2:4d:ba:ea:e4:a2:d2:d5:cc:97
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "KEYNECTIS ROOT CA"

```

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\114\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\022\060\020\006\003\125\004\012\023\011\113\105\131\116\105\103  
\124\111\123\061\015\060\013\006\003\125\004\013\023\004\122\117  
\117\124\061\032\060\030\006\003\125\004\003\023\021\113\105\131  
\116\105\103\124\111\123\040\122\117\117\124\040\103\101

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\114\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\022\060\020\006\003\125\004\012\023\011\113\105\131\116\105\103  
\124\111\123\061\015\060\013\006\003\125\004\013\023\004\122\117  
\117\124\061\032\060\030\006\003\125\004\003\023\021\113\105\131  
\116\105\103\124\111\123\040\122\117\117\124\040\103\101

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\022\021\041\274\047\154\125\107\257\130\116\357\324\316\326  
\051\262\242\205

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\345\060\202\002\315\240\003\002\001\002\002\022\021  
\041\274\047\154\125\107\257\130\116\357\324\316\326\051\262\242  
\205\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000  
\060\114\061\013\060\011\006\003\125\004\006\023\002\106\122\061  
\022\060\020\006\003\125\004\012\023\011\113\105\131\116\105\103  
\124\111\123\061\015\060\013\006\003\125\004\013\023\004\122\117  
\117\124\061\032\060\030\006\003\125\004\003\023\021\113\105\131  
\116\105\103\124\111\123\040\122\117\117\124\040\103\101\060\036  
\027\015\060\071\060\065\062\066\060\060\060\060\060\132\027  
\015\062\060\060\065\062\066\060\060\060\060\060\132\060\114  
\061\013\060\011\006\003\125\004\006\023\002\106\122\061\022\060  
\020\006\003\125\004\012\023\011\113\105\131\116\105\103\124\111  
\123\061\015\060\013\006\003\125\004\013\023\004\122\117\117\124  
\061\032\060\030\006\003\125\004\003\023\021\113\105\131\116\105  
\103\124\111\123\040\122\117\117\124\040\103\101\060\202\001\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\001\017\000\060\202\001\012\002\202\001\001\000\306\375\263  
\027\205\241\255\046\033\225\151\065\041\075\244\210\372\336\333  
\140\066\100\027\151\302\024\143\373\270\331\302\164\025\067\056  
\234\320\040\315\151\215\204\062\242\205\114\024\264\233\362\045  
\263\124\052\203\077\055\276\017\363\073\144\321\377\240\120\357  
\167\117\073\116\341\077\013\144\205\232\272\130\176\322\303\142  
\323\144\045\242\324\262\227\074\167\135\143\052\063\222\374\315  
\202\015\233\124\225\207\365\265\353\214\315\133\321\312\060\057  
\311\210\106\265\315\015\021\264\030\217\356\321\241\076\135\025  
\350\050\317\337\303\220\233\154\314\321\014\105\167\263\072\353



\212\220\035\351\257\144\152\211\173\251\075\103\164\372\344\147  
\042\241\373\334\115\304\365\142\311\312\045\264\311\200\140\063  
\251\335\173\240\002\277\226\045\012\136\311\137\051\173\264\027  
\201\213\155\201\031\320\331\203\134\005\217\101\151\032\151\103  
\200\237\250\257\340\351\214\221\213\047\053\242\046\140\315\017  
\362\244\243\002\203\216\030\201\302\027\212\103\025\371\155\363  
\035\020\244\132\234\104\141\043\041\172\330\373\321\002\003\001  
\000\001\243\201\300\060\201\275\060\022\006\003\125\035\023\001  
\001\377\004\010\060\006\001\001\377\002\001\004\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\127\006\003  
\125\035\037\004\120\060\116\060\114\240\112\240\110\206\106\150  
\164\164\160\072\057\057\164\162\165\163\164\143\145\156\164\145  
\162\055\143\162\154\056\143\145\162\164\151\146\151\143\141\164  
\062\056\143\157\155\057\113\145\171\156\145\143\164\151\163\057  
\113\105\131\116\105\103\124\111\123\137\122\117\117\124\137\103  
\101\056\143\162\154\060\035\006\003\125\035\016\004\026\004\024  
\357\267\043\227\320\250\221\177\246\317\246\041\300\064\237\314  
\167\101\341\320\060\037\006\003\125\035\043\004\030\060\026\200  
\024\357\267\043\227\320\250\221\177\246\317\246\041\300\064\237  
\314\167\101\341\320\060\015\006\011\052\206\110\206\367\015\001  
\001\013\005\000\003\202\001\001\000\032\061\151\231\102\302\345  
\100\205\242\237\222\303\143\324\217\041\071\250\031\041\376\172  
\374\303\115\100\363\053\350\113\254\133\114\131\223\306\334\176  
\013\257\174\137\225\205\153\275\307\157\272\301\276\370\306\072  
\147\113\223\306\005\151\076\044\055\360\033\221\306\076\077\354  
\102\030\223\154\003\044\212\156\371\040\147\053\174\155\253\064  
\311\052\042\063\015\327\175\217\356\322\066\144\102\310\065\232  
\156\031\141\313\215\147\360\150\247\320\044\005\346\303\027\272  
\105\256\174\103\265\200\170\003\115\040\163\005\374\103\020\235  
\065\151\102\165\224\045\202\053\246\073\220\030\336\301\251\257  
\363\055\225\277\225\247\317\030\227\341\131\342\242\257\032\026  
\141\015\367\023\161\123\223\067\375\074\257\000\035\154\213\024  
\257\106\226\214\266\122\174\314\055\116\315\341\351\113\012\356  
\232\376\172\230\347\051\272\033\332\034\272\334\153\315\004\016  
\046\100\251\353\163\074\376\120\250\021\047\125\275\333\216\113  
\357\117\030\355\025\377\275\206\230\146\356\232\045\161\064\154  
\120\361\262\121\313\146\235\115\051

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "KEYNECTIS ROOT CA"

# Issuer: CN=KEYNECTIS ROOT CA,OU=ROOT,O=KEYNECTIS,C=FR

# Serial Number:11:21:bc:27:6c:55:47:af:58:4e:ef:d4:ce:d6:29:b2:a2:85

# Subject: CN=KEYNECTIS ROOT CA,OU=ROOT,O=KEYNECTIS,C=FR

```
Not Valid Before: Tue May 26 00:00:00 2009
Not Valid After: Tue May 26 00:00:00 2020
Fingerprint (MD5): cc:4d:ae:fb:30:6b:d8:38:fe:50:eb:86:61:4b:d2:26
Fingerprint (SHA1): 9c:61:5c:4d:4d:85:10:3a:53:26:c2:4d:ba:ea:e4:a2:d2:d5:cc:97
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "KEYNECTIS ROOT CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\234\141\134\115\115\205\020\072\123\046\302\115\272\352\344\242
\322\325\314\227
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\314\115\256\373\060\153\330\070\376\120\353\206\141\113\322\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\023\011\113\105\131\116\105\103
\124\111\123\061\015\060\013\006\003\125\004\013\023\004\122\117
\117\124\061\032\060\030\006\003\125\004\003\023\021\113\105\131
\116\105\103\124\111\123\040\122\117\117\124\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\041\274\047\154\125\107\257\130\116\357\324\316\326
\051\262\242\205
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "I.CA - Standard Certification Authority, 09/2009"
Issuer: OU=I.CA - Provider of Certification Services,O=První certifikační autorita\, a.s.,CN=I.CA - Standard
Certification Authority\, 09/2009,C=CZ
Serial Number:16:e3:60
Subject: OU=I.CA - Provider of Certification Services,O=První certifikační autorita\, a.s.,CN=I.CA - Standard
Certification Authority\, 09/2009,C=CZ
Not Valid Before: Tue Sep 01 00:00:00 2009
Not Valid After: Sun Sep 01 00:00:00 2019
Fingerprint (MD5): 86:ef:8e:31:9d:9f:85:69:a2:a4:1a:12:71:68:ba:1b
Fingerprint (SHA1): 90:de:ce:77:f8:c8:25:34:0e:62:eb:d6:35:e1:be:20:cf:73:27:dd
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
```

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "I.CA - Standard Certification Authority, 09/2009"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509  
CKA\_SUBJECT MULTILINE\_OCTAL  
\060\201\253\061\013\060\011\006\003\125\004\006\023\002\103\132  
\061\071\060\067\006\003\125\004\003\014\060\111\056\103\101\040  
\055\040\123\164\141\156\144\141\162\144\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053\006  
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162  
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157  
\162\151\164\141\054\040\141\056\163\056\061\062\060\060\006\003  
\125\004\013\014\051\111\056\103\101\040\055\040\120\162\157\166  
\151\144\145\162\040\157\146\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\123\145\162\166\151\143\145\163

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\253\061\013\060\011\006\003\125\004\006\023\002\103\132  
\061\071\060\067\006\003\125\004\003\014\060\111\056\103\101\040  
\055\040\123\164\141\156\144\141\162\144\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053\006  
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162  
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157  
\162\151\164\141\054\040\141\056\163\056\061\062\060\060\006\003  
\125\004\013\014\051\111\056\103\101\040\055\040\120\162\157\166  
\151\144\145\162\040\157\146\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\123\145\162\166\151\143\145\163

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\003\026\343\140

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\052\060\202\003\022\240\003\002\001\002\002\003\026  
\343\140\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\060\201\253\061\013\060\011\006\003\125\004\006\023\002\103  
\132\061\071\060\067\006\003\125\004\003\014\060\111\056\103\101  
\040\055\040\123\164\141\156\144\141\162\144\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053  
\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145  
\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164  
\157\162\151\164\141\054\040\141\056\163\056\061\062\060\060\006  
\003\125\004\013\014\051\111\056\103\101\040\055\040\120\162\157  
\166\151\144\145\162\040\157\146\040\103\145\162\164\151\146\151

\143\141\164\151\157\156\040\123\145\162\166\151\143\145\163\060  
\036\027\015\060\071\060\071\060\061\060\060\060\060\060\060\132  
\027\015\061\071\060\071\060\061\060\060\060\060\060\132\060  
\201\253\061\013\060\011\006\003\125\004\006\023\002\103\132\061  
\071\060\067\006\003\125\004\003\014\060\111\056\103\101\040\055  
\040\123\164\141\156\144\141\162\144\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
\171\054\040\060\071\057\062\060\060\071\061\055\060\053\006\003  
\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162\164  
\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157\162  
\151\164\141\054\040\141\056\163\056\061\062\060\060\006\003\125  
\004\013\014\051\111\056\103\101\040\055\040\120\162\157\166\151  
\144\145\162\040\157\146\040\103\145\162\164\151\146\151\143\141  
\164\151\157\156\040\123\145\162\166\151\143\145\163\060\202\001  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\250\010  
\126\022\077\373\224\203\251\140\166\275\105\203\176\226\064\074  
\317\111\116\326\317\374\040\341\341\261\002\024\155\255\312\176  
\120\162\051\251\375\234\167\046\070\144\367\103\101\077\024\202  
\004\242\101\220\002\347\231\367\203\142\170\104\205\350\235\005  
\160\324\376\170\241\164\064\307\254\073\205\002\335\356\121\133  
\106\073\123\063\326\147\354\354\024\056\343\304\345\263\164\203  
\000\314\306\226\346\034\203\332\334\030\120\151\372\335\103\321  
\216\100\375\026\244\267\214\145\207\340\276\254\227\037\260\161  
\353\000\145\127\026\316\154\207\257\227\210\360\135\367\207\115  
\072\021\012\242\302\104\024\300\026\362\117\365\333\225\102\257  
\051\263\051\240\203\121\156\376\074\121\127\223\060\045\046\272  
\073\152\206\310\366\013\321\161\077\234\267\072\310\316\147\011  
\214\372\100\033\172\154\336\310\034\240\306\134\273\141\030\210  
\077\056\131\035\126\374\172\105\234\246\331\070\331\305\140\314  
\271\101\125\267\312\274\115\356\264\247\304\366\240\016\274\211  
\305\001\225\261\134\337\117\360\314\302\315\102\273\137\002\003  
\001\000\001\243\125\060\123\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\021\006\003\125\035\040\004  
\012\060\010\060\006\006\004\125\035\040\000\060\035\006\003\125  
\035\016\004\026\004\024\301\114\070\224\325\200\206\110\331\042  
\220\054\323\356\031\020\333\147\107\207\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\003\202\001\001\000\243\313  
\321\175\164\373\065\170\007\222\350\356\150\351\344\122\136\360  
\330\143\221\224\237\150\373\276\133\272\251\341\143\167\253\120  
\166\306\351\126\107\124\120\231\264\045\213\350\301\031\162\066  
\132\011\276\347\326\372\302\266\062\075\107\303\120\116\231\156  
\223\066\305\212\121\167\143\340\111\063\253\074\037\212\351\073  
\331\206\265\050\307\302\165\161\133\146\152\215\130\016\363\165  
\220\265\255\054\201\030\315\234\330\303\315\117\361\373\151\040  
\227\300\110\317\023\105\022\265\034\366\076\203\342\116\136\335  
\131\306\153\112\340\110\316\331\052\235\145\072\275\057\360\360

```
\114\274\011\172\313\067\000\244\077\073\014\043\335\343\373\306
\102\242\264\266\346\322\162\205\114\337\263\336\026\247\176\035
\347\324\317\255\253\263\120\344\160\214\337\260\160\220\311\206
\236\356\174\204\213\144\034\153\341\150\025\176\311\245\164\340
\116\367\132\352\335\022\061\253\221\100\205\161\013\316\051\050
\371\156\070\024\134\035\376\354\021\277\115\103\176\236\137\070
\277\327\352\236\223\057\320\035\164\265\005\011\323\042
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "I.CA - Standard Certification Authority, 09/2009"

# Issuer: OU=I.CA - Provider of Certification Services,O=První certifikační autorita, a.s.,CN=I.CA - Standard Certification Authority, 09/2009,C=CZ

# Serial Number:16:e3:60

# Subject: OU=I.CA - Provider of Certification Services,O=První certifikační autorita, a.s.,CN=I.CA - Standard Certification Authority, 09/2009,C=CZ

# Not Valid Before: Tue Sep 01 00:00:00 2009

# Not Valid After: Sun Sep 01 00:00:00 2019

# Fingerprint (MD5): 86:ef:8e:31:9d:9f:85:69:a2:a4:1a:12:71:68:ba:1b

# Fingerprint (SHA1): 90:de:ce:77:f8:c8:25:34:0e:62:eb:d6:35:e1:be:20:cf:73:27:dd

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "I.CA - Standard Certification Authority, 09/2009"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\220\336\316\167\370\310\045\064\016\142\353\326\065\341\276\040
\317\163\047\335
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\206\357\216\061\235\237\205\151\242\244\032\022\161\150\272\033
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\253\061\013\060\011\006\003\125\004\006\023\002\103\132
\061\071\060\067\006\003\125\004\003\014\060\111\056\103\101\040
\055\040\123\164\141\156\144\141\162\144\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056\061\062\060\060\006\003
\125\004\013\014\051\111\056\103\101\040\055\040\120\162\157\166
```

\151\144\145\162\040\157\146\040\103\145\162\164\151\146\151\143

\141\164\151\157\156\040\123\145\162\166\151\143\145\163

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\003\026\343\140

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "I.CA - Qualified Certification Authority, 09/2009"

# Issuer: OU=I.CA - Accredited Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA - Qualified Certification Authority\, 09/2009,C=CZ

# Serial Number:a0:37:a0

# Subject: OU=I.CA - Accredited Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA - Qualified Certification Authority\, 09/2009,C=CZ

# Not Valid Before: Tue Sep 01 00:00:00 2009

# Not Valid After: Sun Sep 01 00:00:00 2019

# Fingerprint (MD5): 8d:63:9b:56:c1:14:e4:ee:9a:12:85:86:11:90:82:a3

# Fingerprint (SHA1): d2:44:1a:a8:c2:03:ae:ca:a9:6e:50:1f:12:4d:52:b6:8f:e4:c3:75

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "I.CA - Qualified

Certification Authority, 09/2009"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\267\061\013\060\011\006\003\125\004\006\023\002\103\132

\061\072\060\070\006\003\125\004\003\014\061\111\056\103\101\040

\055\040\121\165\141\154\151\146\151\145\144\040\103\145\162\164

\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162

\151\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053

\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145

\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164

\157\162\151\164\141\054\040\141\056\163\056\061\075\060\073\006

\003\125\004\013\014\064\111\056\103\101\040\055\040\101\143\143

\162\145\144\151\164\145\144\040\120\162\157\166\151\144\145\162

\040\157\146\040\103\145\162\164\151\146\151\143\141\164\151\157

\156\040\123\145\162\166\151\143\145\163

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\267\061\013\060\011\006\003\125\004\006\023\002\103\132

\061\072\060\070\006\003\125\004\003\014\061\111\056\103\101\040

\055\040\121\165\141\154\151\146\151\145\144\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053  
\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145  
\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164  
\157\162\151\164\141\054\040\141\056\163\056\061\075\060\073\006  
\003\125\004\013\014\064\111\056\103\101\040\055\040\101\143\143  
\162\145\144\151\164\145\144\040\120\162\157\166\151\144\145\162  
\040\157\146\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\123\145\162\166\151\143\145\163

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\004\000\240\067\240

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\036\060\202\004\006\240\003\002\001\002\002\004\000  
\240\067\240\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\060\201\267\061\013\060\011\006\003\125\004\006\023\002  
\103\132\061\072\060\070\006\003\125\004\003\014\061\111\056\103  
\101\040\055\040\121\165\141\154\151\146\151\145\144\040\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150  
\157\162\151\164\171\054\040\060\071\057\062\060\060\071\061\055  
\060\053\006\003\125\004\012\014\044\120\162\166\156\303\255\040  
\143\145\162\164\151\146\151\153\141\304\215\156\303\255\040\141  
\165\164\157\162\151\164\141\054\040\141\056\163\056\061\075\060  
\073\006\003\125\004\013\014\064\111\056\103\101\040\055\040\101  
\143\143\162\145\144\151\164\145\144\040\120\162\157\166\151\144  
\145\162\040\157\146\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\123\145\162\166\151\143\145\163\060\036\027\015  
\060\071\060\071\060\061\060\060\060\060\060\132\027\015\061  
\071\060\071\060\061\060\060\060\060\060\132\060\201\267\061  
\013\060\011\006\003\125\004\006\023\002\103\132\061\072\060\070  
\006\003\125\004\003\014\061\111\056\103\101\040\055\040\121\165  
\141\154\151\146\151\145\144\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\054  
\040\060\071\057\062\060\060\071\061\055\060\053\006\003\125\004  
\012\014\044\120\162\166\156\303\255\040\143\145\162\164\151\146  
\151\153\141\304\215\156\303\255\040\141\165\164\157\162\151\164  
\141\054\040\141\056\163\056\061\075\060\073\006\003\125\004\013  
\014\064\111\056\103\101\040\055\040\101\143\143\162\145\144\151  
\164\145\144\040\120\162\157\166\151\144\145\162\040\157\146\040  
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145  
\162\166\151\143\145\163\060\202\001\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202  
\001\012\002\202\001\001\000\265\066\204\313\102\202\360\317\145  
\342\124\232\130\163\054\343\353\025\127\122\360\317\042\130\210  
\204\015\170\052\357\324\161\346\375\212\106\041\326\077\147\256

\064\161\346\247\222\064\057\041\176\346\333\160\112\340\344\202  
\350\243\274\221\226\000\337\072\051\073\076\206\024\043\212\127  
\143\357\056\351\033\163\347\066\212\141\172\220\261\304\277\252  
\215\003\305\261\204\366\321\337\022\260\224\160\360\007\154\241  
\133\072\073\127\164\025\200\064\106\363\173\056\202\244\047\264  
\246\002\334\271\345\114\146\311\244\323\376\003\076\366\202\223  
\275\000\165\047\374\200\141\026\116\044\261\317\045\141\055\213  
\364\140\262\364\053\046\164\244\201\077\277\051\367\017\013\307  
\273\303\056\251\003\202\335\177\314\032\334\121\151\222\111\276  
\300\023\360\117\021\343\053\311\005\165\041\322\072\236\121\247  
\006\025\244\134\346\037\350\144\235\153\042\160\363\246\355\273  
\020\273\276\040\312\066\266\351\343\201\343\101\026\222\306\172  
\172\073\167\255\243\134\170\015\370\230\167\017\330\154\221\136  
\354\110\344\305\044\001\313\002\003\001\000\001\243\202\001\056  
\060\202\001\052\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\201\347\006\003\125\035\040\004\201\337  
\060\201\334\060\201\331\006\004\125\035\040\000\060\201\320\060  
\201\315\006\010\053\006\001\005\005\007\002\002\060\201\300\032  
\201\275\124\145\156\164\157\040\143\145\162\164\151\146\151\153  
\141\164\040\152\145\040\166\171\144\141\156\040\152\141\153\157  
\040\153\166\141\154\151\146\151\153\157\166\141\156\171\040\163  
\171\163\164\145\155\157\166\171\040\143\145\162\164\151\146\151  
\153\141\164\040\160\157\144\154\145\040\172\141\153\157\156\141  
\040\143\056\040\062\062\067\057\062\060\060\060\040\123\142\056  
\040\166\040\160\154\141\164\156\145\155\040\172\156\145\156\151  
\057\124\150\151\163\040\151\163\040\161\165\141\154\151\146\151  
\145\144\040\163\171\163\164\145\155\040\143\145\162\164\151\146  
\151\143\141\164\145\040\141\143\143\157\162\144\151\156\147\040  
\164\157\040\103\172\145\143\150\040\101\143\164\040\116\157\056  
\040\062\062\067\057\062\060\060\060\040\103\157\154\154\056\060  
\035\006\003\125\035\016\004\026\004\024\171\313\320\043\351\072  
\147\160\221\164\117\323\121\342\340\040\375\341\050\373\060\015  
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001  
\001\000\175\225\245\066\327\210\130\150\021\317\145\373\133\015  
\057\366\164\201\213\131\331\235\111\270\365\071\226\311\360\262  
\017\004\314\130\214\372\004\062\254\300\107\276\055\303\336\223  
\213\246\226\105\256\126\164\345\232\113\242\077\252\046\304\050  
\126\141\044\005\127\137\231\244\307\147\260\030\122\311\373\101  
\250\371\344\361\236\062\316\236\025\105\331\135\254\373\236\333  
\233\307\074\217\257\333\113\242\043\350\073\051\160\161\030\245  
\370\343\207\256\041\023\152\364\151\052\131\016\061\263\050\123  
\072\142\232\254\010\223\174\251\207\266\137\132\246\030\302\320  
\302\363\135\214\157\247\077\060\211\070\353\224\023\052\110\132  
\336\171\345\220\313\136\244\271\027\266\143\006\071\137\310\066  
\143\021\364\266\022\317\110\166\211\074\152\127\371\353\163\042  
\367\372\076\005\256\072\300\306\016\222\115\317\324\211\124\321  
\032\202\152\067\133\226\050\250\000\042\203\316\320\052\271\263



```
\215\123\130\056\145\134\325\362\333\214\001\045\163\154\227\213
\374\140\001\354\100\223\301\355\121\270\252\313\142\330\045\060
\242\075
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "I.CA - Qualified Certification Authority, 09/2009"

# Issuer: OU=I.CA - Accredited Provider of Certification Services,O=První certifikační autorita\, a.s.,CN=I.CA -  
Qualified Certification Authority\, 09/2009,C=CZ

# Serial Number:a0:37:a0

# Subject: OU=I.CA - Accredited Provider of Certification Services,O=První certifikační autorita\, a.s.,CN=I.CA -  
Qualified Certification Authority\, 09/2009,C=CZ

# Not Valid Before: Tue Sep 01 00:00:00 2009

# Not Valid After: Sun Sep 01 00:00:00 2019

# Fingerprint (MD5): 8d:63:9b:56:c1:14:e4:ee:9a:12:85:86:11:90:82:a3

# Fingerprint (SHA1): d2:44:1a:a8:c2:03:ae:ca:a9:6e:50:1f:12:4d:52:b6:8f:e4:c3:75

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL

CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "I.CA - Qualified Certification Authority, 09/2009"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\322\104\032\250\302\003\256\312\251\156\120\037\022\115\122\266
\217\344\303\165
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\215\143\233\126\301\024\344\356\232\022\205\206\021\220\202\243
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\267\061\013\060\011\006\003\125\004\006\023\002\103\132
\061\072\060\070\006\003\125\004\003\014\061\111\056\103\101\040
\055\040\121\165\141\154\151\146\151\145\144\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053
\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145
\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164
\157\162\151\164\141\054\040\141\056\163\056\061\075\060\073\006
\003\125\004\013\014\064\111\056\103\101\040\055\040\101\143\143
\162\145\144\151\164\145\144\040\120\162\157\166\151\144\145\162
\040\157\146\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\123\145\162\166\151\143\145\163
```

END

CKA\_SERIAL\_NUMBER

```

MULTILINE_OCTAL
\002\004\000\240\067\240
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "VI Registru Centras RCSC (RootCA)"
Issuer: CN=VI Registru Centras RCSC (RootCA),OU=Registru Centro Sertifikavimo Centras,O=VI Registru
Centras - I.k. 124110246,C=LT
Serial Number:03:a3:a4:57:b5:f0:f3:86:4a:11:63:e8:98:ff:16:9c
Subject: CN=VI Registru Centras RCSC (RootCA),OU=Registru Centro Sertifikavimo Centras,O=VI Registru
Centras - I.k. 124110246,C=LT
Not Valid Before: Mon Jul 21 11:47:46 2008
Not Valid After: Sun Jul 21 11:47:46 2024
Fingerprint (MD5): 41:5b:95:78:0d:d1:c3:a7:dc:d9:ba:fe:e7:27:b6:14
#
Fingerprint (SHA1): 97:1d:34:86:fc:1e:8e:63:15:f7:c6:f2:e1:29:67:c7:24:34:22:14
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VI Registru Centras RCSC (RootCA)"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\114\124
\061\055\060\053\006\003\125\004\012\023\044\126\111\040\122\145
\147\151\163\164\162\165\040\103\145\156\164\162\141\163\040\055
\040\111\056\153\056\040\061\062\064\061\061\060\062\064\066\061
\056\060\054\006\003\125\004\013\023\045\122\145\147\151\163\164
\162\165\040\103\145\156\164\162\157\040\123\145\162\164\151\146
\151\153\141\166\151\155\157\040\103\145\156\164\162\141\163\061
\052\060\050\006\003\125\004\003\023\041\126\111\040\122\145\147
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\040\111\056\153\056\040\061\062\064\061\061\060\062\064\066\061
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "VI Registru Centras RCSC (RootCA)"

# Issuer: CN=VI Registru Centras RCSC (RootCA),OU=Registru Centro Sertifikavimo Centras,O=VI Registru Centras - I.k. 124110246,C=LT

# Serial

Number:03:a3:a4:57:b5:f0:f3:86:4a:11:63:e8:98:ff:16:9c

# Subject: CN=VI Registru Centras RCSC (RootCA),OU=Registru Centro Sertifikavimo Centras,O=VI Registru Centras - I.k. 124110246,C=LT

# Not Valid Before: Mon Jul 21 11:47:46 2008

# Not Valid After: Sun Jul 21 11:47:46 2024

# Fingerprint (MD5): 41:5b:95:78:0d:d1:c3:a7:dc:d9:ba:fe:e7:27:b6:14

# Fingerprint (SHA1): 97:1d:34:86:fc:1e:8e:63:15:f7:c6:f2:e1:29:67:c7:24:34:22:14

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "VI Registru Centras RCSC (RootCA)"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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END

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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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END

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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
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# Microsoft Code Signing Only Certificate

# Certificate "Autoridade Certificadora Raiz Brasileira v1"

# Issuer: CN=Autoridade Certificadora Raiz Brasileira v1,OU=Instituto Nacional de Tecnologia da Informacao - ITI,O=ICP-Brasil,C=BR

# Serial Number: 1 (0x1)

# Subject: CN=Autoridade Certificadora Raiz Brasileira v1,OU=Instituto Nacional de Tecnologia da Informacao - ITI,O=ICP-Brasil,C=BR

# Not Valid Before: Tue Jul 29 19:17:10 2008

# Not Valid After: Thu Jul 29 19:17:10 2021

# Fingerprint (MD5): 93:f1:ad:34:0b:2b:e7:a8:54:60:e2:73:8c:a4:94:31

# Fingerprint (SHA1): 70:5d:2b:45:65:c7:04:7a:54:06:94:a7:9a:f7:ab:b8:42:bd:c1:61

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CKA\_LABEL UTF8 "Autoridade Certificadora Raiz Brasileira v1"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

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END
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\077\006\003\125\035\037\004\070\060\066\060\064\240\062\240\060  
\206\056\150\164\164\160\072\057\057\141\143\162\141\151\172\056  
\151\143\160\142\162\141\163\151\154\056\147\157\166\056\142\162  
\057\114\103\122\141\143\162\141\151\172\166\061\056\143\162\154  
\060\035\006\003\125\035\016\004\026\004\024\102\262\054\134\164  
\001\007\276\233\377\125\063\073\356\051\273\135\221\277\006\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\131\154\212\166\351\031\161\127\203\376\247\364  
\172\017\236\201\320\317\007\034\014\043\351\044\015\121\313\063  
\350\052\011\303\172\377\016\243\200\206\140\301\160\227\340\300  
\012\125\335\244\145\114\217\247\107\260\127\267\363\253\304\303  
\031\343\230\354\015\260\033\121\221\311\331\011\326\351\152\263  
\347\014\260\262\222\207\373\216\115\025\354\022\024\031\170\014  
\142\352\024\071\030\012\305\125\333\123\205\334\173\050\372\025  
\161\243\312\164\045\202\017\147\047\064\327\256\122\023\002\373  
\305\357\232\200\045\245\122\236\071\016\355\072\364\170\007\137  
\325\050\172\012\112\365\320\303\147\367\214\130\027\157\012\000  
\243\046\020\264\140\042\072\112\110\245\332\340\251\204\336\103  
\333\237\103\247\077\050\004\107\222\057\367\347\144\165\041\322  
\117\201\316\252\076\144\016\343\016\255\125\232\176\224\233\064  
\301\320\256\151\116\036\243\331\263\207\127\332\160\302\132\175  
\207\315\371\277\067\336\355\126\065\367\267\042\016\117\222\270  
\077\010\337\234\236\230\136\362\157\271\372\233\054\370\315\105  
\330\162\262\040

END



```

CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
#
Trust for "Autoridade Certificadora Raiz Brasileira v1"
Issuer: CN=Autoridade Certificadora Raiz Brasileira v1,OU=Instituto Nacional de Tecnologia da Informacao -
ITI,O=ICP-Brasil,C=BR
Serial Number: 1 (0x1)
Subject: CN=Autoridade Certificadora Raiz Brasileira v1,OU=Instituto Nacional de Tecnologia da Informacao -
ITI,O=ICP-Brasil,C=BR
Not Valid Before: Tue Jul 29 19:17:10 2008
Not Valid After: Thu Jul 29 19:17:10 2021
Fingerprint (MD5): 93:f1:ad:34:0b:2b:e7:a8:54:60:e2:73:8c:a4:94:31
Fingerprint (SHA1): 70:5d:2b:45:65:c7:04:7a:54:06:94:a7:9a:f7:ab:b8:42:bd:c1:61
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridade Certificadora Raiz Brasileira v1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\160\135\053\105\145\307\004\172\124\006\224\247\232\367\253\270
\102\275\301\141
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\223\361\255\064\013\053\347\250\124\140\342\163\214\244\224\061
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156
\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146
\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141
\163\151\154\145\151\162\141\040\166\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

```

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Actalis Authentication

CA G1"

# Issuer: CN=Actalis Authentication CA G1,O=Actalis S.p.A./03358520967,L=Milano,C=IT

# Serial Number: 1 (0x1)

# Subject: CN=Actalis Authentication CA G1,O=Actalis S.p.A./03358520967,L=Milano,C=IT

# Not Valid Before: Tue Jun 23 14:06:00 2009

# Not Valid After: Sat Jun 25 14:06:00 2022

# Fingerprint (MD5): c2:2a:59:ab:cf:15:2f:4c:f7:e6:31:a3:16:ae:84:0c

# Fingerprint (SHA1): 91:58:c5:ef:98:73:01:a8:90:3c:fd:ab:03:d7:2d:a1:d8:89:09:c9

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Actalis Authentication CA G1"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\152\061\013\060\011\006\003\125\004\006\023\002\111\124\061  
\017\060\015\006\003\125\004\007\014\006\115\151\154\141\156\157  
\061\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154  
\151\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065  
\062\060\071\066\067\061\045\060\043\006\003\125\004\003\014\034  
\101\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151  
\143\141\164\151\157\156\040\103\101\040\107\061

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\152\061\013\060\011\006\003\125\004\006\023\002\111\124\061  
\017\060\015\006\003\125\004\007\014\006\115\151\154\141\156\157  
\061\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154  
\151\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065  
\062\060\071\066\067\061\045\060\043\006\003\125\004\003\014\034  
\101\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151  
\143\141\164\151\157\156\040\103\101\040\107\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\224\060\202\002\174\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\152\061\013\060\011\006\003\125\004\006\023\002\111\124\061\017  
\060\015\006\003\125\004\007\014\006\115\151\154\141\156\157\061  
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151  
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062

\060\071\066\067\061\045\060\043\006\003\125\004\003\014\034\101  
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143  
\141\164\151\157\156\040\103\101\040\107\061\060\036\027\015\060  
\071\060\066\062\063\061\064\060\066\060\060\132\027\015\062\062  
\060\066\062\065\061\064\060\066\060\060\132\060\152\061\013\060  
\011\006\003\125\004\006\023\002\111\124\061\017\060\015\006\003  
\125\004\007\014\006\115\151\154\141\156\157\061\043\060\041\006  
\003\125\004\012\014\032\101\143\164\141\154\151\163\040\123\056  
\160\056\101\056\057\060\063\063\065\070\065\062\060\071\066\067  
\061\045\060\043\006\003\125\004\003\014\034\101\143\164\141\154  
\151\163\040\101\165\164\150\145\156\164\151\143\141\164\151\157  
\156\040\103\101\040\107\061\060\202\001\042\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060  
\202\001\012\002\202\001\001\000\303\034\206\064\077\047\122\102  
\140\272\053\140\320\041\053\311\327\351\100\165\072\154\130\017  
\043\073\317\206\076\324\144\253\156\332\352\310\052\330\225\105  
\337\311\034\322\045\222\236\020\230\132\213\161\151\300\225\351  
\366\153\150\334\367\266\304\015\376\156\365\160\073\301\244\250  
\117\040\242\047\013\237\361\022\165\174\317\256\177\136\313\170  
\002\130\050\327\057\252\333\240\256\164\075\176\253\366\351\162  
\241\052\317\326\220\140\337\340\240\065\312\300\333\004\304\007  
\126\374\146\165\214\216\172\023\241\074\006\153\032\346\177\071  
\234\210\344\204\157\242\342\177\153\237\354\001\252\322\304\313  
\262\354\232\075\270\027\030\254\037\140\231\063\346\353\005\335  
\314\362\151\147\260\016\276\050\044\103\313\055\271\107\204\031  
\371\352\344\361\365\150\364\237\307\173\120\121\257\242\374\157  
\167\210\061\277\222\333\177\234\305\265\254\241\010\230\347\152  
\063\376\321\273\000\341\267\005\010\257\363\246\126\210\066\075  
\343\212\112\342\015\235\200\206\146\237\324\302\243\120\272\034  
\022\327\207\212\061\112\270\025\002\003\001\000\001\243\105\060  
\103\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\022\006\003\125\035\023\001\001\377\004\010\060\006\001  
\001\377\002\001\000\060\035\006\003\125\035\016\004\026\004\024  
\001\273\326\233\126\264\176\346\305\130\335\054\230\364\312\162  
\366\137\063\206\060\015\006\011\052\206\110\206\367\015\001\001  
\005\005\000\003\202\001\001\000\241\040\326\313\242\064\155\074  
\156\341\125\322\112\320\331\272\262\067\121\210\167\047\356\002  
\110\223\105\101\342\165\121\362\031\224\011\240\363\270\175\272  
\003\200\043\240\045\357\001\031\265\331\032\172\055\343\102\212  
\261\206\061\017\226\354\146\204\362\316\043\022\106\226\153\061  
\136\006\272\257\243\122\252\102\040\250\321\256\252\233\337\304  
\027\236\123\160\001\264\251\032\332\150\310\143\017\266\132\163  
\123\321\151\021\006\023\122\347\153\250\005\061\267\260\374\207  
\106\305\165\210\201\361\137\170\002\347\237\255\234\273\124\355  
\137\231\152\067\325\353\125\263\052\300\103\140\121\334\264\161  
\222\046\243\017\314\172\075\334\300\102\211\027\051\010\147\124  
\144\305\371\250\104\274\204\161\130\226\075\147\127\177\273\254  
\220\263\161\042\277\076\272\254\146\046\105\020\263\360\037\072

```
\072\150\245\120\065\312\264\027\221\006\001\054\367\015\260\160
\262\133\126\165\271\167\231\300\331\225\205\002\055\163\146\007
\311\117\231\021\356\133\053\250\343\150\043\005\250\363\004\017
\006\273\037\011\216\306\133\035
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Actalis Authentication CA G1"

# Issuer: CN=Actalis Authentication CA G1,O=Actalis S.p.A./03358520967,L=Milano,C=IT

# Serial Number: 1 (0x1)

# Subject: CN=Actalis Authentication CA G1,O=Actalis S.p.A./03358520967,L=Milano,C=IT

# Not Valid Before: Tue Jun 23 14:06:00 2009

# Not Valid After: Sat Jun 25 14:06:00 2022

# Fingerprint (MD5): c2:2a:59:ab:cf:15:2f:4c:f7:e6:31:a3:16:ae:84:0c

#

Fingerprint (SHA1): 91:58:c5:ef:98:73:01:a8:90:3c:fd:ab:03:d7:2d:a1:d8:89:09:c9

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Actalis Authentication CA G1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\221\130\305\357\230\163\001\250\220\074\375\253\003\327\055\241
\330\211\011\311
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\302\052\131\253\317\025\057\114\367\346\061\243\026\256\204\014
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\152\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\017\060\015\006\003\125\004\007\014\006\115\151\154\141\156\157
\061\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154
\151\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065
\062\060\071\066\067\061\045\060\043\006\003\125\004\003\014\034
\101\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151
\143\141\164\151\157\156\040\103\101\040\107\061
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\001\001
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "A-Trust-Qual-03"

# Issuer: CN=A-Trust-Qual-03,OU=A-Trust-Qual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT

# Serial Number: 255636 (0x3e694)

# Subject: CN=A-Trust-Qual-03,OU=A-Trust-Qual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT

# Not Valid Before: Thu Apr 24 22:00:00 2008

# Not Valid After: Tue Apr 24 22:00:00 2018

# Fingerprint (MD5): d8:7e:32:ef:69:f8:bf:72:03:1d:40:82:e8:a7:75:af

# Fingerprint (SHA1): 42:ef:dd:e6:bf:f3:5e:d0:ba:e6:ac:dd:20:4c:50:ae:86:c4:f4:fa

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "A-Trust-Qual-03"

CKA\_CERTIFICATE\_TYPE

CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124  
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165  
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145  
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155  
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145  
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003  
\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141  
\154\055\060\063\061\030\060\026\006\003\125\004\003\014\017\101  
\055\124\162\165\163\164\055\121\165\141\154\055\060\063

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124  
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165  
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145  
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155  
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145  
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003  
\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141  
\154\055\060\063\061\030\060\026\006\003\125\004\003\014\017\101  
\055\124\162\165\163\164\055\121\165\141\154\055\060\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\003\003\346\224

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\313\060\202\002\263\240\003\002\001\002\002\003\003  
\346\224\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101  
\124\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162  
\165\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150  
\145\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151  
\155\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166  
\145\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006  
\003\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165  
\141\154\055\060\063\061\030\060\026\006\003\125\004\003\014\017  
\101\055\124\162\165\163\164\055\121\165\141\154\055\060\063\060  
\036\027\015\060\070\060\064\062\064\062\062\060\060\060\060\132  
\027\015\061\070\060\064\062\064\062\062\060\060\060\060\132\060  
\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124\061  
\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165\163  
\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145\162  
\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155\040  
\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145\162  
\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003\125  
\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141\154  
\055\060\063\061\030\060\026\006\003\125\004\003\014\017\101\055  
\124\162\165\163\164\055\121\165\141\154\055\060\063\060\202\001  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\263\236  
\044\210\034\322\317\100\003\110\152\252\245\240\053\275\226\365  
\174\012\237\237\253\120\220\333\101\316\126\200\171\052\300\375  
\223\123\172\234\133\363\131\141\044\210\143\243\325\030\356\233  
\204\164\204\234\354\214\075\332\301\206\172\157\066\056\046\353  
\176\075\311\076\255\347\256\113\164\167\050\053\044\040\377\052  
\056\302\225\144\020\366\176\173\303\267\332\021\175\236\253\355  
\057\214\031\242\034\235\214\314\063\160\165\011\007\376\136\373  
\100\244\045\214\057\375\265\121\147\072\250\053\114\237\326\150  
\235\140\233\244\305\143\260\356\160\315\050\077\112\164\352\131  
\371\165\305\000\006\156\037\260\143\301\052\252\023\135\374\313  
\322\145\033\071\061\042\132\302\171\042\135\031\361\113\302\276  
\316\034\210\001\164\361\046\101\167\062\071\306\214\120\150\317  
\123\205\103\212\017\240\217\356\216\013\222\243\000\100\276\300  
\242\131\136\054\241\104\270\376\037\042\323\014\272\320\350\357  
\051\344\162\067\112\213\370\026\354\042\062\007\052\043\054\363  
\243\327\315\312\251\247\117\162\277\274\021\216\250\033\002\003  
\001\000\001\243\066\060\064\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\021\006\003\125\035\016\004  
\012\004\010\106\006\337\067\362\302\067\020\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052  
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\161  
\010\324\046\104\276\200\342\153\102\265\052\120\375\135\350\214  
\140\363\234\266\222\201\162\070\262\157\251\076\201\362\303\064  
\044\123\241\121\122\310\245\211\323\274\334\333\022\271\333\251

```
\260\130\357\300\010\146\062\142\343\341\363\243\130\243\167\156
\356\344\241\273\127\021\150\167\063\010\364\315\131\270\352\135
\033\011\306\254\314\215\013\272\315\337\326\232\276\253\166\000
\255\175\026\113\144\134\337\230\076\153\155\136\054\174\071\025
\131\102\067\040\074\237\303\334\177\365\123\066\267\342\307\244
\042\214\172\276\161\275\115\263\150\310\270\251\211\377\161\060
\213\317\221\155\362\205\056\245\112\042\176\162\336\324\256\261
\355\014\357\374\105\175\055\334\044\255\355\171\007\345\255\117
\262\351\122\164\111\270\214\122\372\275\022\344\031\303\374\121
\215\026\343\153\150\156\071\232\337\051\071\245\273\261\241\027
\301\027\343\165\152\374\175\261\162\074\337\301\352\345\243\034
\324\235\131\033\032\164\037\151\052\203\124\044\030\323\356\345
\340\203\127\276\033\342\320\037\255\154\065\276\215\272\137
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "A-Trust-Qual-03"

# Issuer: CN=A-Trust-Qual-03,OU=A-Trust-Qual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT

# Serial Number: 255636 (0x3e694)

# Subject: CN=A-Trust-Qual-03,OU=A-Trust-Qual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT

# Not Valid Before: Thu Apr 24 22:00:00 2008

# Not Valid After: Tue Apr 24 22:00:00 2018

# Fingerprint (MD5): d8:7e:32:ef:69:f8:bf:72:03:1d:40:82:e8:a7:75:af

# Fingerprint

(SHA1): 42:ef:dd:e6:bf:f3:5e:d0:ba:e6:ac:dd:20:4c:50:ae:86:c4:f4:fa

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "A-Trust-Qual-03"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\102\357\335\346\277\363\136\320\272\346\254\335\040\114\120\256
\206\304\364\372
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\330\176\062\357\151\370\277\162\003\035\100\202\350\247\165\257
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
```

```
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141
\154\055\060\063\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\121\165\141\154\055\060\063
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\003\003\346\224
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "AddTrust External CA Root"

# Issuer: CN=AddTrust External CA Root,OU=AddTrust External TTP Network,O=AddTrust AB,C=SE

# Serial Number: 1 (0x1)

# Subject: CN=AddTrust External CA Root,OU=AddTrust External TTP Network,O=AddTrust AB,C=SE

# Not Valid Before: Tue May 30 10:48:38 2000

# Not Valid After: Sat May 30 10:48:38 2020

# Fingerprint (MD5): 1d:35:54:04:85:78:b0:3f:42:42:4d:bf:20:73:0a:3f

# Fingerprint (SHA1): 02:fa:f3:e2:91:43:54:68:60:78:57:69:4d:f5:e4:5b:68:85:18:68

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL

CK\_FALSE

CKA\_LABEL UTF8 "AddTrust External CA Root"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\024\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165
\163\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035
\101\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141
\154\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060
\040\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164
\040\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157
\164
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\024\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165
\163\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035
\101\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141
\154\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060
```



\040\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164  
\040\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157  
\164  
END  
CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\001\001  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\004\066\060\202\003\036\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061\024  
\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165\163  
\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035\101  
\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141\154  
\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060\040  
\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164\040  
\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157\164  
\060\036\027\015\060\060\060\065\063\060\061\060\064\070\063\070  
\132\027\015\062\060\060\065\063\060\061\060\064\070\063\070\132  
\060\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061  
\024\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165  
\163\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035  
\101\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141  
\154\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060  
\040\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164  
\040\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157  
\164\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001  
\001\000\267\367\032\063\346\362\000\004\055\071\340\116\133\355  
\037\274\154\017\315\265\372\043\266\316\336\233\021\063\227\244  
\051\114\175\223\237\275\112\274\223\355\003\032\343\217\317\345  
\155\120\132\326\227\051\224\132\200\260\111\172\333\056\225\375  
\270\312\277\067\070\055\036\076\221\101\255\160\126\307\360\117  
\077\350\062\236\164\312\310\220\124\351\306\137\017\170\235\232  
\100\074\016\254\141\252\136\024\217\236\207\241\152\120\334\327  
\232\116\257\005\263\246\161\224\234\161\263\120\140\012\307\023  
\235\070\007\206\002\250\351\250\151\046\030\220\253\114\260\117  
\043\253\072\117\204\330\337\316\237\341\151\157\273\327\102\327  
\153\104\344\307\255\356\155\101\137\162\132\161\010\067\263\171  
\145\244\131\240\224\067\367\000\057\015\302\222\162\332\320\070  
\162\333\024\250\105\304\135\052\175\267\264\326\304\356\254\315  
\023\104\267\311\053\335\103\000\045\372\141\271\151\152\130\043  
\021\267\247\063\217\126\165\131\365\315\051\327\106\267\012\053  
\145\266\323\102\157\025\262\270\173\373\357\351\135\123\325\064  
\132\047\002\003\001\000\001\243\201\334\060\201\331\060\035\006  
\003\125\035\016\004\026\004\024\255\275\230\172\064\264\046\367  
\372\304\046\124\357\003\275\340\044\313\124\032\060\013\006\003

\125\035\017\004\004\003\002\001\006\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\201\231\006\003\125  
\035\043\004\201\221\060\201\216\200\024\255\275\230\172\064\264  
\046\367\372\304\046\124\357\003\275\340\044\313\124\032\241\163  
\244\161\060\157\061\013\060\011\006\003\125\004\006\023\002\123  
\105\061\024\060\022\006\003\125\004\012\023\013\101\144\144\124  
\162\165\163\164\040\101\102\061\046\060\044\006\003\125\004\013  
\023\035\101\144\144\124\162\165\163\164\040\105\170\164\145\162  
\156\141\154\040\124\124\120\040\116\145\164\167\157\162\153\061  
\042\060\040\006\003\125\004\003\023\031\101\144\144\124\162\165  
\163\164\040\105\170\164\145\162\156\141\154\040\103\101\040\122  
\157\157\164\202\001\001\060\015\006\011\052\206\110\206\367\015  
\001\001\005\005\000\003\202\001\001\000\260\233\340\205\045\302  
\326\043\342\017\226\006\222\235\101\230\234\331\204\171\201\331  
\036\133\024\007\043\066\145\217\260\330\167\273\254\101\154\107  
\140\203\121\260\371\062\075\347\374\366\046\023\307\200\026\245  
\277\132\374\207\317\170\171\211\041\232\342\114\007\012\206\065  
\274\362\336\121\304\322\226\267\334\176\116\356\160\375\034\071  
\353\014\002\121\024\055\216\275\026\340\301\337\106\165\347\044  
\255\354\364\102\264\205\223\160\020\147\272\235\006\065\112\030  
\323\053\172\314\121\102\241\172\143\321\346\273\241\305\053\302  
\066\276\023\015\346\275\143\176\171\173\247\011\015\100\253\152  
\335\217\212\303\366\366\214\032\102\005\121\324\105\365\237\247  
\142\041\150\025\040\103\074\231\347\174\275\044\330\251\221\027  
\163\210\077\126\033\061\070\030\264\161\017\232\315\310\016\236  
\216\056\033\341\214\230\203\313\037\061\361\104\114\306\004\163  
\111\166\140\017\307\370\275\027\200\153\056\351\314\114\016\132  
\232\171\017\040\012\056\325\236\143\046\036\125\222\224\330\202  
\027\132\173\320\274\307\217\116\206\004

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "AddTrust External CA Root"

# Issuer: CN=AddTrust External CA Root,OU=AddTrust External TTP Network,O=AddTrust AB,C=SE

# Serial Number: 1 (0x1)

# Subject: CN=AddTrust External CA Root,OU=AddTrust External TTP Network,O=AddTrust  
AB,C=SE

# Not Valid Before: Tue May 30 10:48:38 2000

# Not Valid After: Sat May 30 10:48:38 2020

# Fingerprint (MD5): 1d:35:54:04:85:78:b0:3f:42:42:4d:bf:20:73:0a:3f

# Fingerprint (SHA1): 02:fa:f3:e2:91:43:54:68:60:78:57:69:4d:f5:e4:5b:68:85:18:68

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AddTrust External CA Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\002\372\363\342\221\103\124\150\140\170\127\151\115\365\344\133
\150\205\030\150
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\035\065\124\004\205\170\260\077\102\102\115\277\040\163\012\077
END
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\024\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165
\163\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035
\101\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141
\154\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060
\040\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164
\040\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157
\164
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "ECRaizEstado"
Issuer: CN=ECRaizEstado,O=SCEE,C=PT
Serial Number:42:ea:5b:0a:51:11:26:7c:d8:27:74:b7:df:7f:71
Subject: CN=ECRaizEstado,O=SCEE,C=PT
Not Valid Before: Fri Jun 23 13:41:27 2006
Not Valid After: Sun Jun 23 13:41:27 2030
Fingerprint (MD5): c2:db:ab:8e:96:52:c5:ee:ae:f2:55:00:89:6d:55:95
Fingerprint (SHA1): 39:13:85:3e:45:c4:39:a2:da:71:8c:df:b6:f3:e0:33:e0:4f:ee:71

```

```

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "ECRaizEstado"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\063\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\015\060\013\006\003\125\004\012\014\004\123\103\105\105\061\025
\060\023\006\003\125\004\003\014\014\105\103\122\141\151\172\105

```

\163\164\141\144\157

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\063\061\013\060\011\006\003\125\004\006\023\002\120\124\061  
\015\060\013\006\003\125\004\012\014\004\123\103\105\105\061\025  
\060\023\006\003\125\004\003\014\014\105\103\122\141\151\172\105  
\163\164\141\144\157

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\017\102\352\133\012\121\021\046\174\330\047\164\267\337\177  
\161

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\156\060\202\003\126\240\003\002\001\002\002\017\102  
\352\133\012\121\021\046\174\330\047\164\267\337\177\161\060\015  
\006\011\052\206\110\206\367\015\001\001\005\005\000\060\063\061  
\013\060\011\006\003\125\004\006\023\002\120\124\061\015\060\013  
\006\003\125\004\012\014\004\123\103\105\105\061\025\060\023\006  
\003\125\004\003\014\014\105\103\122\141\151\172\105\163\164\141  
\144\157\060\036\027\015\060\066\060\066\062\063\061\063\064\061  
\062\067\132\027\015\063\060\060\066\062\063\061\063\064\061\062  
\067\132\060\063\061\013\060\011\006\003\125\004\006\023\002\120  
\124\061\015\060\013\006\003\125\004\012\014\004\123\103\105\105  
\061\025\060\023\006\003\125\004\003\014\014\105\103\122\141\151  
\172\105\163\164\141\144\157\060\202\002\042\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060  
\202\002\012\002\202\002\001\000\333\357\242\103\156\310\251\375  
\156\327\337\254\242\222\204\241\310\131\240\014\232\123\376\357  
\256\314\031\015\162\212\244\302\063\043\357\347\006\162\352\155  
\113\072\101\122\017\311\110\016\055\347\272\144\356\242\072\114  
\143\134\146\051\213\337\251\210\305\275\350\361\367\216\113\374  
\001\074\104\022\071\052\160\242\300\333\305\242\337\137\307\113  
\306\250\334\075\141\174\112\130\301\104\062\223\336\160\231\241  
\043\046\126\077\243\341\352\137\060\106\330\170\365\060\243\226  
\011\211\260\075\361\206\223\005\266\022\152\030\215\360\245\144  
\073\053\207\144\136\075\027\216\013\156\346\230\314\227\070\070  
\040\214\160\132\151\053\275\145\215\315\067\131\134\154\321\162  
\164\131\006\116\310\267\001\327\167\277\360\110\206\250\263\032  
\135\101\324\067\027\021\020\137\112\156\215\165\305\003\100\175  
\041\256\000\360\333\374\237\154\072\146\244\337\367\312\337\200  
\146\132\331\330\177\024\242\046\031\364\256\013\041\340\312\076  
\005\335\026\330\176\131\332\241\260\151\303\235\064\023\372\145  
\111\071\207\356\166\057\215\275\074\047\031\003\116\255\016\013  
\053\054\306\056\161\023\065\051\127\351\160\334\033\121\352\315  
\227\361\225\215\262\206\372\046\006\057\200\032\225\361\230\073  
\356\366\345\206\245\316\033\001\345\364\351\063\312\017\125\104  
\137\150\212\054\307\133\146\050\335\226\113\203\235\136\035\176

\030\325\376\262\140\373\232\121\150\303\226\214\037\150\113\120  
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\336\365\167\161\155\035\022\234\341\220\244\272\360\251\203\217  
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\366\300\255\222\030\023\214\247\355\035\322\337\003\220\005\354  
\260\223\230\233\367\115\132\023\370\347\233\367\066\166\336\174  
\046\370\021\070\117\111\116\263\163\037\137\047\133\341\236\062  
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\156\377\234\207\355\334\165\313\020\210\340\264\316\056\016\123  
\035\013\350\156\036\102\114\320\276\071\170\165\311\024\336\047  
\221\163\252\354\152\200\360\360\027\226\142\117\276\004\313\342  
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\120\225\021\231\163\321\067\111\012\372\102\117\057\020\124\323  
\101\220\372\310\334\273\021\334\015\314\175\174\233\334\016\221  
\161\206\115\270\362\025\232\053\070\027\021\241\362\236\250\154  
\234\343\316\256\342\346\113\213\362\212\006\073\007\167\002\021  
\356\203\352\235\146\206\312\360\142\251\325\127\203\244\025\361  
\105\024\376\032\165\177\245\017\334\122\164\131\165\012\370\373  
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\115\361\126\070\327\277\100\042\373\040\200\343\034\302\131\106
\007\143\002\141\000\073\233\120\273\103\303\260\351\012\232\270
\166\364\107\141\125\144\160\117\067\331\234\021\243\023\262\341
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\177\272
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ECRaizEstado"

# Issuer: CN=ECRaizEstado,O=SCEE,C=PT

# Serial Number:42:ea:5b:0a:51:11:26:7c:d8:27:74:b7:df:7f:71

# Subject: CN=ECRaizEstado,O=SCEE,C=PT

# Not Valid Before: Fri Jun 23 13:41:27 2006

# Not Valid After: Sun Jun 23 13:41:27 2030

# Fingerprint (MD5): c2:db:ab:8e:96:52:c5:ee:ae:f2:55:00:89:6d:55:95

# Fingerprint (SHA1): 39:13:85:3e:45:c4:39:a2:da:71:8c:df:b6:f3:e0:33:e0:4f:ee:71

CKA\_CLASS CK\_OBJECT\_CLASS

CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ECRaizEstado"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\071\023\205\076\105\304\071\242\332\161\214\337\266\363\340\063
\340\117\356\161
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\302\333\253\216\226\122\305\356\256\362\125\000\211\155\125\225
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END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\063\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\015\060\013\006\003\125\004\012\014\004\123\103\105\105\061\025
\060\023\006\003\125\004\003\014\014\105\103\122\141\151\172\105
\163\164\141\144\157
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END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\017\102\352\133\012\121\021\046\174\330\047\164\267\337\177
\161
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END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

```
Microsoft Code Signing Only Certificate
Certificate "Configuration"
#
Issuer: CN=Posta CA Root,CN=AIA,CN=Public Key
Services,CN=Services,CN=Configuration,DC=ca,DC=posta,DC=rs
Serial Number:48:fc:7e:f5
Subject: CN=Posta CA Root,CN=AIA,CN=Public Key
Services,CN=Services,CN=Configuration,DC=ca,DC=posta,DC=rs
Not Valid Before: Mon Oct 20 12:22:08 2008
Not Valid After: Fri Oct 20 12:52:08 2028
Fingerprint (MD5): 18:02:b0:01:27:03:6a:19:1b:32:3b:83:de:9a:a9:85
Fingerprint (SHA1): d6:bf:79:94:f4:2b:e5:fa:29:da:0b:d7:58:7b:59:1f:47:a4:4f:22
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Configuration"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\256\061\022\060\020\006\012\011\222\046\211\223\362\054
\144\001\031\026\002\162\163\061\025\060\023\006\012\011\222\046
\211\223\362\054\144\001\031\026\005\160\157\163\164\141\061\022
\060\020\006\012\011\222\046\211\223\362\054\144\001\031\026\002
\143\141\061\026\060\024\006\003\125\004\003\023\015\103\157\156
\146\151\147\165\162\141\164\151\157\156\061\021\060\017\006\003
\125\004\003\023\010\123\145\162\166\151\143\145\163\061\034\060
\032\006\003\125\004\003\023\023\120\165\142\154\151\143\040\113
\145\171\040\123\145\162\166\151\143\145\163\061\014\060\012\006
\003\125\004\003\023\003\101\111\101\061\026\060\024\006\003\125
\004\003\023\015\120\157\163\164\141\040\103\101\040\122\157\157
\164
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\022\060\020\006\012\011\222\046\211\223\362\054
\144\001\031\026\002\162\163\061\025\060\023\006\012\011\222\046
\211\223\362\054\144\001\031\026\005\160\157\163\164\141\061\022
\060\020\006\012\011\222\046\211\223\362\054\144\001\031\026\002
\143\141\061\026\060\024\006\003\125\004\003\023\015\103\157\156
\146\151\147\165\162\141\164\151\157\156\061\021\060\017\006\003
\125\004\003\023\010\123\145\162\166\151\143\145\163\061\034\060
\032\006\003\125\004\003\023\023\120\165\142\154\151\143\040\113
\145\171\040\123\145\162\166\151\143\145\163\061\014\060\012\006
\003\125\004\003\023\003\101\111\101\061\026\060\024\006\003\125
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\004\110\374\176\365

END

CKA\_VALUE MULTILINE\_OCTAL

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\005\000\060\201\256\061\022\060\020\006\012\011\222\046\211\223  
\362\054\144\001\031\026\002\162\163\061\025\060\023\006\012\011  
\222\046\211\223\362\054\144\001\031\026\005\160\157\163\164\141  
\061\022\060\020\006\012\011\222\046\211\223\362\054\144\001\031  
\026\002\143\141\061\026\060\024\006\003\125\004\003\023\015\103  
\157\156\146\151\147\165\162\141\164\151\157\156\061\021\060\017  
\006\003\125\004\003\023\010\123\145\162\166\151\143\145\163\061  
\034\060\032\006\003\125\004\003\023\023\120\165\142\154\151\143  
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\012\006\003\125\004\003\023\003\101\111\101\061\026\060\024\006  
\003\125\004\003\023\015\120\157\163\164\141\040\103\101\040\122  
\157\157\164\060\036\027\015\060\070\061\060\062\060\061\062\065\062  
\062\060\070\132\027\015\062\070\061\060\062\060\061\062\065\062  
\060\070\132\060\201\256\061\022\060\020\006\012\011\222\046\211  
\223\362\054\144\001\031\026\002\162\163\061\025\060\023\006\012  
\011\222\046\211\223\362\054\144\001\031\026\005\160\157\163\164  
\141\061\022\060\020\006\012\011\222\046\211\223\362\054\144\001  
\031\026\002\143\141\061\026\060\024\006\003\125\004\003\023\015  
\103\157\156\146\151\147\165\162\141\164\151\157\156\061\021\060  
\017\006\003\125\004\003\023\010\123\145\162\166\151\143\145\163  
\061\034\060\032\006\003\125\004\003\023\023\120\165\142\154\151  
\143\040\113\145\171\040\123\145\162\166\151\143\145\163\061\014  
\060\012\006\003\125\004\003\023\003\101\111\101\061\026\060\024  
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\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003  
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\146\151\147\165\162\141\164\151\157\156\061\021\060\017\006\003  
\125\004\003\023\010\123\145\162\166\151\143\145\163\061\034\060  
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\060\035\006\011\052\206\110\206\366\175\007\101\000\004\020\060  
\016\033\010\126\067\056\061\072\064\056\060\003\002\004\220\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202  
\001\001\000\160\106\241\310\344\027\005\146\017\235\342\103\061  
\110\035\222\220\031\304\205\001\205\026\156\370\222\316\173\256  
\122\026\304\227\215\012\050\175\325\313\154\343\325\345\016\062  
\117\310\150\055\064\010\075\163\250\223\102\051\063\106\014\104  
\147\361\320\232\234\151\001\345\221\361\015\311\151\074\063\113  
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\241\172\002\327\334\377\245\076\124\170\371\323\301\312\022\225  
\371\211\236\024\342\362\241\104\262\313\351\055\165\065\314\226  
\125\273\070\013\210\046\332\326\254\357\323\122\242\013\113\072  
\123\332\113\042\123\314\312\052\044\232\142\252\304\062\232\176  
\334\314\301\262\154\315\217\331\264\300\317\365\002\300\214\053  
\204\133\033\100\274\020\320\120\341\141\326\146\126\232\004\221  
\245\343\325\275\240\056\042\201\261\331\070\332\344\250\207\137  
\074\106\004\226\336\311\232\073\277\255\170\154\035\111\111\264  
\151\271\160\017\005\222\126\266\375\257\256\370\040\055\107\043  
\317\266\034\315\304\233\200\116\371\277\061\300\124\276\273\061  
\177\363\076

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Configuration"

# Issuer: CN=Posta CA Root,CN=AIA,CN=Public Key

Services,CN=Services,CN=Configuration,DC=ca,DC=posta,DC=rs

# Serial Number:48:fc:7e:f5

# Subject: CN=Posta CA Root,CN=AIA,CN=Public Key

Services,CN=Services,CN=Configuration,DC=ca,DC=posta,DC=rs

# Not Valid Before: Mon Oct 20 12:22:08 2008

# Not Valid After: Fri Oct 20 12:52:08 2028

# Fingerprint (MD5): 18:02:b0:01:27:03:6a:19:1b:32:3b:83:de:9a:a9:85

# Fingerprint (SHA1): d6:bf:79:94:f4:2b:e5:fa:29:da:0b:d7:58:7b:59:1f:47:a4:4f:22

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Configuration"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\326\277\171\224\364\053\345\372\051\332\013\327\130\173\131\037  
\107\244\117\042

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\030\002\260\001\047\003\152\031\033\062\073\203\336\232\251\205

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\256\061\022\060\020\006\012\011\222\046\211\223\362\054  
\144\001\031\026\002\162\163\061\025\060\023\006\012\011\222\046  
\211\223\362\054\144\001\031\026\005\160\157\163\164\141\061\022  
\060\020\006\012\011\222\046\211\223\362\054\144\001\031\026\002  
\143\141\061\026\060\024\006\003\125\004\003\023\015\103\157\156  
\146\151\147\165\162\141\164\151\157\156\061\021\060\017\006\003  
\125\004\003\023\010\123\145\162\166\151\143\145\163\061\034\060  
\032\006\003\125\004\003\023\023\120\165\142\154\151\143\040\113  
\145\171\040\123\145\162\166\151\143\145\163\061\014\060\012\006  
\003\125\004\003\023\003\101\111\101\061\026\060\024\006\003\125  
\004\003\023\015\120\157\163\164\141\040\103\101\040\122\157\157  
\164

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\004\110\374\176\365

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "StartCom Certification Authority"

# Issuer: CN=StartCom Certification Authority,OU=Secure

Digital Certificate Signing,O=StartCom Ltd.,C=IL

# Serial Number: 1 (0x1)

# Subject: CN=StartCom Certification Authority,OU=Secure Digital Certificate Signing,O=StartCom Ltd.,C=IL

# Not Valid Before: Sun Sep 17 19:46:36 2006

# Not Valid After: Wed Sep 17 19:46:36 2036

# Fingerprint (MD5): 22:4d:8f:8a:fc:f7:35:c2:bb:57:34:90:7b:8b:22:16

# Fingerprint (SHA1): 3e:2b:f7:f2:03:1b:96:f3:8c:e6:c4:d8:a8:5d:3e:2d:58:47:6a:0f

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "StartCom Certification Authority"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\175\061\013\060\011\006\003\125\004\006\023\002\111\114\061  
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103

\157\155\040\114\164\144\056\061\053\060\051\006\003\125\004\013  
\023\042\123\145\143\165\162\145\040\104\151\147\151\164\141\154  
\040\103\145\162\164\151\146\151\143\141\164\145\040\123\151\147  
\156\151\156\147\061\051\060\047\006\003\125\004\003\023\040\123  
\164\141\162\164\103\157\155\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\175\061\013\060\011\006\003\125\004\006\023\002\111\114\061  
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103  
\157\155\040\114\164\144\056\061\053\060\051\006\003\125\004\013  
\023\042\123\145\143\165\162\145\040\104\151\147\151\164\141\154  
\040\103\145\162\164\151\146\151\143\141\164\145\040\123\151\147  
\156\151\156\147\061\051\060\047\006\003\125\004\003\023\040\123  
\164\141\162\164\103\157\155\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\007\311\060\202\005\261\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\175\061\013\060\011\006\003\125\004\006\023\002\111\114\061\026  
\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103\157  
\155\040\114\164\144\056\061\053\060\051\006\003\125\004\013\023  
\042\123\145\143\165\162\145\040\104\151\147\151\164\141\154\040  
\103\145\162\164\151\146\151\143\141\164\145\040\123\151\147\156  
\151\156\147\061\051\060\047\006\003\125\004\003\023\040\123\164  
\141\162\164\103\157\155\040\103\145\162\164\151\146\151\143\141  
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036  
\027\015\060\066\060\071\061\067\061\071\064\066\063\066\132\027  
\015\063\066\060\071\061\067\061\071\064\066\063\066\132\060\175  
\061\013\060\011\006\003\125\004\006\023\002\111\114\061\026\060  
\024\006\003\125\004\012\023\015\123\164\141\162\164\103\157\155  
\040\114\164\144\056\061\053\060\051\006\003\125\004\013\023\042  
\123\145\143\165\162\145\040\104\151\147\151\164\141\154\040\103  
\145\162\164\151\146\151\143\141\164\145\040\123\151\147\156\151  
\156\147\061\051\060\047\006\003\125\004\003\023\040\123\164\141  
\162\164\103\157\155\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\101\165\164\150\157\162\151\164\171\060\202\002  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\301\210  
\333\011\274\154\106\174\170\237\225\173\265\063\220\362\162\142  
\326\301\066\040\042\044\136\316\351\167\362\103\012\242\006\144  
\244\314\216\066\370\070\346\043\360\156\155\261\074\335\162\243

\205\034\241\323\075\264\063\053\323\057\257\376\352\260\101\131  
\147\266\304\006\175\012\236\164\205\326\171\114\200\067\172\337  
\071\005\122\131\367\364\033\106\103\244\322\205\205\322\303\161  
\363\165\142\064\272\054\212\177\036\217\356\355\064\320\021\307  
\226\315\122\075\272\063\326\335\115\336\013\073\112\113\237\302  
\046\057\372\265\026\034\162\065\167\312\074\135\346\312\341\046  
\213\032\066\166\134\001\333\164\024\045\376\355\265\240\210\017  
\335\170\312\055\037\007\227\060\001\055\162\171\372\106\326\023  
\052\250\271\246\253\203\111\035\345\362\357\335\344\001\216\030  
\012\217\143\123\026\205\142\251\016\031\072\314\265\146\246\302  
\153\164\007\344\053\341\166\076\264\155\330\366\104\341\163\142  
\037\073\304\276\240\123\126\045\154\121\011\367\252\253\312\277  
\166\375\155\233\363\235\333\277\075\146\274\014\126\252\257\230  
\110\225\072\113\337\247\130\120\331\070\165\251\133\352\103\014  
\002\377\231\353\350\154\115\160\133\051\145\234\335\252\135\314  
\257\001\061\354\014\353\322\215\350\352\234\173\346\156\367\047  
\146\014\032\110\327\156\102\343\077\336\041\076\173\341\015\160  
\373\143\252\250\154\032\124\264\134\045\172\311\242\311\213\026  
\246\273\054\176\027\136\005\115\130\156\022\035\001\356\022\020  
\015\306\062\177\030\377\374\364\372\315\156\221\350\066\111\276  
\032\110\151\213\302\226\115\032\022\262\151\027\301\012\220\326  
\372\171\042\110\277\272\173\151\370\160\307\372\172\067\330\330  
\015\322\166\117\127\377\220\267\343\221\322\335\357\302\140\267  
\147\072\335\376\252\234\360\324\213\177\162\042\316\306\237\227  
\266\370\257\212\240\020\250\331\373\030\306\266\265\134\122\074  
\211\266\031\052\163\001\012\017\003\263\022\140\362\172\057\201  
\333\243\156\377\046\060\227\365\213\335\211\127\266\255\075\263  
\257\053\305\267\166\002\360\245\326\053\232\206\024\052\162\366  
\343\063\214\135\011\113\023\337\273\214\164\023\122\113\002\003  
\001\000\001\243\202\002\122\060\202\002\116\060\014\006\003\125  
\035\023\004\005\060\003\001\001\377\060\013\006\003\125\035\017  
\004\004\003\002\001\256\060\035\006\003\125\035\016\004\026\004  
\024\116\013\357\032\244\100\133\245\027\151\207\060\312\064\150  
\103\320\101\256\362\060\144\006\003\125\035\037\004\135\060\133  
\060\054\240\052\240\050\206\046\150\164\164\160\072\057\057\143  
\145\162\164\056\163\164\141\162\164\143\157\155\056\157\162\147  
\057\163\146\163\143\141\055\143\162\154\056\143\162\154\060\053  
\240\051\240\047\206\045\150\164\164\160\072\057\057\143\162\154  
\056\163\164\141\162\164\143\157\155\056\157\162\147\057\163\146  
\163\143\141\055\143\162\154\056\143\162\154\060\202\001\135\006  
\003\125\035\040\004\202\001\124\060\202\001\120\060\202\001\114  
\006\013\053\006\001\004\001\201\265\067\001\001\001\060\202\001  
\073\060\057\006\010\053\006\001\005\005\007\002\001\026\043\150  
\164\164\160\072\057\057\143\145\162\164\056\163\164\141\162\164  
\143\157\155\056\157\162\147\057\160\157\154\151\143\171\056\160  
\144\146\060\065\006\010\053\006\001\005\005\007\002\001\026\051  
\150\164\164\160\072\057\057\143\145\162\164\056\163\164\141\162  
\164\143\157\155\056\157\162\147\057\151\156\164\145\162\155\145

\144\151\141\164\145\056\160\144\146\060\201\320\006\010\053\006  
\001\005\005\007\002\002\060\201\303\060\047\026\040\123\164\141  
\162\164\040\103\157\155\155\145\162\143\151\141\154\040\050\123  
\164\141\162\164\103\157\155\051\040\114\164\144\056\060\003\002  
\001\001\032\201\227\114\151\155\151\164\145\144\040\114\151\141  
\142\151\154\151\164\171\054\040\162\145\141\144\040\164\150\145  
\040\163\145\143\164\151\157\156\040\052\114\145\147\141\154\040  
\114\151\155\151\164\141\164\151\157\156\163\052\040\157\146\040  
\164\150\145\040\123\164\141\162\164\103\157\155\040\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171\040\120\157\154\151\143\171\040\141\166\141\151  
\154\141\142\154\145\040\141\164\040\150\164\164\160\072\057\057  
\143\145\162\164\056\163\164\141\162\164\143\157\155\056\157\162  
\147\057\160\157\154\151\143\171\056\160\144\146\060\021\006\011  
\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007\060  
\070\006\011\140\206\110\001\206\370\102\001\015\004\053\026\051  
\123\164\141\162\164\103\157\155\040\106\162\145\145\040\123\123  
\114\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040  
\101\165\164\150\157\162\151\164\171\060\015\006\011\052\206\110  
\206\367\015\001\001\005\005\000\003\202\002\001\000\026\154\231  
\364\146\014\064\365\320\205\136\175\012\354\332\020\116\070\034  
\136\337\246\045\005\113\221\062\301\350\073\361\075\335\104\011  
\133\007\111\212\051\313\146\002\267\261\232\367\045\230\011\074  
\216\033\341\335\066\207\053\113\273\150\323\071\146\075\240\046  
\307\362\071\221\035\121\253\202\173\176\325\316\132\344\342\003  
\127\160\151\227\010\371\136\130\246\012\337\214\006\232\105\026  
\026\070\012\136\127\366\142\307\172\002\005\346\274\036\265\362  
\236\364\251\051\203\370\262\024\343\156\050\207\104\303\220\032  
\336\070\251\074\254\103\115\144\105\316\335\050\251\134\362\163  
\173\004\370\027\350\253\261\363\056\134\144\156\163\061\072\022  
\270\274\263\021\344\175\217\201\121\232\073\215\211\364\115\223  
\146\173\074\003\355\323\232\035\232\363\145\120\365\240\320\165  
\237\057\257\360\352\202\103\230\370\151\234\211\171\304\103\216  
\106\162\343\144\066\022\257\367\045\036\070\211\220\167\176\303  
\153\152\271\303\313\104\113\254\170\220\213\347\307\054\036\113  
\021\104\310\064\122\047\315\012\135\237\205\301\211\325\032\170  
\362\225\020\123\062\335\200\204\146\165\331\265\150\050\373\141  
\056\276\204\250\070\300\231\022\206\245\036\147\144\255\006\056  
\057\251\160\205\307\226\017\174\211\145\365\216\103\124\016\253  
\335\245\200\071\224\140\300\064\311\226\160\054\243\022\365\037  
\110\173\275\034\176\153\267\235\220\364\042\073\256\370\374\052  
\312\372\202\122\240\357\257\113\125\223\353\301\265\360\042\213  
\254\064\116\046\042\004\241\207\054\165\112\267\345\175\023\327  
\270\014\144\300\066\322\311\057\206\022\214\043\011\301\033\202  
\073\163\111\243\152\127\207\224\345\326\170\305\231\103\143\343  
\115\340\167\055\341\145\231\162\151\004\032\107\011\346\017\001  
\126\044\373\037\277\016\171\251\130\056\271\304\011\001\176\225  
\272\155\000\006\076\262\352\112\020\071\330\320\053\365\277\354

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\165\277\227\002\305\011\033\010\334\125\067\342\201\373\067\204
\103\142\040\312\347\126\113\145\352\376\154\301\044\223\044\241
\064\353\005\377\232\042\256\233\175\077\361\145\121\012\246\060
\152\263\364\210\034\200\015\374\162\212\350\203\136
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL

CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "StartCom Certification Authority"

# Issuer: CN=StartCom Certification Authority,OU=Secure Digital Certificate Signing,O=StartCom Ltd.,C=IL

# Serial Number: 1 (0x1)

# Subject: CN=StartCom Certification Authority,OU=Secure Digital Certificate Signing,O=StartCom Ltd.,C=IL

# Not Valid Before: Sun Sep 17 19:46:36 2006

# Not Valid After: Wed Sep 17 19:46:36 2036

# Fingerprint (MD5): 22:4d:8f:8a:fc:f7:35:c2:bb:57:34:90:7b:8b:22:16

# Fingerprint (SHA1): 3e:2b:f7:f2:03:1b:96:f3:8c:e6:c4:d8:a8:5d:3e:2d:58:47:6a:0f

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "StartCom Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\076\053\367\362\003\033\226\363\214\346\304\330\250\135\076\055
\130\107\152\017
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\042\115\217\212\374\367\065\302\273\127\064\220\173\213\042\026
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\175\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\053\060\051\006\003\125\004\013
\023\042\123\145\143\165\162\145\040\104\151\147\151\164\141\154
\040\103\145\162\164\151\146\151\143\141\164\145\040\123\151\147
\156\151\156\147\061\051\060\047\006\003\125\004\003\023\040\123
\164\141\162\164\103\157\155\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\001\001
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "VeriSign Class 3 Public Primary Certification Authority  
- G4"

# Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G4,OU=(c) 2007 VeriSign\, Inc. - For  
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US

# Serial Number:2f:80:fe:23:8c:0e:22:0f:48:67:12:28:91:87:ac:b3

# Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G4,OU=(c) 2007 VeriSign\, Inc. - For  
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US

# Not Valid Before: Mon Nov 05 00:00:00 2007

# Not Valid After: Mon Jan 18 23:59:59 2038

# Fingerprint (MD5): 3a:52:e1:e7:fd:6f:3a:e3:6f:f3:6f:99:1b:f9:22:41

# Fingerprint (SHA1): 22:d5:d8:df:8f:02:31:d1:8d:f7:9d:b7:cf:8a:2d:64:c9:3f:6c:3a

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G4"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123  
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125  
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165  
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003  
\125\004\013\023\061\050\143\051\040\062\060\060\067\040\126\145  
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106  
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163  
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023  
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040  
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171\040\055\040\107\064

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123  
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125  
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165  
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003  
\125\004\013\023\061\050\143\051\040\062\060\060\067\040\126\145  
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106  
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163  
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023



\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040  
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171\040\055\040\107\064

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\057\200\376\043\214\016\042\017\110\147\022\050\221\207  
\254\263

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\204\060\202\003\012\240\003\002\001\002\002\020\057  
\200\376\043\214\016\042\017\110\147\022\050\221\207\254\263\060  
\012\006\010\052\206\110\316\075\004\003\003\060\201\312\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006  
\003\125\004\012\023\016\126\145\162\151\123\151\147\156\054\040  
\111\156\143\056\061\037\060\035\006\003\125\004\013\023\026\126  
\145\162\151\123\151\147\156\040\124\162\165\163\164\040\116\145  
\164\167\157\162\153\061\072\060\070\006\003\125\004\013\023\061  
\050\143\051\040\062\060\060\067\040\126\145\162\151\123\151\147  
\156\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165  
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154  
\171\061\105\060\103\006\003\125\004\003\023\074\126\145\162\151  
\123\151\147\156\040\103\154\141\163\163\040\063\040\120\165\142  
\154\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\040\055\040\107\064\060\036\027\015\060\067\061\061  
\060\065\060\060\060\060\060\060\132\027\015\063\070\060\061\061  
\070\062\063\065\071\065\071\132\060\201\312\061\013\060\011\006  
\003\125\004\006\023\002\125\123\061\027\060\025\006\003\125\004  
\012\023\016\126\145\162\151\123\151\147\156\054\040\111\156\143  
\056\061\037\060\035\006\003\125\004\013\023\026\126\145\162\151  
\123\151\147\156\040\124\162\165\163\164\040\116\145\164\167\157  
\162\153\061\072\060\070\006\003\125\004\013\023\061\050\143\051  
\040\062\060\060\067\040\126\145\162\151\123\151\147\156\054\040  
\111\156\143\056\040\055\040\106\157\162\040\141\165\164\150\157  
\162\151\172\145\144\040\165\163\145\040\157\156\154\171\061\105  
\060\103\006\003\125\004\003\023\074\126\145\162\151\123\151\147  
\156\040\103\154\141\163\163\040\063\040\120\165\142\154\151\143  
\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171  
\040\055\040\107\064\060\166\060\020\006\007\052\206\110\316\075  
\002\001\006\005\053\201\004\000\042\003\142\000\004\247\126\172  
\174\122\332\144\233\016\055\134\330\136\254\222\075\376\001\346  
\031\112\075\024\003\113\372\140\047\040\331\203\211\151\372\124  
\306\232\030\136\125\052\144\336\006\366\215\112\073\255\020\074  
\145\075\220\210\004\211\340\060\141\263\256\135\001\247\173\336  
\174\262\276\312\145\141\000\206\256\332\217\173\320\211\255\115

```
\035\131\232\101\261\274\107\200\334\236\142\303\371\243\201\262
\060\201\257\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\155\006\010\053\006\001\005\005\007\001\014
\004\141\060\137\241\135\240\133\060\131\060\127\060\125\026\011
\151\155\141\147\145\057\147\151\146\060\041\060\037\060\007\006
\005\053\016\003\002\032\004\024\217\345\323\032\206\254\215\216
\153\303\317\200\152\324\110\030\054\173\031\056\060\045\026\043
\150\164\164\160\072\057\057\154\157\147\157\056\166\145\162\151
\163\151\147\156\056\143\157\155\057\166\163\154\157\147\157\056
\147\151\146\060\035\006\003\125\035\016\004\026\004\024\263\026
\221\375\356\246\156\344\265\056\111\217\207\170\201\200\354\345
\261\265\060\012\006\010\052\206\110\316\075\004\003\003\003\150
\000\060\145\002\060\146\041\014\030\046\140\132\070\173\126\102
\340\247\374\066\204\121\221\040\054\166\115\103\075\304\035\204
\043\320\254\326\174\065\006\316\315\151\275\220\015\333\154\110
\102\035\016\252\102\002\061\000\234\075\110\071\043\071\130\032
\025\022\131\152\236\357\325\131\262\035\122\054\231\161\315\307
\051\337\033\052\141\173\161\321\336\363\300\345\015\072\112\252
\055\247\330\206\052\335\056\020
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "VeriSign Class 3 Public Primary Certification Authority - G4"

# Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G4,OU=(c) 2007 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US

# Serial Number:2f:80:fe:23:8c:0e:22:0f:48:67:12:28:91:87:ac:b3

# Subject:

CN=VeriSign Class 3 Public Primary Certification Authority - G4,OU=(c) 2007 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US

# Not Valid Before: Mon Nov 05 00:00:00 2007

# Not Valid After: Mon Jan 18 23:59:59 2038

# Fingerprint (MD5): 3a:52:e1:e7:fd:6f:3a:e3:6f:f3:6f:99:1b:f9:22:41

# Fingerprint (SHA1): 22:d5:d8:df:8f:02:31:d1:8d:f7:9d:b7:cf:8a:2d:64:c9:3f:6c:3a

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G4"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\042\325\330\337\217\002\061\321\215\367\235\267\317\212\055\144
\311\077\154\072
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\072\122\341\347\375\157\072\343\157\363\157\231\033\371\042\101
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\067\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\064
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\057\200\376\043\214\016\042\017\110\147\022\050\221\207
\254\263
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "thawte Primary Root CA - G2"

# Issuer: CN=thawte Primary Root CA - G2,OU=(c) 2007 thawte\, Inc. - For authorized use only,O=thawte\, Inc.,C=US

# Serial Number:35:fc:26:5c:d9:84:4f:c9:3d:26:3d:57:9b:ae:d7:56

# Subject: CN=thawte Primary Root CA - G2,OU=(c) 2007 thawte\, Inc. - For authorized use only,O=thawte\, Inc.,C=US

# Not Valid Before: Mon Nov 05 00:00:00 2007

# Not Valid After: Mon Jan 18 23:59:59 2038

# Fingerprint (MD5): 74:9d:ea:60:24:c4:fd:22:53:3e:cc:3a:72:d9:29:4f

# Fingerprint (SHA1): aa:db:bc:22:23:8f:c4:01:a1:27:bb:38:dd:f4:1d:db:08:9e:f0:12

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "thawte Primary Root CA - G2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\201\204\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
```

\145\054\040\111\156\143\056\061\070\060\066\006\003\125\004\013  
\023\057\050\143\051\040\062\060\060\067\040\164\150\141\167\164  
\145\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165  
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154  
\171\061\044\060\042\006\003\125\004\003\023\033\164\150\141\167  
\164\145\040\120\162\151\155\141\162\171\040\122\157\157\164\040  
\103\101\040\055\040\107\062

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\204\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164  
\145\054\040\111\156\143\056\061\070\060\066\006\003\125\004\013  
\023\057\050\143\051\040\062\060\060\067\040\164\150\141\167\164  
\145\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165  
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154  
\171\061\044\060\042\006\003\125\004\003\023\033\164\150\141\167  
\164\145\040\120\162\151\155\141\162\171\040\122\157\157\164\040  
\103\101\040\055\040\107\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\065\374\046\134\331\204\117\311\075\046\075\127\233\256  
\327\126

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\210\060\202\002\015\240\003\002\001\002\002\020\065  
\374\046\134\331\204\117\311\075\046\075\127\233\256\327\126\060  
\012\006\010\052\206\110\316\075\004\003\003\060\201\204\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006  
\003\125\004\012\023\014\164\150\141\167\164\145\054\040\111\156  
\143\056\061\070\060\066\006\003\125\004\013\023\057\050\143\051  
\040\062\060\060\067\040\164\150\141\167\164\145\054\040\111\156  
\143\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151  
\172\145\144\040\165\163\145\040\157\156\154\171\061\044\060\042  
\006\003\125\004\003\023\033\164\150\141\167\164\145\040\120\162  
\151\155\141\162\171\040\122\157\157\164\040\103\101\040\055\040  
\107\062\060\036\027\015\060\067\061\061\060\065\060\060\060\060  
\060\060\132\027\015\063\070\060\061\061\070\062\063\065\071\065  
\071\132\060\201\204\061\013\060\011\006\003\125\004\006\023\002  
\125\123\061\025\060\023\006\003\125\004\012\023\014\164\150\141  
\167\164\145\054\040\111\156\143\056\061\070\060\066\006\003\125  
\004\013\023\057\050\143\051\040\062\060\060\067\040\164\150\141  
\167\164\145\054\040\111\156\143\056\040\055\040\106\157\162\040  
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157  
\156\154\171\061\044\060\042\006\003\125\004\003\023\033\164\150  
\141\167\164\145\040\120\162\151\155\141\162\171\040\122\157\157

```
\164\040\103\101\040\055\040\107\062\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\242\325\234\202\173\225\235\361\122\170\207\376\212\026\277
\005\346\337\243\002\117\015\007\306\000\121\272\014\002\122\055
\042\244\102\071\304\376\217\352\311\301\276\324\115\377\237\172
\236\342\261\174\232\255\247\206\011\163\207\321\347\232\343\172
\245\252\156\373\272\263\160\300\147\210\242\065\324\243\232\261
\375\255\302\357\061\372\250\271\363\373\010\306\221\321\373\051
\225\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\232\330\000\060\000\347\153\177\205\030\356\213\266\316\212
\014\370\021\341\273\060\012\006\010\052\206\110\316\075\004\003
\003\003\151\000\060\146\002\061\000\335\370\340\127\107\133\247
\346\012\303\275\365\200\212\227\065\015\033\211\074\124\206\167
\050\312\241\364\171\336\265\346\070\260\360\145\160\214\177\002
\124\302\277\377\330\241\076\331\317\002\061\000\304\215\224\374
\334\123\322\334\235\170\026\037\025\063\043\123\122\343\132\061
\135\235\312\256\275\023\051\104\015\047\133\250\347\150\234\022
\367\130\077\056\162\002\127\243\217\241\024\056
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft

Code Signing Only Certificate

# Trust for "thawte Primary Root CA - G2"

# Issuer: CN=thawte Primary Root CA - G2,OU=(c) 2007 thawte\, Inc. - For authorized use only,O=thawte\, Inc.,C=US

# Serial Number:35:fc:26:5c:d9:84:4f:c9:3d:26:3d:57:9b:ae:d7:56

# Subject: CN=thawte Primary Root CA - G2,OU=(c) 2007 thawte\, Inc. - For authorized use only,O=thawte\, Inc.,C=US

# Not Valid Before: Mon Nov 05 00:00:00 2007

# Not Valid After: Mon Jan 18 23:59:59 2038

# Fingerprint (MD5): 74:9d:ea:60:24:c4:fd:22:53:3e:cc:3a:72:d9:29:4f

# Fingerprint (SHA1): aa:db:bc:22:23:8f:c4:01:a1:27:bb:38:dd:f4:1d:db:08:9e:f0:12

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "thawte Primary Root CA - G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\252\333\274\042\043\217\304\001\241\047\273\070\335\364\035\333
\010\236\360\022
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\164\235\352\140\044\304\375\042\123\076\314\072\162\331\051\117

END

CKA\_ISSUER

MULTILINE\_OCTAL

\060\201\204\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164  
\145\054\040\111\156\143\056\061\070\060\066\006\003\125\004\013  
\023\057\050\143\051\040\062\060\060\067\040\164\150\141\167\164  
\145\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165  
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154  
\171\061\044\060\042\006\003\125\004\003\023\033\164\150\141\167  
\164\145\040\120\162\151\155\141\162\171\040\122\157\157\164\040  
\103\101\040\055\040\107\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\065\374\046\134\331\204\117\311\075\046\075\127\233\256  
\327\126

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "GeoTrust Primary

Certification Authority - G2"

# Issuer: CN=GeoTrust Primary Certification Authority - G2,OU=(c) 2007 GeoTrust Inc. - For authorized use  
only,O=GeoTrust Inc.,C=US

# Serial Number:3c:b2:f4:48:0a:00:e2:fe:eb:24:3b:5e:60:3e:c3:6b

# Subject: CN=GeoTrust Primary Certification Authority - G2,OU=(c) 2007 GeoTrust Inc. - For authorized use  
only,O=GeoTrust Inc.,C=US

# Not Valid Before: Mon Nov 05 00:00:00 2007

# Not Valid After: Mon Jan 18 23:59:59 2038

# Fingerprint (MD5): 01:5e:d8:6b:bd:6f:3d:8e:a1:31:f8:12:e0:98:73:6a

# Fingerprint (SHA1): 8d:17:84:d5:37:f3:03:7d:ec:70:fe:57:8b:51:9a:99:e6:10:d7:b0

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GeoTrust Primary Certification Authority - G2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162  
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004  
\013\023\060\050\143\051\040\062\060\060\067\040\107\145\157\124  
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040  
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157

\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145  
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\040\055\040\107\062

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162  
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004  
\013\023\060\050\143\051\040\062\060\060\067\040\107\145\157\124  
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040  
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157  
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145  
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\040\055\040\107\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\074\262\364\110\012\000\342\376\353\044\073\136\140\076  
\303\153

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\256\060\202\002\065\240\003\002\001\002\002\020\074  
\262\364\110\012\000\342\376\353\044\073\136\140\076\303\153\060  
\012\006\010\052\206\110\316\075\004\003\003\060\201\230\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\026\060\024\006  
\003\125\004\012\023\015\107\145\157\124\162\165\163\164\040\111  
\156\143\056\061\071\060\067\006\003\125\004\013\023\060\050\143  
\051\040\062\060\060\067\040\107\145\157\124\162\165\163\164\040  
\111\156\143\056\040\055\040\106\157\162\040\141\165\164\150\157  
\162\151\172\145\144\040\165\163\145\040\157\156\154\171\061\066  
\060\064\006\003\125\004\003\023\055\107\145\157\124\162\165\163  
\164\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
\171\040\055\040\107\062\060\036\027\015\060\067\061\061\060\065  
\060\060\060\060\060\060\132\027\015\063\070\060\061\061\070\062  
\063\065\071\065\071\132\060\201\230\061\013\060\011\006\003\125  
\004\006\023\002\125\123\061\026\060\024\006\003\125\004\012\023  
\015\107\145\157\124\162\165\163\164\040\111\156\143\056\061\071  
\060\067\006\003\125\004\013\023\060\050\143\051\040\062\060\060  
\067\040\107\145\157\124\162\165\163\164\040\111\156\143\056\040  
\055\040\106\157\162\040\141\165\164\150\157\162\151\172\145\144  
\040\165\163\145\040\157\156\154\171\061\066\060\064\006\003\125  
\004\003\023\055\107\145\157\124\162\165\163\164\040\120\162\151  
\155\141\162\171\040\103\145\162\164\151\146\151\143\141\164\151

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\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\025\261\350\375\003\025\103
\345\254\353\207\067\021\142\357\322\203\066\122\175\105\127\013
\112\215\173\124\073\072\156\137\025\002\300\120\246\317\045\057
\175\312\110\270\307\120\143\034\052\041\010\174\232\066\330\013
\376\321\046\305\130\061\060\050\045\363\135\135\243\270\266\245
\264\222\355\154\054\237\353\335\103\211\242\074\113\110\221\035
\120\354\046\337\326\140\056\275\041\243\102\060\100\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\025\137\065\127\121\125\373
\045\262\255\003\151\374\001\243\372\276\021\125\325\060\012\006
\010\052\206\110\316\075\004\003\003\003\147\000\060\144\002\060
\144\226\131\246\350\011\336\213\272\372\132\210\210\360\037\221
\323\106\250\362\112\114\002\143\373\154\137\070\333\056\101\223
\251\016\346\235\334\061\034\262\240\247\030\034\171\341\307\066
\002\060\072\126\257\232\164\154\366\373\203\340\063\323\010\137
\241\234\302\133\237\106\326\266\313\221\006\143\242\006\347\063
\254\076\250\201\022\320\313\272\320\222\013\266\236\226\252\004
\017\212
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GeoTrust Primary Certification Authority - G2"

# Issuer: CN=GeoTrust Primary Certification Authority - G2,OU=(c) 2007 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US

# Serial Number:3c:b2:f4:48:0a:00:e2:fe:eb:24:3b:5e:60:3e:c3:6b

# Subject: CN=GeoTrust Primary Certification Authority - G2,OU=(c) 2007 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US

# Not Valid Before: Mon Nov 05 00:00:00 2007

# Not Valid After: Mon Jan 18 23:59:59 2038

# Fingerprint (MD5): 01:5e:d8:6b:bd:6f:3d:8e:a1:31:f8:12:e0:98:73:6a

# Fingerprint (SHA1): 8d:17:84:d5:37:f3:03:7d:ec:70:fe:57:8b:51:9a:99:e6:10:d7:b0

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL

CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GeoTrust Primary Certification Authority - G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\215\027\204\325\067\363\003\175\354\160\376\127\213\121\232\231
\346\020\327\260
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END



CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL  
\001\136\330\153\275\157\075\216\241\061\370\022\340\230\163\152  
END

CKA\_ISSUER MULTILINE\_OCTAL  
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162  
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004  
\013\023\060\050\143\051\040\062\060\060\067\040\107\145\157\124  
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040  
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157  
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145  
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\040\055\040\107\062  
END

CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\020\074\262\364\110\012\000\342\376\353\044\073\136\140\076  
\303\153  
END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Certificate "VeriSign Universal Root Certification Authority"  
# Issuer: CN=VeriSign Universal Root Certification Authority,OU=(c) 2008 VeriSign\, Inc. - For authorized use  
only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US  
# Serial Number:40:1a:c4:64:21:b3:13:21:03:0e:bb:e4:12:1a:c5:1d  
# Subject: CN=VeriSign Universal Root Certification Authority,OU=(c) 2008 VeriSign\, Inc. - For authorized use  
only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US  
# Not Valid Before: Wed Apr 02 00:00:00 2008  
# Not Valid After: Tue Dec 01 23:59:59 2037  
# Fingerprint (MD5): 8e:ad:b5:01:aa:4d:81:e4:8c:1d:d1:e1:14:00:95:19  
#

Fingerprint (SHA1): 36:79:ca:35:66:87:72:30:4d:30:a5:fb:87:3b:0f:a7:7b:b7:0d:54

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "VeriSign Universal Root Certification Authority"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509  
CKA\_SUBJECT MULTILINE\_OCTAL  
\060\201\275\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123  
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125  
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165

\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003  
\125\004\013\023\061\050\143\051\040\062\060\060\070\040\126\145  
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106  
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163  
\145\040\157\156\154\171\061\070\060\066\006\003\125\004\003\023  
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END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123  
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125  
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165  
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003  
\125\004\013\023\061\050\143\051\040\062\060\060\070\040\126\145  
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106  
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163  
\145\040\157\156\154\171\061\070\060\066\006\003\125\004\003\023  
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END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\100\032\304\144\041\263\023\041\003\016\273\344\022\032  
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END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\004\271\060\202\003\241\240\003\002\001\002\002\020\100  
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\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201  
\275\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027  
\060\025\006\003\125\004\012\023\016\126\145\162\151\123\151\147  
\156\054\040\111\156\143\056\061\037\060\035\006\003\125\004\013  
\023\026\126\145\162\151\123\151\147\156\040\124\162\165\163\164  
\040\116\145\164\167\157\162\153\061\072\060\070\006\003\125\004  
\013\023\061\050\143\051\040\062\060\060\070\040\126\145\162\151  
\123\151\147\156\054\040\111\156\143\056\040\055\040\106\157\162  
\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040  
\157\156\154\171\061\070\060\066\006\003\125\004\003\023\057\126  
\145\162\151\123\151\147\156\040\125\156\151\166\145\162\163\141  
\154\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141  
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036  
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\015\063\067\061\062\060\061\062\063\065\071\065\071\132\060\201

\275\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027  
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\156\054\040\111\156\143\056\061\037\060\035\006\003\125\004\013  
\023\026\126\145\162\151\123\151\147\156\040\124\162\165\163\164  
\040\116\145\164\167\157\162\153\061\072\060\070\006\003\125\004  
\013\023\061\050\143\051\040\062\060\060\070\040\126\145\162\151  
\123\151\147\156\054\040\111\156\143\056\040\055\040\106\157\162  
\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040  
\157\156\154\171\061\070\060\066\006\003\125\004\003\023\057\126  
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\043\326\140\216\221\327\220\230\203\172\346\130\031\070\214\305  
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\343\314\171\356\130\330\016\302\263\105\223\300\054\347\232\027  
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\374\023\021\171\204\355\136\124\366\064\237\010\001\363\020\045  
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\056\202\361\360\357\011\352\104\311\025\152\342\003\156\063\323  
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\035\017\001\001\377\004\004\003\002\001\006\060\155\006\010\053  
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\060\041\060\037\060\007\006\005\053\016\003\002\032\004\024\217  
\345\323\032\206\254\215\216\153\303\317\200\152\324\110\030\054  
\173\031\056\060\045\026\043\150\164\164\160\072\057\057\154\157  
\147\157\056\166\145\162\151\163\151\147\156\056\143\157\155\057  
\166\163\154\157\147\157\056\147\151\146\060\035\006\003\125\035  
\016\004\026\004\024\266\167\372\151\110\107\237\123\022\325\302  
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\235\073\143\363\232\371\166\062\225\221\261\167\274\254\232\276  
\261\344\061\041\306\201\225\126\132\016\261\302\324\261\246\131  
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\243\175\106\371\075\355\250\137\142\324\361\077\370\340\164\127
\053\030\235\201\264\304\050\332\224\227\245\160\353\254\035\276
\007\021\360\325\333\335\345\214\360\325\062\260\203\346\127\342
\217\277\276\241\252\277\075\035\265\324\070\352\327\260\134\072
\117\152\077\217\300\146\154\143\252\351\331\244\026\364\201\321
\225\024\016\175\315\225\064\331\322\217\160\163\201\173\234\176
\275\230\141\330\105\207\230\220\305\353\206\060\306\065\277\360
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "VeriSign Universal Root Certification Authority"

# Issuer: CN=VeriSign Universal Root Certification Authority,OU=(c) 2008 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US

# Serial Number:40:1a:c4:64:21:b3:13:21:03:0e:bb:e4:12:1a:c5:1d

# Subject: CN=VeriSign Universal Root Certification Authority,OU=(c) 2008 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US

# Not Valid Before: Wed Apr 02 00:00:00 2008

# Not Valid After: Tue Dec 01 23:59:59 2037

# Fingerprint (MD5): 8e:ad:b5:01:aa:4d:81:e4:8c:1d:d1:e1:14:00:95:19

# Fingerprint (SHA1): 36:79:ca:35:66:87:72:30:4d:30:a5:fb:87:3b:0f:a7:7b:b7:0d:54

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE

CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "VeriSign Universal Root Certification Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\066\171\312\065\146\207\162\060\115\060\245\373\207\073\017\247
\173\267\015\124
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END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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\216\255\265\001\252\115\201\344\214\035\321\341\024\000\225\031
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END

CKA\_ISSUER MULTILINE\_OCTAL

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\060\201\275\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\070\040\126\145
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\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\070\060\066\006\003\125\004\003\023
\057\126\145\162\151\123\151\147\156\040\125\156\151\166\145\162
\163\141\154\040\122\157\157\164\040\103\145\162\164\151\146\151
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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\002\020\100\032\304\144\041\263\023\041\003\016\273\344\022\032
\305\035
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "thawte Primary Root CA - G3"

# Issuer: CN=thawte Primary Root CA - G3,OU=(c) 2008 thawte\, Inc. - For authorized use only,OU=Certification Services Division,O=thawte\, Inc.,C=US

# Serial Number:60:01:97:b7:46:a7:ea:b4:b4:9a:d6:4b:2f:f7:90:fb

# Subject: CN=thawte Primary Root CA - G3,OU=(c) 2008 thawte\, Inc. - For authorized use only,OU=Certification Services Division,O=thawte\, Inc.,C=US

# Not Valid Before: Wed Apr 02 00:00:00 2008

# Not Valid After:

Tue Dec 01 23:59:59 2037

# Fingerprint (MD5): fb:1b:5d:43:8a:94:cd:44:c6:76:f2:43:4b:47:e7:31

# Fingerprint (SHA1): f1:8b:53:8d:1b:e9:03:b6:a6:f0:56:43:5b:17:15:89:ca:f3:6b:f2

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "thawte Primary Root CA - G3"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040
\062\060\060\070\040\164\150\141\167\164\145\054\040\111\156\143
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172
\145\144\040\165\163\145\040\157\156\154\171\061\044\060\042\006
\003\125\004\003\023\033\164\150\141\167\164\145\040\120\162\151
\155\141\162\171\040\122\157\157\164\040\103\101\040\055\040\107
\063
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END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\256\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164  
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013  
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040  
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157  
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040  
\062\060\060\070\040\164\150\141\167\164\145\054\040\111\156\143  
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172  
\145\144\040\165\163\145\040\157\156\154\171\061\044\060\042\006  
\003\125\004\003\023\033\164\150\141\167\164\145\040\120\162\151  
\155\141\162\171\040\122\157\157\164\040\103\101\040\055\040\107  
\063

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\140\001\227\267\106\247\352\264\264\232\326\113\057\367  
\220\373

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\004\052\060\202\003\022\240\003\002\001\002\002\020\140  
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\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201  
\256\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025  
\060\023\006\003\125\004\012\023\014\164\150\141\167\164\145\054  
\040\111\156\143\056\061\050\060\046\006\003\125\004\013\023\037  
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145  
\162\166\151\143\145\163\040\104\151\166\151\163\151\157\156\061  
\070\060\066\006\003\125\004\013\023\057\050\143\051\040\062\060  
\060\070\040\164\150\141\167\164\145\054\040\111\156\143\056\040  
\055\040\106\157\162\040\141\165\164\150\157\162\151\172\145\144  
\040\165\163\145\040\157\156\154\171\061\044\060\042\006\003\125  
\004\003\023\033\164\150\141\167\164\145\040\120\162\151\155\141  
\162\171\040\122\157\157\164\040\103\101\040\055\040\107\063\060  
\036\027\015\060\070\060\064\060\062\060\060\060\060\060\060\132  
\027\015\063\067\061\062\060\061\062\063\065\071\065\071\132\060  
\201\256\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164\145  
\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013\023  
\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123  
\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157\156  
\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040\062  
\060\060\070\040\164\150\141\167\164\145\054\040\111\156\143\056  
\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172\145  
\144\040\165\163\145\040\157\156\154\171\061\044\060\042\006\003

\125\004\003\023\033\164\150\141\167\164\145\040\120\162\151\155  
\141\162\171\040\122\157\157\164\040\103\101\040\055\040\107\063  
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001  
\000\262\277\047\054\373\333\330\133\335\170\173\033\236\167\146  
\201\313\076\274\174\256\363\246\047\232\064\243\150\061\161\070  
\063\142\344\363\161\146\171\261\251\145\243\245\213\325\217\140  
\055\077\102\314\252\153\062\300\043\313\054\101\335\344\337\374  
\141\234\342\163\262\042\225\021\103\030\137\304\266\037\127\154  
\012\005\130\042\310\066\114\072\174\245\321\317\206\257\210\247  
\104\002\023\164\161\163\012\102\131\002\370\033\024\153\102\337  
\157\137\272\153\202\242\235\133\347\112\275\036\001\162\333\113  
\164\350\073\177\177\175\037\004\264\046\233\340\264\132\254\107  
\075\125\270\327\260\046\122\050\001\061\100\146\330\331\044\275  
\366\052\330\354\041\111\134\233\366\172\351\177\125\065\176\226  
\153\215\223\223\047\313\222\273\352\254\100\300\237\302\370\200  
\317\135\364\132\334\316\164\206\246\076\154\013\123\312\275\222  
\316\031\006\162\346\014\134\070\151\307\004\326\274\154\316\133  
\366\367\150\234\334\045\025\110\210\241\351\251\370\230\234\340  
\363\325\061\050\141\021\154\147\226\215\071\231\313\302\105\044  
\071\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125  
\035\016\004\026\004\024\255\154\252\224\140\234\355\344\377\372  
\076\012\164\053\143\003\367\266\131\277\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\003\202\001\001\000\032\100  
\330\225\145\254\011\222\211\306\071\364\020\345\251\016\146\123  
\135\170\336\372\044\221\273\347\104\121\337\306\026\064\012\357  
\152\104\121\352\053\007\212\003\172\303\353\077\012\054\122\026  
\240\053\103\271\045\220\077\160\251\063\045\155\105\032\050\073  
\047\317\252\303\051\102\033\337\073\114\300\063\064\133\101\210  
\277\153\053\145\257\050\357\262\365\303\252\146\316\173\126\356  
\267\310\313\147\301\311\234\032\030\270\304\303\111\003\361\140  
\016\120\315\106\305\363\167\171\367\266\025\340\070\333\307\057  
\050\240\014\077\167\046\164\331\045\022\332\061\332\032\036\334  
\051\101\221\042\074\151\247\273\002\362\266\134\047\003\211\364  
\006\352\233\344\162\202\343\241\011\301\351\000\031\323\076\324  
\160\153\272\161\246\252\130\256\364\273\351\154\266\357\207\314  
\233\273\377\071\346\126\141\323\012\247\304\134\114\140\173\005  
\167\046\172\277\330\007\122\054\142\367\160\143\331\071\274\157  
\034\302\171\334\166\051\257\316\305\054\144\004\136\210\066\156  
\061\324\100\032\142\064\066\077\065\001\256\254\143\240

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```

Microsoft Code Signing Only Certificate
Trust for "thawte Primary Root CA - G3"
Issuer: CN=thawte Primary Root CA - G3,OU=(c) 2008 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
Serial Number:60:01:97:b7:46:a7:ea:b4:b4:9a:d6:4b:2f:f7:90:fb
Subject: CN=thawte Primary Root CA - G3,OU=(c) 2008 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
#
 Not Valid Before: Wed Apr 02 00:00:00 2008
Not Valid After: Tue Dec 01 23:59:59 2037
Fingerprint (MD5): fb:1b:5d:43:8a:94:cd:44:c6:76:f2:43:4b:47:e7:31
Fingerprint (SHA1): f1:8b:53:8d:1b:e9:03:b6:a6:f0:56:43:5b:17:15:89:ca:f3:6b:f2
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "thawte Primary Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\361\213\123\215\033\351\003\266\246\360\126\103\133\027\025\211
\312\363\153\362
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\373\033\135\103\212\224\315\104\306\166\362\103\113\107\347\061
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040
\062\060\060\070\040\164\150\141\167\164\145\054\040\111\156\143
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172
\145\144\040\165\163\145\040\157\156\154\171\061\044\060\042\006
\003\125\004\003\023\033\164\150\141\167\164\145\040\120\162\151
\155\141\162\171\040\122\157\157\164\040\103\101\040\055\040\107
\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\140\001\227\267\106\247\352\264\264\232\326\113\057\367
\220\373
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```



```
Microsoft Code Signing Only Certificate
Certificate "GeoTrust Primary Certification Authority - G3"
Issuer: CN=GeoTrust Primary Certification Authority - G3,OU=(c) 2008 GeoTrust Inc. - For authorized use
only,O=GeoTrust Inc.,C=US
Serial Number:15:ac:6e:94:19:b2:79:4b:41:f6:27:a9:c3:18:0f:1f
#
Subject: CN=GeoTrust Primary Certification Authority - G3,OU=(c) 2008 GeoTrust Inc. - For authorized use
only,O=GeoTrust Inc.,C=US
Not Valid Before: Wed Apr 02 00:00:00 2008
Not Valid After: Tue Dec 01 23:59:59 2037
Fingerprint (MD5): b5:e8:34:36:c9:10:44:58:48:70:6d:2e:83:d4:b8:05
Fingerprint (SHA1): 03:9e:ed:b8:0b:e7:a0:3c:69:53:89:3b:20:d2:d9:32:3a:4c:2a:fd
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Primary Certification Authority - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\050\143\051\040\062\060\060\070\040\107\145\157\124
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\050\143\051\040\062\060\060\070\040\107\145\157\124
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\025\254\156\224\031\262\171\113\101\366\047\251\303\030
\017\037
```

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\376\060\202\002\346\240\003\002\001\002\002\020\025  
\254\156\224\031\262\171\113\101\366\047\251\303\030\017\037\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201  
\230\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026  
\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163  
\164\040\111\156\143\056\061\071\060\067\006\003\125\004\013\023  
\060\050\143\051\040\062\060\060\070\040\107\145\157\124\162\165  
\163\164\040\111\156\143\056\040\055\040\106\157\162\040\141\165  
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154  
\171\061\066\060\064\006\003\125\004\003\023\055\107\145\157\124  
\162\165\163\164\040\120\162\151\155\141\162\171\040\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171\040\055\040\107\063\060\036\027\015\060\070\060  
\064\060\062\060\060\060\060\060\132\027\015\063\067\061\062  
\060\061\062\063\065\071\065\071\132\060\201\230\061\013\060\011  
\006\003\125\004\006\023\002\125\123\061\026\060\024\006\003\125  
\004\012\023\015\107\145\157\124\162\165\163\164\040\111\156\143  
\056\061\071\060\067\006\003\125\004\013\023\060\050\143\051\040  
\062\060\060\070\040\107\145\157\124\162\165\163\164\040\111\156  
\143\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151  
\172\145\144\040\165\163\145\040\157\156\154\171\061\066\060\064  
\006\003\125\004\003\023\055\107\145\157\124\162\165\163\164\040  
\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040  
\055\040\107\063\060\202\001\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012  
\002\202\001\001\000\334\342\136\142\130\035\063\127\071\062\063  
\372\353\313\207\214\247\324\112\335\006\210\352\144\216\061\230  
\245\070\220\036\230\317\056\143\053\360\106\274\104\262\211\241  
\300\050\014\111\160\041\225\237\144\300\246\223\022\002\145\046  
\206\306\245\211\360\372\327\204\240\160\257\117\032\227\077\006  
\104\325\311\353\162\020\175\344\061\050\373\034\141\346\050\007  
\104\163\222\042\151\247\003\210\154\235\143\310\122\332\230\047  
\347\010\114\160\076\264\311\022\301\305\147\203\135\063\363\003  
\021\354\152\320\123\342\321\272\066\140\224\200\273\141\143\154  
\133\027\176\337\100\224\036\253\015\302\041\050\160\210\377\326  
\046\154\154\140\004\045\116\125\176\175\357\277\224\110\336\267  
\035\335\160\215\005\137\210\245\233\362\302\356\352\321\100\101  
\155\142\070\035\126\006\305\003\107\121\040\031\374\173\020\013  
\016\142\256\166\125\277\137\167\276\076\111\001\123\075\230\045  
\003\166\044\132\035\264\333\211\352\171\345\266\263\073\077\272  
\114\050\101\177\006\254\152\216\301\320\366\005\035\175\346\102  
\206\343\245\325\107\002\003\001\000\001\243\102\060\100\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060  
\035\006\003\125\035\016\004\026\004\024\304\171\312\216\241\116

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\003\035\034\334\153\333\061\133\224\076\077\060\177\055\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\055\305\023\317\126\200\173\172\170\275\237\256\054\231
\347\357\332\337\224\136\011\151\247\347\156\150\214\275\162\276
\107\251\016\227\022\270\112\361\144\323\071\337\045\064\324\301
\315\116\201\360\017\004\304\044\263\064\226\306\246\252\060\337
\150\141\163\327\371\216\205\211\357\016\136\225\050\112\052\047
\217\020\216\056\174\206\304\002\236\332\014\167\145\016\104\015
\222\375\375\263\026\066\372\021\015\035\214\016\007\211\152\051
\126\367\162\364\335\025\234\167\065\146\127\253\023\123\330\216
\301\100\305\327\023\026\132\162\307\267\151\001\304\172\261\203
\001\150\175\215\101\241\224\030\301\045\134\374\360\376\203\002
\207\174\015\015\317\056\010\134\112\100\015\076\354\201\141\346
\044\333\312\340\016\055\007\262\076\126\334\215\365\101\205\007
\110\233\014\013\313\111\077\175\354\267\375\313\215\147\211\032
\253\355\273\036\243\000\010\010\027\052\202\134\061\135\106\212
\055\017\206\233\164\331\105\373\324\100\261\172\252\150\055\206
\262\231\042\341\301\053\307\234\370\363\137\250\202\022\353\031
\021\055
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GeoTrust Primary Certification Authority - G3"

# Issuer: CN=GeoTrust Primary Certification Authority - G3,OU=(c) 2008 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US

# Serial Number: 15:ac:6e:94:19:b2:79:4b:41:f6:27:a9:c3:18:0f:1f

# Subject: CN=GeoTrust Primary Certification Authority - G3,OU=(c) 2008 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US

# Not Valid Before: Wed Apr 02 00:00:00 2008

# Not Valid After: Tue Dec 01 23:59:59 2037

# Fingerprint (MD5): b5:e8:34:36:c9:10:44:58:48:70:6d:2e:83:d4:b8:05

#

Fingerprint (SHA1): 03:9e:ed:b8:0b:e7:a0:3c:69:53:89:3b:20:d2:d9:32:3a:4c:2a:fd

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GeoTrust Primary Certification Authority - G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\003\236\355\270\013\347\240\074\151\123\211\073\040\322\331\062
\072\114\052\375
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\265\350\064\066\311\020\104\130\110\160\155\056\203\324\270\005
```

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162  
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004  
\013\023\060\050\143\051\040\062\060\060\070\040\107\145\157\124  
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040  
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157  
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145  
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\040\055\040\107\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\025\254\156\224\031\262\171\113\101\366\047\251\303\030  
\017\037

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "E-ME SSI (RCA)"

# Issuer: CN=E-ME SSI (RCA),OU=Sertifikācijas pakalpojumu dala,C=LV

# Serial Number:2e:ef:db:fb:d8:89:3d:8f:49:1c:93:72:fe:45:df:ed

# Subject: CN=E-ME SSI (RCA),OU=Sertifikācijas pakalpojumu dala,C=LV

# Not Valid Before: Tue May 19 08:45:56 2009

# Not Valid After: Wed May 19 08:48:15 2027

# Fingerprint (MD5): cb:bd:c3:68:2d:b3:cb:18:59:d3:29:52:e8:c6:64:89

# Fingerprint (SHA1): c9:32:1d:e6:b5:a8:26:66:cf:69:71:a1:8a:56:f2:d3:a8:67:56:02

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "E-ME SSI (RCA)"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\120\061\013\060\011\006\003\125\004\006\023\002\114\126\061  
\050\060\046\006\003\125\004\013\023\037\123\145\162\164\151\146  
\151\153\141\143\151\152\141\163\040\160\141\153\141\154\160\157  
\152\165\155\165\040\144\141\154\141\061\027\060\025\006\003\125  
\004\003\023\016\105\055\115\105\040\123\123\111\040\050\122\103  
\101\051

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\120\061\013\060\011\006\003\125\004\006\023\002\114\126\061  
\050\060\046\006\003\125\004\013\023\037\123\145\162\164\151\146  
\151\153\141\143\151\152\141\163\040\160\141\153\141\154\160\157  
\152\165\155\165\040\144\141\154\141\061\027\060\025\006\003\125  
\004\003\023\016\105\055\115\105\040\123\123\111\040\050\122\103  
\101\051

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\056\357\333\373\330\211\075\217\111\034\223\162\376\105  
\337\355

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\340\060\202\003\310\240\003\002\001\002\002\020\056  
\357\333\373\330\211\075\217\111\034\223\162\376\105\337\355\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\120  
\061\013\060\011\006\003\125\004\006\023\002\114\126\061\050\060  
\046\006\003\125\004\013\023\037\123\145\162\164\151\146\151\153  
\141\143\151\152\141\163\040\160\141\153\141\154\160\157\152\165  
\155\165\040\144\141\154\141\061\027\060\025\006\003\125\004\003  
\023\016\105\055\115\105\040\123\123\111\040\050\122\103\101\051  
\060\036\027\015\060\071\060\065\061\071\060\070\064\065\065\066  
\132\027\015\062\067\060\065\061\071\060\070\064\070\061\065\132  
\060\120\061\013\060\011\006\003\125\004\006\023\002\114\126\061  
\050\060\046\006\003\125\004\013\023\037\123\145\162\164\151\146  
\151\153\141\143\151\152\141\163\040\160\141\153\141\154\160\157  
\152\165\155\165\040\144\141\154\141\061\027\060\025\006\003\125  
\004\003\023\016\105\055\115\105\040\123\123\111\040\050\122\103  
\101\051\060\202\002\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202  
\002\001\000\304\004\153\000\303\260\340\056\073\350\123\005\005  
\010\276\310\204\047\125\326\035\212\022\342\027\042\132\154\377  
\263\335\266\231\303\312\301\352\371\330\045\265\337\072\235\235  
\077\122\305\351\362\254\277\211\164\212\124\256\116\317\156\362  
\136\256\332\275\022\007\231\225\317\144\253\376\231\221\144\131  
\214\311\276\104\152\061\233\230\352\272\352\321\041\016\050\013  
\071\233\343\326\212\246\367\002\272\077\075\331\131\364\171\231  
\336\323\044\233\213\160\033\052\204\326\345\011\017\046\046\044  
\130\217\045\136\363\305\235\164\211\245\066\305\345\122\262\353  
\350\206\223\107\156\247\051\207\244\176\334\264\243\313\062\126  
\367\105\200\332\134\307\057\240\247\327\357\365\374\265\250\315  
\204\225\142\370\251\053\043\073\155\323\267\222\310\352\301\274  
\024\115\350\153\234\026\172\323\354\007\373\007\045\020\117\024  
\207\173\222\066\316\126\202\145\113\023\046\006\330\243\243\246  
\337\302\172\373\173\065\005\242\023\075\076\166\274\034\127\203  
\003\121\307\064\336\132\365\074\275\066\045\234\026\017\115\316  
\350\015\032\313\135\103\242\024\157\272\174\140\324\002\205\166

\305\153\052\270\105\261\134\167\107\021\255\240\045\251\146\221  
\214\121\027\155\141\125\012\031\077\233\002\377\304\365\326\322  
\263\351\045\123\341\004\075\217\042\320\242\145\345\256\247\264  
\340\035\221\152\302\206\222\367\072\135\023\247\172\114\102\337  
\132\263\112\210\104\054\357\107\272\251\257\326\317\142\163\212  
\006\042\026\054\302\354\037\006\250\323\107\120\131\062\022\345  
\271\235\142\065\236\312\136\012\264\235\043\210\302\323\117\054  
\054\311\223\350\176\270\011\354\246\331\335\143\341\311\250\152  
\150\334\204\121\254\132\022\347\073\246\265\007\012\261\252\116  
\263\264\242\127\337\067\154\026\116\253\231\062\172\360\234\043  
\045\213\312\232\250\214\340\070\041\264\316\367\154\141\310\342  
\014\022\131\006\201\046\066\132\017\065\163\324\026\105\375\336  
\225\336\326\113\134\237\163\331\276\031\275\347\277\344\125\152  
\310\153\104\367\307\270\063\210\171\031\015\006\144\350\257\013  
\241\165\014\122\145\272\012\043\225\161\367\143\374\176\345\214  
\217\314\321\002\003\001\000\001\243\201\265\060\201\262\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\030  
\006\010\053\006\001\005\005\007\001\003\004\014\060\012\060\010  
\006\006\004\000\216\106\001\001\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016  
\004\026\004\024\073\046\003\272\317\343\131\106\102\120\255\024  
\234\277\003\073\357\326\076\061\060\020\006\011\053\006\001\004  
\001\202\067\025\001\004\003\002\001\000\060\104\006\003\125\035  
\040\004\075\060\073\060\071\006\013\053\006\001\004\001\201\372  
\075\001\001\001\060\052\060\050\006\010\053\006\001\005\005\007  
\002\001\026\034\150\164\164\160\072\057\057\167\167\167\056\145  
\155\145\056\154\166\057\162\145\160\157\163\151\164\157\162\171  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\002\001\000\205\346\246\224\344\331\106\137\235\277\223\273  
\371\153\166\144\050\256\277\074\105\052\212\223\171\154\323\113  
\210\206\040\153\042\046\070\075\034\023\252\353\141\227\154\056  
\076\127\234\154\103\242\336\155\100\304\061\362\155\272\106\026  
\263\055\306\273\246\334\345\057\261\330\301\325\221\036\021\177  
\373\137\241\334\035\141\370\155\233\141\360\342\077\053\161\325  
\015\313\336\337\145\077\240\157\225\233\172\313\333\065\067\051  
\135\136\235\271\124\261\254\140\022\345\143\331\315\257\122\033  
\005\226\023\174\332\044\165\001\255\324\236\245\313\301\022\105  
\117\127\257\043\277\051\274\352\216\255\170\370\207\043\350\110  
\313\100\250\276\135\063\326\354\306\006\103\302\147\052\350\343  
\205\056\140\236\104\057\053\117\061\261\007\235\225\041\325\052  
\222\257\200\221\323\307\051\275\315\361\025\014\237\001\356\370  
\055\073\244\007\160\111\171\044\355\274\241\323\226\121\202\237  
\302\310\274\336\043\232\307\120\053\232\266\170\122\252\316\225  
\366\140\073\242\231\371\046\146\364\107\054\101\045\274\101\372  
\326\213\177\275\137\202\174\323\105\205\264\114\330\354\263\027  
\357\104\072\365\050\145\357\365\236\161\314\041\336\350\326\121  
\034\020\373\100\374\111\345\134\204\027\257\252\031\136\242\355  
\116\036\242\373\312\107\034\034\144\076\024\221\242\071\031\064

```
\210\177\221\313\073\235\031\160\352\050\373\374\120\017\314\275
\075\136\002\003\153\171\065\104\101\166\356\266\055\164\204\341
\202\161\323\045\260\323\303\231\104\253\077\342\014\245\356\275
\246\374\244\021\000\356\234\275\067\321\326\142\304\060\024\055
\020\012\227\212\210\365\045\074\226\276\106\100\032\212\300\205
\166\304\240\111\340\111\245\347\031\265\011\363\314\115\355\026
\136\232\324\323\310\151\320\330\212\067\205\153\116\344\252\007
\222\134\324\161\161\201\110\323\170\365\126\140\376\314\002\324
\000\223\037\114\222\100\227\276\162\123\171\056\046\122\276\246
\243\164\261\224\331\024\143\072\156\133\321\074\222\047\122\220
\062\132\222\322\017\116\133\013\006\072\142\345\326\047\014\001
\366\045\002\270\213\020\051\102\251\367\151\312\334\353\012\222
\113\050\061\206
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "E-ME SSI (RCA)"

# Issuer: CN=E-ME SSI (RCA),OU=Sertifikācijas pakalpojumu dala,C=LV

# Serial Number:2e:ef:db:fb:d8:89:3d:8f:49:1c:93:72:fe:45:df:ed

# Subject: CN=E-ME SSI (RCA),OU=Sertifikācijas pakalpojumu dala,C=LV

# Not Valid Before: Tue May 19 08:45:56 2009

# Not Valid After: Wed May 19 08:48:15 2027

# Fingerprint (MD5): cb:bd:c3:68:2d:b3:cb:18:59:d3:29:52:e8:c6:64:89

# Fingerprint (SHA1): c9:32:1d:e6:b5:a8:26:66:cf:69:71:a1:8a:56:f2:d3:a8:67:56:02

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL

CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "E-ME SSI (RCA)"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\311\062\035\346\265\250\046\146\317\151\161\241\212\126\362\323
\250\147\126\002
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\313\275\303\150\055\263\313\030\131\323\051\122\350\306\144\211
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\120\061\013\060\011\006\003\125\004\006\023\002\114\126\061
\050\060\046\006\003\125\004\013\023\037\123\145\162\164\151\146
\151\153\141\143\151\152\141\163\040\160\141\153\141\154\160\157
\152\165\155\165\040\144\141\154\141\061\027\060\025\006\003\125
\004\003\023\016\105\055\115\105\040\123\123\111\040\050\122\103
\101\051
```

```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\056\357\333\373\330\211\075\217\111\034\223\162\376\105
\337\355
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
Microsoft Code Signing Only Certificate
Certificate "ACEDICOM Root"
Issuer: C=ES,O=EDICOM,OU=PKI,CN=ACEDICOM Root
Serial Number:61:8d:c7:86:3b:01:82:05
Subject: C=ES,O=EDICOM,OU=PKI,CN=ACEDICOM Root
Not Valid Before: Fri Apr 18 16:24:22 2008
Not Valid After: Thu Apr 13 16:24:22 2028
Fingerprint (MD5): 42:81:a0:e2:1c:e3:55:10:de:55:89:42:65:96:22:e6
Fingerprint (SHA1): e0:b4:32:2e:b2:f6:a5:68:b6:54:53:84:48:18:4a:50:36:87:43:84
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACEDICOM Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\026\060\024\006\003\125\004\003\014\015\101\103\105
\104\111\103\117\115\040\122\157\157\164\061\014\060\012\006\003
\125\004\013\014\003\120\113\111\061\017\060\015\006\003\125\004
\012\014\006\105\104\111\103\117\115\061\013\060\011\006\003\125
\004\006\023\002\105\123
END
CKA_ID UTF8 "0"
CKA_ISSUER
MULTILINE_OCTAL
\060\104\061\026\060\024\006\003\125\004\003\014\015\101\103\105
\104\111\103\117\115\040\122\157\157\164\061\014\060\012\006\003
\125\004\013\014\003\120\113\111\061\017\060\015\006\003\125\004
\012\014\006\105\104\111\103\117\115\061\013\060\011\006\003\125
\004\006\023\002\105\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\141\215\307\206\073\001\202\005
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\265\060\202\003\235\240\003\002\001\002\002\010\141
\215\307\206\073\001\202\005\060\015\006\011\052\206\110\206\367

```



\015\001\001\005\005\000\060\104\061\026\060\024\006\003\125\004  
\003\014\015\101\103\105\104\111\103\117\115\040\122\157\157\164  
\061\014\060\012\006\003\125\004\013\014\003\120\113\111\061\017  
\060\015\006\003\125\004\012\014\006\105\104\111\103\117\115\061  
\013\060\011\006\003\125\004\006\023\002\105\123\060\036\027\015  
\060\070\060\064\061\070\061\066\062\064\062\062\132\027\015\062  
\070\060\064\061\063\061\066\062\064\062\062\132\060\104\061\026  
\060\024\006\003\125\004\003\014\015\101\103\105\104\111\103\117  
\115\040\122\157\157\164\061\014\060\012\006\003\125\004\013\014  
\003\120\113\111\061\017\060\015\006\003\125\004\012\014\006\105  
\104\111\103\117\115\061\013\060\011\006\003\125\004\006\023\002  
\105\123\060\202\002\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202  
\002\001\000\377\222\225\341\150\006\166\264\054\310\130\110\312  
\375\200\124\051\125\143\044\377\220\145\233\020\165\173\303\152  
\333\142\002\001\362\030\206\265\174\132\070\261\344\130\271\373  
\323\330\055\237\275\062\067\277\054\025\155\276\265\364\041\322  
\023\221\331\007\255\001\005\326\363\275\167\316\137\102\201\012  
\371\152\343\203\000\250\053\056\125\023\143\201\312\107\034\173  
\134\026\127\172\033\203\140\004\072\076\145\303\315\001\336\336  
\244\326\014\272\216\336\331\004\356\027\126\042\233\217\143\375  
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CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```

Microsoft Code Signing Only Certificate
Trust for "ACEDICOM Root"
Issuer: C=ES,O=EDICOM,OU=PKI,CN=ACEDICOM Root
Serial Number:61:8d:c7:86:3b:01:82:05
Subject: C=ES,O=EDICOM,OU=PKI,CN=ACEDICOM Root
Not Valid Before: Fri Apr 18 16:24:22 2008
Not Valid After: Thu Apr 13 16:24:22 2028
Fingerprint (MD5): 42:81:a0:e2:1c:e3:55:10:de:55:89:42:65:96:22:e6
Fingerprint (SHA1): e0:b4:32:2e:b2:f6:a5:68:b6:54:53:84:48:18:4a:50:36:87:43:84
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACEDICOM Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\340\264\062\056\262\366\245\150\266\124\123\204\110\030\112\120
\066\207\103\204
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\102\201\240\342\034\343\125\020\336\125\211\102\145\226\042\346
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\026\060\024\006\003\125\004\003\014\015\101\103\105
\104\111\103\117\115\040\122\157\157\164\061\014\060\012\006\003
\125\004\013\014\003\120\113\111\061\017\060\015\006\003\125\004
\012\014\006\105\104\111\103\117\115\061\013\060\011\006\003\125
\004\006\023\002\105\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\141\215\307\206\073\001\202\005
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

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```

Microsoft Code Signing Only Certificate
#
Certificate "Autoridad Certificadora Raiz de la Secretaria de Economia"
Issuer: 1.2.840.113549.1.9.1=acrse@economia.gob.mx,O=Secretaria de Economia,OU=Direccion General de
Normatividad Mercantil,CN=Autoridad Certificadora Raiz de la Secretaria de Economia,STREET=Insurgentes Sur
1940,2.5.4.17=01030,C=MX,ST=Distrito Federal,L=Alvaro Obregon
Serial Number: 1 (0x1)
Subject: 1.2.840.113549.1.9.1=acrse@economia.gob.mx,O=Secretaria de Economia,OU=Direccion General de
Normatividad Mercantil,CN=Autoridad Certificadora Raiz de la Secretaria de Economia,STREET=Insurgentes Sur
1940,2.5.4.17=01030,C=MX,ST=Distrito Federal,L=Alvaro Obregon
Not Valid Before: Sun May 08 00:00:00 2005

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Not Valid After: Thu May 08 00:00:00 2025
Fingerprint (MD5): 07:61:92:04:7e:a6:b9:cd:5e:6b:00:7a:e3:bf:1d:04
Fingerprint (SHA1): 34:d4:99:42:6f:9f:c2:bb:27:b0:75:ba:b6:82:aa:e5:ef:fc:ba:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad Certificadora Raiz de la Secretaria de Economia"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\154\166\141\162\157\040\117\142\162\145\147\157\156\061\031\060
\027\006\003\125\004\010\023\020\104\151\163\164\162\151\164\157
\040\106\145\144\145\162\141\154\061\013\060\011\006\003\125\004
\006\023\002\115\130\061\016\060\014\006\003\125\004\021\023\005
\060\061\060\063\060\061\035\060\033\006\003\125\004\011\023\024
\111\156\163\165\162\147\145\156\164\145\163\040\123\165\162\040
\061\071\064\060\061\102\060\100\006\003\125\004\003\023\071\101
\165\164\157\162\151\144\141\144\040\103\145\162\164\151\146\151
\143\141\144\157\162\141\040\122\141\151\172\040\144\145\040\154
\141\040\123\145\143\162\145\164\141\162\151\141\040\144\145\040
\105\143\157\156\157\155\151\141\061\064\060\062\006\003\125\004
\013\023\053\104\151\162\145\143\143\151\157\156\040\107\145\156
\145\162\141\154\040\144\145\040\116\157\162\155\141\164\151\166
\151\144\141\144\040\115\145\162\143\141\156\164\151\154\061\037
\060\035\006\003\125\004\012\023\026\123\145\143\162\145\164\141
\162\151\141\040\144\145\040\105\143\157\156\157\155\151\141\061
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\013\023\053\104\151\162\145\143\143\151\157\156\040\107\145\156
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

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\141\051\107\363\313\024\000\323\332\342\335\355\163\337\113\362
\143\344\046\330\165\320\115\103\024\220\026\224\107\001\377\241
\131\113\344\166\233\131\003\336\326\027\366\173\327\134\370\351
\343\157\310\116\340\107\046\261\342\234\174\112\061\345\144\021
\340\260\137\332\221\066\110\037\372\011\212\145\150\365\016\302
\237\357\270\152\317\167\376\022\355\066\332\021\066\255\031\152
\302\324\216\122\327\150\357\061
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Autoridad Certificadora Raiz de la Secretaria de Economia"

# Issuer: 1.2.840.113549.1.9.1=acrse@economia.gob.mx,O=Secretaria de Economia,OU=Direccion General de Normatividad

Mercantil,CN=Autoridad Certificadora Raiz de la Secretaria de Economia,STREET=Insurgentes Sur 1940,2.5.4.17=01030,C=MX,ST=Distrito Federal,L=Alvaro Obregon

# Serial Number: 1 (0x1)

# Subject: 1.2.840.113549.1.9.1=acrse@economia.gob.mx,O=Secretaria de Economia,OU=Direccion General de Normatividad Mercantil,CN=Autoridad Certificadora Raiz de la Secretaria de Economia,STREET=Insurgentes Sur 1940,2.5.4.17=01030,C=MX,ST=Distrito Federal,L=Alvaro Obregon

# Not Valid Before: Sun May 08 00:00:00 2005

# Not Valid After: Thu May 08 00:00:00 2025

# Fingerprint (MD5): 07:61:92:04:7e:a6:b9:cd:5e:6b:00:7a:e3:bf:1d:04

# Fingerprint (SHA1): 34:d4:99:42:6f:9f:c2:bb:27:b0:75:ba:b6:82:aa:e5:ef:fc:ba:74

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Autoridad Certificadora Raiz de la Secretaria de Economia"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\064\324\231\102\157\237\302\273\047\260\165\272\266\202\252\345
\357\374\272\164
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\007\141\222\004\176\246\271\315\136\153\000\172\343\277\035\004
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\202\001\061\061\027\060\025\006\003\125\004\007\023\016\101
\154\166\141\162\157\040\117\142\162\145\147\157\156\061\031\060
\027\006\003\125\004\010\023\020\104\151\163\164\162\151\164\157
\040\106\145\144\145\162\141\154\061\013\060\011\006\003\125\004
\006\023\002\115\130\061\016\060\014\006\003\125\004\021\023\005
\060\061\060\063\060\061\035\060\033\006\003\125\004\011\023\024
\111\156\163\165\162\147\145\156\164\145\163\040\123\165\162\040
```

```
\061\071\064\060\061\102\060\100\006\003\125\004\003\023\071\101
\165\164\157\162\151\144\141\144\040\103\145\162\164\151\146\151
\143\141\144\157\162\141\040\122\141\151\172\040\144\145\040\154
\141\040\123\145\143\162\145\164\141\162\151\141\040\144\145\040
\105\143\157\156\157\155\151\141\061\064\060\062\006\003\125\004
\013\023\053\104\151\162\145\143\143\151\157\156\040\107\145\156
\145\162\141\154\040\144\145\040\116\157\162\155\141\164\151\166
\151\144\141\144\040\115\145\162\143\141\156\164\151\154\061\037
\060\035\006\003\125\004\012\023\026\123\145\143\162\145\164\141
\162\151\141\040\144\145\040\105\143\157\156\157\155\151\141\061
\044\060\042\006\011\052\206\110\206\367\015\001\011\001\026\025
\141\143\162\163\145\100\145\143\157\156\157\155\151\141\056\147
\157\142\056\155\170
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\001\001
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Correo Uruguayo - Root CA"

# Issuer: CN=Correo Uruguayo - Root CA,OU=SERVICIOS ELECTRONICOS,O=ADMINISTRACION  
NACIONAL DE CORREOS,C=UY

# Serial Number:ca:22:79:08:23:2a:f0:f5:82:b8:85:d3:63:dd:f1

# Subject: CN=Correo Uruguayo - Root CA,OU=SERVICIOS ELECTRONICOS,O=ADMINISTRACION  
NACIONAL DE CORREOS,C=UY

# Not Valid Before: Mon Jul 14 16:52:15 2008

# Not Valid After: Tue Dec 31 02:59:59 2030

# Fingerprint (MD5): 24:6d:ab:d2:f2:ea:4a:66:ae:5b:bc:ae:50:ad:6e:56

# Fingerprint (SHA1): f9:dd:19:26:6b:20:43:f1:fe:4b:3d:cb:01:90:af:f1:1f:31:a6:9d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Correo Uruguayo - Root CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\131\061
\053\060\051\006\003\125\004\012\014\042\101\104\115\111\116\111
\123\124\122\101\103\111\117\116\040\116\101\103\111\117\116\101
\114\040\104\105\040\103\117\122\122\105\117\123\061\037\060\035
\006\003\125\004\013\014\026\123\105\122\126\111\103\111\117\123
\040\105\114\105\103\124\122\117\116\111\103\117\123\061\042\060
\040\006\003\125\004\003\014\031\103\157\162\162\145\157\040\125
```



\162\165\147\165\141\171\157\040\055\040\122\157\157\164\040\103  
\101  
END  
CKA\_ID  
UTF8 "0"  
CKA\_ISSUER MULTILINE\_OCTAL  
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\131\061  
\053\060\051\006\003\125\004\012\014\042\101\104\115\111\116\111  
\123\124\122\101\103\111\117\116\040\116\101\103\111\117\116\101  
\114\040\104\105\040\103\117\122\122\105\117\123\061\037\060\035  
\006\003\125\004\013\014\026\123\105\122\126\111\103\111\117\123  
\040\105\114\105\103\124\122\117\116\111\103\117\123\061\042\060  
\040\006\003\125\004\003\014\031\103\157\162\162\145\157\040\125  
\162\165\147\165\141\171\157\040\055\040\122\157\157\164\040\103  
\101  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\020\000\312\042\171\010\043\052\360\365\202\270\205\323\143  
\335\361  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\006\032\060\202\004\002\240\003\002\001\002\002\020\000  
\312\042\171\010\043\052\360\365\202\270\205\323\143\335\361\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\177  
\061\013\060\011\006\003\125\004\006\023\002\125\131\061\053\060  
\051\006\003\125\004\012\014\042\101\104\115\111\116\111\123\124  
\122\101\103\111\117\116\040\116\101\103\111\117\116\101\114\040  
\104\105\040\103\117\122\122\105\117\123\061\037\060\035\006\003  
\125\004\013\014\026\123\105\122\126\111\103\111\117\123\040\105  
\114\105\103\124\122\117\116\111\103\117\123\061\042\060\040\006  
\003\125\004\003\014\031\103\157\162\162\145\157\040\125\162\165  
\147\165\141\171\157\040\055\040\122\157\157\164\040\103\101\060  
\036\027\015\060\070\060\067\061\064\061\066\065\062\061\065\132  
\027\015\063\060\061\062\063\061\060\062\065\071\065\071\132\060  
\177\061\013\060\011\006\003\125\004\006\023\002\125\131\061\053  
\060\051\006\003\125\004\012\014\042\101\104\115\111\116\111\123  
\124\122\101\103\111\117\116\040\116\101\103\111\117\116\101\114  
\040\104\105\040\103\117\122\122\105\117\123\061\037\060\035\006  
\003\125\004\013\014\026\123\105\122\126\111\103\111\117\123\040  
\105\114\105\103\124\122\117\116\111\103\117\123\061\042\060\040  
\006\003\125\004\003\014\031\103\157\162\162\145\157\040\125\162  
\165\147\165\141\171\157\040\055\040\122\157\157\164\040\103\101  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\261\075\322\247\045\160\227\203\170\016\327\062\311\146\016  
\170\043\344\052\033\354\303\357\123\205\203\273\312\317\176\352  
\123\231\155\047\125\310\321\070\041\100\156\111\115\303\075\366  
\011\053\006\031\103\251\230\311\001\116\364\252\200\060\007\125

\363\365\267\175\231\267\163\205\325\034\145\126\154\015\062\233  
\010\016\064\141\052\100\011\204\067\303\146\355\015\114\234\014  
\170\100\072\354\355\253\314\244\204\362\165\061\225\100\250\252  
\273\223\265\167\230\154\362\310\340\041\132\043\344\102\247\223  
\310\250\035\070\316\244\032\100\100\277\074\223\220\233\137\326  
\224\301\042\133\106\327\305\000\025\325\217\306\367\336\013\257  
\156\213\005\217\133\200\225\016\243\275\223\314\220\362\175\343  
\110\176\262\315\007\075\033\355\024\220\164\363\335\064\037\174  
\344\003\131\361\055\315\340\243\240\073\041\056\134\256\254\010  
\006\120\025\061\065\356\137\371\037\015\064\245\200\156\142\162  
\117\343\041\272\070\100\135\137\333\150\052\134\064\306\010\073  
\366\174\056\250\215\304\267\246\255\331\233\277\031\101\016\110  
\071\011\146\156\015\064\001\305\273\007\021\043\244\332\376\140  
\226\050\107\334\217\147\233\023\257\175\171\016\170\315\300\214  
\057\273\041\054\374\164\026\036\336\300\062\235\372\170\072\206  
\272\076\311\170\012\000\321\344\340\311\022\342\133\334\353\273  
\200\232\062\065\253\360\060\303\016\110\204\057\215\010\012\366  
\054\214\115\062\200\105\125\010\333\315\015\250\277\010\172\270  
\347\150\135\232\224\211\225\274\374\232\216\270\177\072\330\154  
\325\364\030\254\151\342\244\301\013\263\037\243\202\237\363\212  
\074\205\100\070\011\372\302\005\076\341\234\211\372\303\005\154  
\010\217\135\121\364\177\273\304\363\154\001\275\075\117\304\031  
\213\071\331\312\314\351\171\210\004\125\253\155\270\332\026\105  
\145\071\025\005\030\373\013\054\163\001\355\224\122\345\175\014  
\001\073\011\240\115\361\075\010\201\146\064\066\027\104\360\147  
\363\133\362\005\266\041\230\130\331\364\241\067\331\157\346\357  
\126\304\373\277\126\142\002\254\060\060\266\002\326\322\026\374  
\116\352\207\103\232\150\135\210\243\221\106\050\053\277\071\025  
\025\002\003\001\000\001\243\201\221\060\201\216\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006  
\003\125\035\016\004\026\004\024\175\273\151\353\210\141\341\100  
\317\107\043\144\000\206\242\146\153\334\204\225\060\114\006\003  
\125\035\040\004\105\060\103\060\101\006\004\125\035\040\000\060  
\071\060\067\006\010\053\006\001\005\005\007\002\001\026\053\150  
\164\164\160\072\057\057\167\167\167\056\143\157\162\162\145\157  
\056\143\157\155\056\165\171\057\143\157\162\162\145\157\143\145  
\162\164\057\143\160\163\056\160\144\146\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\126\337  
\023\211\276\142\267\016\201\041\163\244\324\067\312\355\267\057  
\225\164\327\211\370\113\107\201\356\147\355\270\051\337\041\240  
\374\124\147\147\310\127\054\133\241\012\165\170\041\041\312\240  
\250\337\153\234\331\066\002\215\270\001\301\157\216\173\154\311  
\244\262\305\106\251\312\114\002\201\372\243\173\235\075\110\346  
\312\100\146\322\104\235\166\340\125\271\246\234\247\321\103\330  
\365\240\264\235\370\367\345\246\246\102\363\002\062\131\106\162  
\053\024\354\136\145\325\121\201\170\316\252\057\215\226\211\171  
\152\373\017\310\133\317\264\256\220\266\137\343\174\142\154\267

\246\377\220\201\265\230\221\163\022\060\257\307\350\201\002\150  
\163\051\273\130\165\075\267\326\103\325\256\115\362\102\271\360  
\337\332\061\000\023\332\341\263\266\006\213\133\375\311\230\270  
\242\023\321\272\217\301\212\032\236\017\377\202\276\004\202\345  
\053\223\076\036\265\242\014\033\306\032\260\163\211\166\203\274  
\216\073\273\027\155\024\303\213\276\175\025\046\265\251\234\027  
\172\120\172\055\353\351\231\224\256\230\020\275\356\052\135\135  
\326\216\064\133\254\036\207\140\153\230\307\207\217\323\234\262  
\150\005\111\007\371\251\061\146\234\376\277\247\131\350\054\360  
\066\324\362\250\031\202\300\236\247\071\371\261\230\064\243\037  
\372\315\311\031\055\170\336\267\375\142\360\223\243\376\000\133  
\326\012\344\363\176\174\227\050\341\005\354\005\064\105\023\377  
\051\023\141\212\047\117\333\270\322\222\041\047\265\210\167\147  
\250\176\317\044\074\207\010\004\063\163\217\013\266\206\370\317  
\357\262\246\044\036\013\221\221\000\120\026\062\022\330\011\045  
\332\143\116\335\333\055\327\347\004\153\343\143\037\251\376\251  
\001\143\304\312\114\024\150\203\274\005\254\131\026\373\156\241  
\007\157\273\113\276\155\230\110\166\045\173\112\021\226\124\010  
\254\251\363\067\253\203\303\321\315\201\230\300\345\100\065\270  
\237\221\347\157\346\113\040\026\212\123\173\254\072\321\230\065  
\124\320\324\277\256\176\232\113\036\351\165\243\045\260\073\347  
\145\277\117\225\364\035\275\304\272\311\115\201\121\302\077\132  
\331\022\364\041\033\326\225\352\075\220\376\251\223\342

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Correo Uruguayo - Root CA"

# Issuer: CN=Correo Uruguayo - Root CA,OU=SERVICIOS ELECTRONICOS,O=ADMINISTRACION  
NACIONAL DE CORREOS,C=UY

# Serial Number:ca:22:79:08:23:2a:f0:f5:82:b8:85:d3:63:dd:f1

# Subject: CN=Correo Uruguayo - Root CA,OU=SERVICIOS ELECTRONICOS,O=ADMINISTRACION  
NACIONAL DE CORREOS,C=UY

# Not Valid Before: Mon Jul 14 16:52:15 2008

# Not Valid After: Tue Dec 31 02:59:59 2030

# Fingerprint (MD5): 24:6d:ab:d2:f2:ea:4a:66:ae:5b:bc:ae:50:ad:6e:56

# Fingerprint (SHA1): f9:dd:19:26:6b:20:43:f1:fe:4b:3d:cb:01:90:af:f1:1f:31:a6:9d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE

CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Correo Uruguayo - Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\371\335\031\046\153\040\103\361\376\113\075\313\001\220\257\361

```
\037\061\246\235
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\044\155\253\322\362\352\112\146\256\133\274\256\120\255\156\126
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\131\061
\053\060\051\006\003\125\004\012\014\042\101\104\115\111\116\111
\123\124\122\101\103\111\117\116\040\116\101\103\111\117\116\101
\114\040\104\105\040\103\117\122\122\105\117\123\061\037\060\035
\006\003\125\004\013\014\026\123\105\122\126\111\103\111\117\123
\040\105\114\105\103\124\122\117\116\111\103\117\123\061\042\060
\040\006\003\125\004\003\014\031\103\157\162\162\145\157\040\125
\162\165\147\165\141\171\157\040\055\040\122\157\157\164\040\103
\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\000\312\042\171\010\043\052\360\365\202\270\205\323\143
\335\361
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

# Microsoft Code Signing Only Certificate

# Certificate "Chambers of Commerce Root - 2008"

# Issuer: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current address at [www.camerfirma.com/address](http://www.camerfirma.com/address)),C=EU

# Serial Number:a3:da:42:7e:a4:b1:ae:da

# Subject: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current address at [www.camerfirma.com/address](http://www.camerfirma.com/address)),C=EU

# Not Valid Before: Fri Aug 01 12:29:50 2008

# Not Valid After: Sat Jul 31 12:29:50 2038

# Fingerprint (MD5): 5e:80:9e:84:5a:0e:65:0b:17:02:f3:55:18:2a:3e:d7

# Fingerprint (SHA1): 78:6a:74:ac:76:ab:14:7f:9c:6a:30:50:ba:9e:a8:7e:fe:9a:ce:3c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Chambers  
of Commerce Root - 2008"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
```

\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141  
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144  
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011  
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125  
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155  
\141\040\123\056\101\056\061\051\060\047\006\003\125\004\003\023  
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MULTILINE\_OCTAL

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CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Chambers of Commerce Root - 2008"

# Issuer: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current address at www.camerfirma.com/address),C=EU

# Serial Number:a3:da:42:7e:a4:b1:ae:da

# Subject: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current address at www.camerfirma.com/address),C=EU

# Not Valid Before: Fri Aug 01 12:29:50 2008

# Not Valid After: Sat Jul 31 12:29:50 2038

# Fingerprint

(MD5): 5e:80:9e:84:5a:0e:65:0b:17:02:f3:55:18:2a:3e:d7

# Fingerprint (SHA1): 78:6a:74:ac:76:ab:14:7f:9c:6a:30:50:ba:9e:a8:7e:fe:9a:ce:3c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Chambers of Commerce Root - 2008"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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MULTILINE_OCTAL
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Global Chambersign Root - 2008"
Issuer: CN=Global Chambersign Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current
address at www.camerfirma.com/address),C=EU
Serial Number:c9:cd:d3:e9:d5:7d:23:ce
Subject: CN=Global Chambersign Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see
current address
at www.camerfirma.com/address),C=EU
Not Valid Before: Fri Aug 01 12:31:40 2008
Not Valid After: Sat Jul 31 12:31:40 2038
Fingerprint (MD5): 9e:80:ff:78:01:0c:2e:c1:36:bd:fe:96:90:6e:08:f3
Fingerprint (SHA1): 4a:bd:ee:ec:95:0d:35:9c:89:ae:c7:52:a1:2c:5b:29:f6:d6:aa:0c
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CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Global Chambersign Root - 2008"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002  
\012\002\202\002\001\000\300\337\126\323\344\072\233\166\105\264  
\023\333\377\301\266\031\213\067\101\030\225\122\107\353\027\235  
\051\210\216\065\154\006\062\056\107\142\363\111\004\277\175\104  
\066\261\161\314\275\132\011\163\325\331\205\104\377\221\127\045  
\337\136\066\216\160\321\134\161\103\035\331\332\357\134\322\373  
\033\275\072\265\313\255\243\314\104\247\015\256\041\025\077\271  
\172\133\222\165\330\244\022\070\211\031\212\267\200\322\342\062  
\157\126\234\221\326\210\020\013\263\164\144\222\164\140\363\366

\317\030\117\140\262\043\320\307\073\316\141\113\231\217\302\014  
\320\100\262\230\334\015\250\116\243\271\012\256\140\240\255\105  
\122\143\272\146\275\150\340\371\276\032\250\201\273\036\101\170  
\165\323\301\376\000\125\260\207\124\350\047\220\065\035\114\063  
\255\227\374\227\056\230\204\277\054\311\243\277\321\230\021\024  
\355\143\370\312\230\210\130\027\231\355\105\003\227\176\074\206  
\036\210\214\276\362\221\204\217\145\064\330\000\114\175\267\061  
\027\132\051\172\012\030\044\060\243\067\265\172\251\001\175\046  
\326\371\016\216\131\361\375\033\063\265\051\073\027\073\101\266  
\041\335\324\300\075\245\237\237\037\103\120\311\273\274\154\172  
\227\230\356\315\214\037\373\234\121\256\213\160\275\047\237\161  
\300\153\254\175\220\146\350\327\135\072\015\260\325\302\215\325  
\310\235\235\301\155\320\320\277\121\344\343\370\303\070\066\256  
\326\247\165\346\257\204\103\135\223\222\014\152\007\336\073\035  
\230\042\326\254\301\065\333\243\240\045\377\162\265\166\035\336  
\155\351\054\146\054\122\204\320\105\222\316\034\345\345\063\035  
\334\007\123\124\243\252\202\073\232\067\057\334\335\240\144\351  
\346\335\275\256\374\144\205\035\074\247\311\006\336\204\377\153  
\350\153\032\074\305\242\263\102\373\213\011\076\137\010\122\307  
\142\304\324\005\161\277\304\144\344\370\241\203\350\076\022\233  
\250\036\324\066\115\057\161\366\215\050\366\203\251\023\322\141  
\301\221\273\110\300\064\217\101\214\113\114\333\151\022\377\120  
\224\234\040\203\131\163\355\174\241\362\361\375\335\367\111\323  
\103\130\240\126\143\312\075\075\345\065\126\131\351\016\312\040  
\314\053\113\223\051\017\002\003\001\000\001\243\202\001\152\060  
\202\001\146\060\022\006\003\125\035\023\001\001\377\004\010\060  
\006\001\001\377\002\001\014\060\035\006\003\125\035\016\004\026  
\004\024\271\011\312\234\036\333\323\154\072\153\256\355\124\361  
\133\223\006\065\056\136\060\201\341\006\003\125\035\043\004\201  
\331\060\201\326\200\024\271\011\312\234\036\333\323\154\072\153  
\256\355\124\361\133\223\006\065\056\136\241\201\262\244\201\257  
\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125  
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151  
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141  
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141  
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144  
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011  
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125  
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155  
\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023  
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163  
\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070\202  
\011\000\311\315\323\351\325\175\043\316\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\006\060\075\006\003\125\035  
\040\004\066\060\064\060\062\006\004\125\035\040\000\060\052\060  
\050\006\010\053\006\001\005\005\007\002\001\026\034\150\164\164  
\160\072\057\057\160\157\154\151\143\171\056\143\141\155\145\162  
\146\151\162\155\141\056\143\157\155\060\015\006\011\052\206\110

\206\367\015\001\001\005\005\000\003\202\002\001\000\200\210\177  
\160\336\222\050\331\005\224\106\377\220\127\251\361\057\337\032  
\015\153\372\174\016\034\111\044\171\047\330\106\252\157\051\131  
\122\210\160\022\352\335\075\365\233\123\124\157\341\140\242\250  
\011\271\354\353\131\174\306\065\361\334\030\351\361\147\345\257  
\272\105\340\011\336\312\104\017\302\027\016\167\221\105\172\063  
\137\137\226\054\150\213\301\107\217\230\233\075\300\354\313\365  
\325\202\222\204\065\321\276\066\070\126\162\061\133\107\055\252  
\027\244\143\121\353\012\001\255\177\354\165\236\313\241\037\361  
\177\022\261\271\344\144\177\147\326\043\052\364\270\071\135\230  
\350\041\247\341\275\075\102\032\164\232\160\257\150\154\120\135  
\111\317\377\373\016\135\346\054\107\327\201\072\131\000\265\163  
\153\143\040\366\061\105\010\071\016\364\160\176\100\160\132\077  
\320\153\102\251\164\075\050\057\002\155\165\162\225\011\215\110  
\143\306\306\043\127\222\223\136\065\301\215\371\012\367\054\235  
\142\034\366\255\174\335\246\061\036\266\261\307\176\205\046\372  
\244\152\265\332\143\060\321\357\223\067\262\146\057\175\005\367  
\347\267\113\230\224\065\300\331\072\051\301\235\262\120\063\035  
\112\251\132\246\311\003\357\355\364\347\250\156\212\264\127\204  
\353\244\077\320\356\252\252\207\133\143\350\223\342\153\250\324  
\270\162\170\153\033\355\071\344\135\313\233\252\207\325\117\116  
\000\376\331\152\237\074\061\017\050\002\001\175\230\350\247\260  
\242\144\236\171\370\110\362\025\251\314\346\310\104\353\077\170  
\231\362\173\161\076\074\361\230\247\305\030\022\077\346\273\050  
\063\102\351\105\012\174\155\362\206\171\057\305\202\031\175\011  
\211\174\262\124\166\210\256\336\301\363\314\341\156\333\061\326  
\223\256\231\240\357\045\152\163\230\211\133\072\056\023\210\036  
\277\300\222\224\064\033\343\047\267\213\036\157\102\377\347\351  
\067\233\120\035\055\242\371\002\356\313\130\130\072\161\274\150  
\343\252\301\257\034\050\037\242\334\043\145\077\201\352\256\231  
\323\330\060\317\023\015\117\025\311\204\274\247\110\055\370\060  
\043\167\330\106\113\171\155\366\214\355\072\177\140\021\170\364  
\351\233\256\325\124\300\164\200\321\013\102\237\301

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Global Chambersign Root - 2008"

# Issuer: CN=Global Chambersign Root - 2008,O=AC Camerfirma

S.A.,2.5.4.5=A82743287,L=Madrid (see current address at [www.camerfirma.com/address](http://www.camerfirma.com/address)),C=EU

# Serial Number:c9:cd:d3:e9:d5:7d:23:ce

# Subject: CN=Global Chambersign Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current address at [www.camerfirma.com/address](http://www.camerfirma.com/address)),C=EU

# Not Valid Before: Fri Aug 01 12:31:40 2008

# Not Valid After: Sat Jul 31 12:31:40 2038

```

Fingerprint (MD5): 9e:80:ff:78:01:0c:2e:c1:36:bd:fe:96:90:6e:08:f3
Fingerprint (SHA1): 4a:bd:ee:ec:95:0d:35:9c:89:ae:c7:52:a1:2c:5b:29:f6:d6:aa:0c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Global Chambersign Root - 2008"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\112\275\356\354\225\015\065\234\211\256\307\122\241\054\133\051
\366\326\252\014
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\236\200\377\170\001\014\056\301\066\275\376\226\220\156\010\363
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163
\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\311\315\323\351\325\175\043\316
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```
Microsoft Code Signing Only
```

```
Certificate
```

```
Certificate "CNNIC ROOT"
```

```
Issuer: CN=CNNIC ROOT,O=CNNIC,C=CN
```

```
Serial Number:49:33:00:01
```

```
Subject: CN=CNNIC ROOT,O=CNNIC,C=CN
```

```
Not Valid Before: Mon Apr 16 07:09:14 2007
```

```
Not Valid After: Fri Apr 16 07:09:14 2027
```

```
Fingerprint (MD5): 21:bc:82:ab:49:c4:13:3b:4b:b2:2b:5c:6b:90:9c:19
```

```
Fingerprint (SHA1): 8b:af:4c:9b:1d:f0:2a:92:f7:da:12:8e:b9:1b:ac:f4:98:60:4b:6f
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

```
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CNNIC ROOT"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\062\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\016\060\014\006\003\125\004\012\023\005\103\116\116\111\103\061
\023\060\021\006\003\125\004\003\023\012\103\116\116\111\103\040
\122\117\117\124
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\062\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\016\060\014\006\003\125\004\012\023\005\103\116\116\111\103\061
\023\060\021\006\003\125\004\003\023\012\103\116\116\111\103\040
\122\117\117\124
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\111\063\000\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\125\060\202\002\075\240\003\002\001\002\002\004\111
\063\000\001\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\062\061\013\060\011\006\003\125\004\006\023\002\103
\116\061\016\060\014\006\003\125\004\012\023\005\103\116\116\111
\103\061\023\060\021\006\003\125\004\003\023\012\103\116\116\111
\103\040\122\117\117\124\060\036\027\015\060\067\060\064\061\066
\060\067\060\071\061\064\132\027\015\062\067\060\064\061\066\060
\067\060\071\061\064\132\060\062\061\013\060\011\006\003\125\004
\006\023\002\103\116\061\016\060\014\006\003\125\004\012\023\005
\103\116\116\111\103\061\023\060\021\006\003\125\004\003\023\012
\103\116\116\111\103\040\122\117\117\124\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\323\065\367\077\163
\167\255\350\133\163\027\302\321\157\355\125\274\156\352\350\244
\171\262\154\303\243\357\341\237\261\073\110\205\365\232\134\041
\042\020\054\305\202\316\332\343\232\156\067\341\207\054\334\271
\014\132\272\210\125\337\375\252\333\037\061\352\001\361\337\071
\001\301\023\375\110\122\041\304\125\337\332\330\263\124\166\272
\164\261\267\175\327\300\350\366\131\305\115\310\275\255\037\024
\332\337\130\104\045\062\031\052\307\176\176\216\256\070\260\060
\173\107\162\011\061\360\060\333\303\033\166\051\273\151\166\116
\127\371\033\144\242\223\126\267\157\231\156\333\012\004\234\021
\343\200\037\313\143\224\020\012\251\341\144\202\061\371\214\047
\355\246\231\000\366\160\223\030\370\241\064\206\243\335\172\302
\030\171\366\172\145\065\317\220\353\275\063\223\237\123\253\163
\073\346\233\064\040\057\035\357\251\035\143\032\240\200\333\003
```

\057\371\046\032\206\322\215\273\251\276\122\072\207\147\110\015  
\277\264\240\330\046\276\043\137\163\067\177\046\346\222\004\243  
\177\317\040\247\267\363\072\312\313\231\313\002\003\001\000\001  
\243\163\060\161\060\021\006\011\140\206\110\001\206\370\102\001  
\001\004\004\003\002\000\007\060\037\006\003\125\035\043\004\030  
\060\026\200\024\145\362\061\255\052\367\367\335\122\226\012\307  
\002\301\016\357\246\325\073\021\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\013\006\003\125\035\017  
\004\004\003\002\001\376\060\035\006\003\125\035\016\004\026\004  
\024\145\362\061\255\052\367\367\335\122\226\012\307\002\301\016  
\357\246\325\073\021\060\015\006\011\052\206\110\206\367\015\001  
\001\005\005\000\003\202\001\001\000\113\065\356\314\344\256\277  
\303\156\255\237\225\073\113\077\133\036\337\127\051\242\131\312  
\070\342\271\032\377\236\346\156\062\335\036\256\352\065\267\365  
\223\221\116\332\102\341\303\027\140\120\362\321\134\046\271\202  
\267\352\155\344\234\204\347\003\171\027\257\230\075\224\333\307  
\272\000\347\270\277\001\127\301\167\105\062\014\073\361\264\034  
\010\260\375\121\240\241\335\232\035\023\066\232\155\267\307\074  
\271\341\305\331\027\372\203\325\075\025\240\074\273\036\013\342  
\310\220\077\250\206\014\374\371\213\136\205\313\117\133\113\142  
\021\107\305\105\174\005\057\101\261\236\020\151\033\231\226\340  
\125\171\373\116\206\231\270\224\332\206\070\152\223\243\347\313  
\156\345\337\352\041\125\211\234\175\175\177\230\365\000\211\356  
\343\204\300\134\226\265\305\106\352\106\340\205\125\266\033\311  
\022\326\301\315\315\200\363\002\001\074\310\151\313\105\110\143  
\330\224\320\354\205\016\073\116\021\145\364\202\214\246\075\256  
\056\042\224\011\310\134\352\074\201\135\026\052\003\227\026\125  
\011\333\212\101\202\236\146\233\021

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CNNIC ROOT"

# Issuer: CN=CNNIC ROOT,O=CNNIC,C=CN

# Serial Number:49:33:00:01

# Subject: CN=CNNIC ROOT,O=CNNIC,C=CN

# Not Valid Before:

Mon Apr 16 07:09:14 2007

# Not Valid After: Fri Apr 16 07:09:14 2027

# Fingerprint (MD5): 21:bc:82:ab:49:c4:13:3b:4b:b2:2b:5c:6b:90:9c:19

# Fingerprint (SHA1): 8b:af:4c:9b:1d:f0:2a:92:f7:da:12:8e:b9:1b:ac:f4:98:60:4b:6f

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

```

CKA_LABEL UTF8 "CNNIC ROOT"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\213\257\114\233\035\360\052\222\367\332\022\216\271\033\254\364
\230\140\113\157
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\041\274\202\253\111\304\023\073\113\262\053\134\153\220\234\031
END
CKA_ISSUER MULTILINE_OCTAL
\060\062\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\016\060\014\006\003\125\004\012\023\005\103\116\116\111\103\061
\023\060\021\006\003\125\004\003\023\012\103\116\116\111\103\040
\122\117\117\124
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\111\063\000\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST
CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Common Policy"
Issuer: CN=Common Policy,OU=FBCA,O=U.S. Government,C=us
Serial Number:29:36:47:aa:e3:8a:ac:86:4a:23:56:f2:ca:b7:61:af
Subject: CN=Common Policy,OU=FBCA,O=U.S. Government,C=us
Not Valid Before: Mon Oct 15 15:58:00 2007
Not Valid After: Fri Oct 15 16:08:00 2027
Fingerprint (MD5): f0:58:c5:03:82:67:17:ab:8f:da:03:10:27:8e:19:c2
Fingerprint (SHA1): cb:44:a0:97:85:7c:45:fa:18:7e:d9:52:08:6c:b9:84:1f:2d:51:b5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Common Policy"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\165\163\061
\030\060\026\006\003\125\004\012\023\017\125\056\123\056\040\107
\157\166\145\162\156\155\145\156\164\061\015\060\013\006\003\125
\004\013\023\004\106\102\103\101\061\026\060\024\006\003\125\004
\003\023\015\103\157\155\155\157\156\040\120\157\154\151\143\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL

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\060\116\061\013\060\011\006\003\125\004\006\023\002\165\163\061  
\030\060\026\006\003\125\004\012\023\017\125\056\123\056\040\107  
\157\166\145\162\156\155\145\156\164\061\015\060\013\006\003\125  
\004\013\023\004\106\102\103\101\061\026\060\024\006\003\125\004  
\003\023\015\103\157\155\155\157\156\040\120\157\154\151\143\171  
END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\051\066\107\252\343\212\254\206\112\043\126\362\312\267  
\141\257

END

CKA\_VALUE MULTILINE\_OCTAL

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\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\116  
\061\013\060\011\006\003\125\004\006\023\002\165\163\061\030\060  
\026\006\003\125\004\012\023\017\125\056\123\056\040\107\157\166  
\145\162\156\155\145\156\164\061\015\060\013\006\003\125\004\013  
\023\004\106\102\103\101\061\026\060\024\006\003\125\004\003\023  
\015\103\157\155\155\157\156\040\120\157\154\151\143\171\060\036  
\027\015\060\067\061\060\061\065\061\065\065\070\060\060\132\027  
\015\062\067\061\060\061\065\061\066\060\070\060\060\132\060\116  
\061\013\060\011\006\003\125\004\006\023\002\165\163\061\030\060  
\026\006\003\125\004\012\023\017\125\056\123\056\040\107\157\166  
\145\162\156\155\145\156\164\061\015\060\013\006\003\125\004\013  
\023\004\106\102\103\101\061\026\060\024\006\003\125\004\003\023  
\015\103\157\155\155\157\156\040\120\157\154\151\143\171\060\202  
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\227  
\215\275\063\047\344\255\133\373\170\275\057\107\107\156\307\170  
\351\223\234\244\336\311\034\375\057\033\071\070\254\107\027\300  
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\142\153\061\366\372\162\011\175\060\051\006\174\347\174\243\075  
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\003\001\000\001\243\173\060\171\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001  
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\004\026\004\024\057\130\227\330\251\005\230\245\126\037\373\331

\253\165\357\002\074\066\064\307\060\022\006\011\053\006\001\004  
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\053\006\001\004\001\202\067\025\002\004\026\004\024\166\267\140  
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\172\245\277\012\255\266\052\371\231\147\337\203\305\167\037\064  
\011\070\371\176\236\101\340\110\140\376\342\252\135\207\210\352  
\210\375\134\105\262\311\152\332\175\244\255\261\117\277\034\015  
\237\036\232\300\325\024\163\070\053\212\170\100\156\060\367\142  
\341\315\231\374\121\151\147\154\021\335\270\020\243\150\336\046  
\245\126\375\066\154\067\230\154\373\356\174\074\154\153\160\077  
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\130\341\066\101\212\304\266\277\216\335\316\112\263\274\032\300  
\315\372\032\231\322\161\233\372\317\274\362\304\124\243\210\065  
\166\314\033\054\106\157\014\264\321\303\141\166\222\164\021\352  
\113\200\215\034\211\021\213\354\133\377\027\311\110\374\347\340  
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END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Common Policy"

# Issuer: CN=Common Policy,OU=FBCA,O=U.S. Government,C=us

# Serial Number:29:36:47:aa:e3:8a:ac:86:4a:23:56:f2:ca:b7:61:af

# Subject: CN=Common Policy,OU=FBCA,O=U.S. Government,C=us

# Not Valid Before: Mon Oct 15 15:58:00 2007

# Not Valid After: Fri Oct 15 16:08:00 2027

# Fingerprint (MD5):

f0:58:c5:03:82:67:17:ab:8f:da:03:10:27:8e:19:c2

# Fingerprint (SHA1): cb:44:a0:97:85:7c:45:fa:18:7e:d9:52:08:6c:b9:84:1f:2d:51:b5

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Common Policy"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\313\104\240\227\205\174\105\372\030\176\331\122\010\154\271\204  
\037\055\121\265

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\360\130\305\003\202\147\027\253\217\332\003\020\047\216\031\302

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\116\061\013\060\011\006\003\125\004\006\023\002\165\163\061  
\030\060\026\006\003\125\004\012\023\017\125\056\123\056\040\107  
\157\166\145\162\156\155\145\156\164\061\015\060\013\006\003\125  
\004\013\023\004\106\102\103\101\061\026\060\024\006\003\125\004  
\003\023\015\103\157\155\155\157\156\040\120\157\154\151\143\171

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\051\066\107\252\343\212\254\206\112\043\126\362\312\267  
\141\257

END

CKA\_TRUST\_SERVER\_AUTH

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Staat der Nederlanden Root CA - G2"

# Issuer: CN=Staat der Nederlanden Root CA - G2,O=Staat der Nederlanden,C=NL

# Serial Number:98:96:8c

# Subject: CN=Staat der Nederlanden Root CA - G2,O=Staat der Nederlanden,C=NL

# Not Valid Before: Wed Mar 26 11:18:17 2008

# Not Valid After: Wed Mar 25 11:03:10 2020

# Fingerprint (MD5): 7c:a5:0f:f8:5b:9a:7d:6d:30:ae:54:5a:e3:42:a2:8a

# Fingerprint (SHA1): 59:af:82:79:91:86:c7:b4:75:07:cb:cf:03:57:46:eb:04:dd:b7:16

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Staat der Nederlanden Root CA - G2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061  
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040  
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061  
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040  
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040  
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END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061

\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040  
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040  
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END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\004\000\230\226\214

END

CKA\_VALUE MULTILINE\_OCTAL

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\156\061\053\060\051\006\003\125\004\003\014\042\123\164\141\141  
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\156\040\122\157\157\164\040\103\101\040\055\040\107\062\060\036  
\027\015\060\070\060\063\062\066\061\061\061\070\061\067\132\027  
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\006\103\021\231\252\024\045\022\255\042\350\000\155\103\304\251  
\270\345\037\211\113\147\275\141\110\357\375\322\340\140\210\345  
\271\030\140\050\303\167\053\255\260\067\252\067\336\144\131\052  
\106\127\344\113\271\370\067\174\325\066\347\200\301\266\363\324  
\147\233\226\350\316\327\306\012\123\320\153\111\226\363\243\013  
\005\167\110\367\045\345\160\254\060\024\040\045\343\177\165\132  
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\004\046\076\125\072\142\050\245\173\262\060\257\370\067\302\321  
\272\326\070\375\364\357\111\060\067\231\046\041\110\205\001\251  
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\004\005\060\003\001\001\377\060\122\006\003\125\035\040\004\113  
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\203\271\206\215\222\246\306\364\007\045\124\314\026\127\022\112  
\202\170\310\024\331\027\202\046\055\135\040\037\171\256\376\324  
\160\026\026\225\203\330\065\071\377\122\135\165\034\026\305\023  
\125\317\107\314\165\145\122\112\336\360\260\247\344\012\226\013  
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\330\347\312\362\351\227\070\176\211\276\314\373\071\027\141\077  
\162\333\072\221\330\145\001\031\035\255\120\244\127\012\174\113  
\274\234\161\163\052\105\121\031\205\314\216\375\107\247\164\225  
\035\250\321\257\116\027\261\151\046\302\252\170\127\133\305\115  
\247\345\236\005\027\224\312\262\137\240\111\030\215\064\351\046  
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\000\262\121\344\302\370\005\271\171\032\214\064\363\236\133\344  
\067\133\153\112\337\054\127\212\100\132\066\272\335\165\104\010  
\067\102\160\014\376\334\136\041\240\243\212\300\220\234\150\332  
\120\346\105\020\107\170\266\116\322\145\311\303\067\337\341\102  
\143\260\127\067\105\055\173\212\234\277\005\352\145\125\063\367

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\313\012\145\207\246\146\301\304\201\243\167\072\130\036\013\356
\203\213\235\036\322\122\244\314\035\157\260\230\155\224\061\265
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```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Staat der Nederlanden Root CA - G2"

# Issuer: CN=Staat der Nederlanden Root CA - G2,O=Staat der Nederlanden,C=NL

# Serial Number:98:96:8c

# Subject: CN=Staat der Nederlanden Root CA - G2,O=Staat der Nederlanden,C=NL

# Not Valid Before: Wed Mar 26 11:18:17 2008

# Not Valid After: Wed Mar 25 11:03:10 2020

# Fingerprint (MD5): 7c:a5:0f:f8:5b:9a:7d:6d:30:ae:54:5a:e3:42:a2:8a

# Fingerprint (SHA1): 59:af:82:79:91:86:c7:b4:75:07:cb:cf:03:57:46:eb:04:dd:b7:16

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Staat der Nederlanden Root CA - G2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\131\257\202\171\221\206\307\264\165\007\313\317\003\127\106\353
\004\335\267\026
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END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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\174\245\017\370\133\232\175\155\060\256\124\132\343\102\242\212
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END

CKA\_ISSUER MULTILINE\_OCTAL

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\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101\040\055\040\107\062
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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\002\004\000\230\226\214
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END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "NetLock Platina (Class Platinum) Ftanúsítvány"

# Issuer: CN=NetLock Platina (Class Platinum) Ftanúsítvány,OU=Tanúsítványkiadók (Certification Services),O=NetLock Kft.,L=Budapest,C=HU

# Serial Number:49:41:2d:ec:00:10

# Subject: CN=NetLock Platina (Class Platinum) Ftanúsítvány,OU=Tanúsítványkiadók (Certification Services),O=NetLock Kft.,L=Budapest,C=HU

# Not Valid Before: Thu Dec 11 15:12:44 2008

# Not Valid After: Wed Dec 06 15:12:44 2028

# Fingerprint (MD5): d5:97:88:da:64:16:e7:1d:66:4a:a6:ea:37:fc:7a:dc

# Fingerprint (SHA1): ec:93:de:08:3c:93:d9:33:a9:86:b3:d5:cd:e2:5a:cb:2f:ee:cf:8e

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "NetLock Platina (Class Platinum) Ftanúsítvány"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\255\061\013\060\011\006\003\125\004\006\023\002\110\125  
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160  
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145  
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003  
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303  
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143  
\145\163\051\061\073\060\071\006\003\125\004\003\014\062\116\145  
\164\114\157\143\153\040\120\154\141\164\151\156\141\040\050\103  
\154\141\163\163\040\120\154\141\164\151\156\165\155\051\040\106  
\305\221\164\141\156\303\272\163\303\255\164\166\303\241\156\171  
END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\255\061\013\060\011\006\003\125\004\006\023\002\110\125  
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160  
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145  
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003  
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303  
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143  
\145\163\051\061\073\060\071\006\003\125\004\003\014\062\116\145  
\164\114\157\143\153\040\120\154\141\164\151\156\141\040\050\103  
\154\141\163\163\040\120\154\141\164\151\156\165\155\051\040\106  
\305\221\164\141\156\303\272\163\303\255\164\166\303\241\156\171  
END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\006\111\101\055\354\000\020

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\041\060\202\004\011\240\003\002\001\002\002\006\111  
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\001\013\005\000\060\201\255\061\013\060\011\006\003\125\004\006  
\023\002\110\125\061\021\060\017\006\003\125\004\007\014\010\102  
\165\144\141\160\145\163\164\061\025\060\023\006\003\125\004\012  
\014\014\116\145\164\114\157\143\153\040\113\146\164\056\061\067  
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\255\164\166\303\241\156\171\153\151\141\144\303\263\153\040\050  
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\162\166\151\143\145\163\051\061\073\060\071\006\003\125\004\003  
\014\062\116\145\164\114\157\143\153\040\120\154\141\164\151\156  
\141\040\050\103\154\141\163\163\040\120\154\141\164\151\156\165  
\155\051\040\106\305\221\164\141\156\303\272\163\303\255\164\166  
\303\241\156\171\060\036\027\015\060\070\061\062\061\061\061\065  
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\023\002\110\125\061\021\060\017\006\003\125\004\007\014\010\102  
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\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145  
\162\166\151\143\145\163\051\061\073\060\071\006\003\125\004\003  
\014\062\116\145\164\114\157\143\153\040\120\154\141\164\151\156  
\141\040\050\103\154\141\163\163\040\120\154\141\164\151\156\165  
\155\051\040\106\305\221\164\141\156\303\272\163\303\255\164\166  
\303\241\156\171\060\202\002\042\060\015\006\011\052\206\110\206  
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\275\344\326\012\027\154\145\342\146\075\304\321\274\014\266\132  
\326\053\160\137\055\314\041\321\131\020\344\261\023\275\366\314  
\042\225\326\154\106\116\221\062\263\353\365\254\313\004\001\117  
\166\335\123\076\170\237\371\136\274\265\202\023\106\312\020\343  
\035\055\151\053\224\062\020\163\041\253\251\070\305\343\156\023  
\144\325\143\251\355\011\146\354\212\157\211\215\021\206\320\365  
\277\062\226\013\165\160\365\050\130\102\136\254\151\264\365\374  
\221\071\056\242\221\100\321\074\124\101\207\043\144\120\110\171  
\150\113\150\223\113\162\353\200\151\263\112\034\220\276\262\101  
\243\245\315\027\300\321\032\151\177\002\030\112\265\142\207\046  
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\171\304\173\073\126\334\172\370\264\130\316\166\012\256\042\125  
\353\217\307\204\144\173\275\153\312\225\117\330\276\061\023\277  
\215\241\012\053\325\171\267\365\166\255\332\121\134\201\107\142  
\250\252\377\317\123\340\064\161\317\015\045\123\251\236\143\107



|257|205|221|370|317|031|021|345|116|371|317|355|343|065|005|001  
|042|003|317|232|174|352|035|121|132|313|375|163|075|071|013|061  
|353|304|073|312|205|052|021|024|000|240|033|201|242|011|210|110  
|363|174|242|144|241|354|147|264|130|207|360|024|352|251|276|245  
|042|101|115|354|275|244|016|350|075|207|367|057|252|316|065|206  
|117|060|127|222|215|066|256|170|326|375|030|374|327|045|036|317  
|172|374|031|375|240|077|162|027|066|010|101|077|227|066|225|014  
|211|225|161|105|372|204|326|324|040|140|263|105|012|362|267|225  
|075|013|345|244|303|270|022|362|221|154|351|155|140|203|366|105  
|021|005|272|346|107|203|331|221|342|156|341|273|106|153|110|033  
|274|306|373|317|176|336|054|273|220|204|356|266|047|071|347|215  
|242|061|017|337|201|267|054|154|000|342|261|330|052|027|134|033  
|036|107|211|113|027|121|024|100|100|117|304|071|030|062|302|200  
|140|066|345|172|107|147|366|250|005|124|301|135|226|240|037|266  
|210|122|014|002|276|215|125|176|024|113|303|242|001|356|234|212  
|101|135|371|137|226|221|011|216|264|344|265|305|004|337|326|066  
|255|131|264|262|327|002|003|000|363|221|243|105|060|103|060|022  
|006|003|125|035|023|001|001|377|004|010|060|006|001|001|377|002  
|001|004|060|016|006|003|125|035|017|001|001|377|004|004|003|002  
|001|006|060|035|006|003|125|035|016|004|026|004|024|346|241|023  
|203|376|227|113|362|330|377|061|241|247|164|063|211|316|136|177  
|244|060|015|006|011|052|206|110|206|367|015|001|001|013|005|000  
|003|202|002|001|000|151|204|102|300|343|136|023|141|227|040|111  
|361|364|026|205|245|237|244|021|010|045|304|143|206|217|360|113  
|257|263|051|365|007|127|032|142|307|033|105|156|257|135|026|267  
|301|320|144|203|073|227|365|103|266|105|220|361|146|052|203|044  
|052|377|210|351|172|013|371|302|133|172|257|143|367|011|170|206  
|110|131|064|136|233|152|020|116|361|156|225|211|066|112|150|320  
|157|233|340|176|117|267|065|017|343|171|261|005|257|047|174|252  
|211|012|103|336|372|014|357|331|127|057|050|161|315|151|153|122  
|102|311|212|060|105|131|241|314|372|131|112|217|367|326|335|104  
|245|263|056|133|021|030|342|262|265|347|021|123|070|376|202|114  
|323|163|276|145|222|032|072|250|322|322|252|274|324|276|155|066  
|122|377|153|324|322|265|033|067|363|027|102|361|056|247|325|220  
|154|164|235|164|365|372|137|042|033|323|334|165|250|265|377|362  
|032|321|274|053|000|134|074|305|270|206|010|124|111|242|234|043  
|373|357|246|215|160|364|102|122|115|033|040|000|201|370|240|270  
|364|164|043|234|276|364|271|016|354|036|152|330|145|112|025|165  
|361|167|133|156|330|261|346|017|264|226|270|035|372|206|310|222  
|156|213|351|175|337|242|016|325|361|361|174|256|112|343|146|277  
|135|374|133|357|110|262|236|151|307|175|220|240|125|266|224|160  
|201|271|012|275|211|165|123|354|204|251|003|245|337|121|231|010  
|320|164|014|002|326|163|162|006|173|213|273|135|252|116|374|147  
|147|330|216|020|003|031|055|067|072|324|167|251|072|034|235|300  
|171|173|154|051|167|062|115|112|213|060|210|302|347|066|316|150  
|243|232|230|206|371|211|025|236|277|252|121|175|361|120|106|124  
|017|002|056|134|237|343|336|127|063|025|376|030|222|141|250|322  
|051|005|135|145|104|036|233|343|357|373|334|005|337|025|253|246

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\330\013\244\163\262\114\072\340\236\324\263\152\345\072\016\012
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\066\263\246\251\002\122\005\164\176\052\154\324\252\222\126\260
\076\073\043\130\261\215\065\247\023\217\147\036\161\025\246\263
\265\003\206\270\040\146\300\110\157\271\254\324\112\003\125\262
\067\337\004\335\042\014\123\206\052\112\052\241\301\070\076\074
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "NetLock Platina (Class Platinum) Ftanúsítvány"

# Issuer: CN=NetLock Platina (Class Platinum) Ftanúsítvány,OU=Tanúsítványkiadók (Certification Services),O=NetLock Kft.,L=Budapest,C=HU

# Serial Number:49:41:2d:ec:00:10

# Subject: CN=NetLock Platina

(Class Platinum) Ftanúsítvány,OU=Tanúsítványkiadók (Certification Services),O=NetLock Kft.,L=Budapest,C=HU

# Not Valid Before: Thu Dec 11 15:12:44 2008

# Not Valid After: Wed Dec 06 15:12:44 2028

# Fingerprint (MD5): d5:97:88:da:64:16:e7:1d:66:4a:a6:ea:37:fc:7a:dc

# Fingerprint (SHA1): ec:93:de:08:3c:93:d9:33:a9:86:b3:d5:cd:e2:5a:cb:2f:ee:cf:8e

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "NetLock Platina (Class Platinum) Ftanúsítvány"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\354\223\336\010\074\223\331\063\251\206\263\325\315\342\132\313
\057\356\317\216
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END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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\325\227\210\332\144\026\347\035\146\112\246\352\067\374\172\334
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END

CKA\_ISSUER MULTILINE\_OCTAL

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\060\201\255\061\013\060\011\006\003\125\004\006\023\002\110\125
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\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
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\305\221\164\141\156\303\272\163\303\255\164\166\303\241\156\171

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\006\111\101\055\354\000\020

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "AC Raíz Certicámara S.A."

# Issuer: CN=AC Raíz Certicámara S.A.,O=Sociedad Cameral de Certificación Digital - Certicámara S.A.,C=CO

#

Serial Number:07:7e:52:93:7b:e0:15:e3:57:f0:69:8c:cb:ec:0c

# Subject: CN=AC Raíz Certicámara S.A.,O=Sociedad Cameral de Certificación Digital - Certicámara S.A.,C=CO

# Not Valid Before: Mon Nov 27 20:46:29 2006

# Not Valid After: Tue Apr 02 21:42:02 2030

# Fingerprint (MD5): 93:2a:3e:f6:fd:23:69:0d:71:20:d4:2b:47:99:2b:a6

# Fingerprint (SHA1): cb:a1:c5:f8:b0:e3:5e:b8:b9:45:12:d3:f9:34:a2:e9:06:10:d3:36

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "AC Raíz Certicámara S.A."

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\173\061\013\060\011\006\003\125\004\006\023\002\103\117\061

\107\060\105\006\003\125\004\012\014\076\123\157\143\151\145\144

\141\144\040\103\141\155\145\162\141\154\040\144\145\040\103\145

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\003\014\032\101\103\040\122\141\303\255\172\040\103\145\162\164

\151\143\303\241\155\141\162\141\040\123\056\101\056

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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\141\162\141\040\123\056\101\056\061\043\060\041\006\003\125\004

\003\014\032\101\103\040\122\141\303\255\172\040\103\145\162\164

\151\143\303\241\155\141\162\141\040\123\056\101\056

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\017\007\176\122\223\173\340\025\343\127\360\151\214\313\354  
\014

END

CKA\_VALUE MULTILINE\_OCTAL

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\013\060\011\006\003\125\004\006\023\002\103\117\061\107\060\105  
\006\003\125\004\012\014\076\123\157\143\151\145\144\141\144\040  
\103\141\155\145\162\141\154\040\144\145\040\103\145\162\164\151  
\146\151\143\141\143\151\303\263\156\040\104\151\147\151\164\141  
\154\040\055\040\103\145\162\164\151\143\303\241\155\141\162\141  
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\064\060\062\062\061\064\062\060\062\132\060\173\061\013\060\011  
\006\003\125\004\006\023\002\103\117\061\107\060\105\006\003\125  
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\040\103\145\162\164\151\143\303\241\155\141\162\141\040\123\056  
\101\056\061\043\060\041\006\003\125\004\003\014\032\101\103\040  
\122\141\303\255\172\040\103\145\162\164\151\143\303\241\155\141  
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\071\163\030\164\117\265\353\231\247\301\036\210\264\302\223\220  
\143\227\363\247\247\022\262\011\042\007\063\331\221\315\016\234  
\037\016\040\307\356\273\063\215\217\302\322\130\247\137\375\145  
\067\342\210\302\330\217\206\165\136\371\055\247\207\063\362\170  
\067\057\213\274\035\206\067\071\261\224\362\330\274\112\234\203  
\030\132\006\374\363\324\324\272\214\025\011\045\360\371\266\215  
\004\176\027\022\063\153\127\110\114\117\333\046\036\353\314\220  
\347\213\371\150\174\160\017\243\052\320\072\070\337\067\227\342  
\133\336\200\141\323\200\330\221\203\102\132\114\004\211\150\021  
\074\254\137\150\200\101\314\140\102\316\015\132\052\014\017\233  
\060\300\246\360\206\333\253\111\327\227\155\110\213\371\003\300  
\122\147\233\022\367\302\362\056\230\145\102\331\326\232\343\320  
\031\061\014\255\207\325\127\002\172\060\350\206\046\373\217\043

\212\124\207\344\277\074\356\353\303\165\110\137\036\071\157\201  
\142\154\305\055\304\027\124\031\267\067\215\234\067\221\310\366  
\013\325\352\143\157\203\254\070\302\363\077\336\232\373\341\043  
\141\360\310\046\313\066\310\241\363\060\217\244\243\242\241\335  
\123\263\336\360\232\062\037\203\221\171\060\301\251\037\123\233  
\123\242\025\123\077\335\235\263\020\073\110\175\211\017\374\355  
\003\365\373\045\144\165\016\027\031\015\217\000\026\147\171\172  
\100\374\055\131\007\331\220\372\232\255\075\334\200\212\346\134  
\065\242\147\114\021\153\261\370\200\144\000\055\157\042\141\305  
\254\113\046\345\132\020\202\233\244\203\173\064\367\236\211\221  
\040\227\216\267\102\307\146\303\320\351\244\326\365\040\215\304  
\303\225\254\104\012\235\133\163\074\046\075\057\112\276\247\311  
\247\020\036\373\237\120\151\363\002\003\001\000\001\243\201\346  
\060\201\343\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\321  
\011\320\351\327\316\171\164\124\371\072\060\263\364\155\054\003  
\003\033\150\060\201\240\006\003\125\035\040\004\201\230\060\201  
\225\060\201\222\006\004\125\035\040\000\060\201\211\060\053\006  
\010\053\006\001\005\005\007\002\001\026\037\150\164\164\160\072  
\057\057\167\167\167\056\143\145\162\164\151\143\141\155\141\162  
\141\056\143\157\155\057\144\160\143\057\060\132\006\010\053\006  
\001\005\005\007\002\002\060\116\032\114\114\151\155\151\164\141  
\143\151\157\156\145\163\040\144\145\040\147\141\162\141\156\164  
\355\141\163\040\144\145\040\145\163\164\145\040\143\145\162\164  
\151\146\151\143\141\144\157\040\163\145\040\160\165\145\144\145  
\156\040\145\156\143\157\156\164\162\141\162\040\145\156\040\154  
\141\040\104\120\103\056\060\015\006\011\052\206\110\206\367\015  
\001\001\005\005\000\003\202\002\001\000\134\224\265\270\105\221  
\115\216\141\037\003\050\017\123\174\346\244\131\251\263\212\172  
\305\260\377\010\174\054\243\161\034\041\023\147\241\225\022\100  
\065\203\203\217\164\333\063\134\360\111\166\012\201\122\335\111  
\324\232\062\063\357\233\247\313\165\345\172\313\227\022\220\134  
\272\173\305\233\337\273\071\043\310\377\230\316\012\115\042\001  
\110\007\176\212\300\325\040\102\224\104\357\277\167\242\211\147  
\110\033\100\003\005\241\211\354\317\142\343\075\045\166\146\277  
\046\267\273\042\276\157\377\071\127\164\272\172\311\001\225\301  
\225\121\350\253\054\370\261\206\040\351\077\313\065\133\322\027  
\351\052\376\203\023\027\100\356\210\142\145\133\325\073\140\351  
\173\074\270\311\325\177\066\002\045\252\150\302\061\025\267\060  
\145\353\177\035\110\171\261\317\071\342\102\200\026\323\365\223  
\043\374\114\227\311\132\067\154\174\042\330\112\315\322\216\066  
\203\071\221\220\020\310\361\311\065\176\077\270\323\201\306\040  
\144\032\266\120\302\041\244\170\334\320\057\073\144\223\164\360  
\226\220\361\357\373\011\132\064\100\226\360\066\022\301\243\164  
\214\223\176\101\336\167\213\354\206\331\322\017\077\055\321\314  
\100\242\211\146\110\036\040\263\234\043\131\163\251\104\163\274  
\044\171\220\126\067\263\306\051\176\243\017\361\051\071\357\176

```
\134\050\062\160\065\254\332\270\310\165\146\374\233\114\071\107
\216\033\157\233\115\002\124\042\063\357\141\272\236\051\204\357
\116\113\063\107\166\227\152\313\176\137\375\025\246\236\102\103
\133\146\132\212\210\015\367\026\271\077\121\145\053\146\152\213
\321\070\122\242\326\106\021\372\374\232\034\164\236\217\227\013
\002\117\144\306\365\150\323\113\055\377\244\067\036\213\077\277
\104\276\141\106\241\204\075\010\047\114\201\040\167\211\010\352
\147\100\136\154\010\121\137\064\132\214\226\150\315\327\367\211
\302\034\323\062\000\257\122\313\323\140\133\052\072\107\176\153
\060\063\241\142\051\177\112\271\341\055\347\024\043\016\016\030
\107\341\171\374\025\125\320\261\374\045\161\143\165\063\034\043
\053\257\134\331\355\107\167\140\016\073\017\036\322\300\334\144
\005\211\374\170\326\134\054\046\103\251
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "AC Raíz Certicámara S.A."

# Issuer: CN=AC Raíz Certicámara S.A.,O=Sociedad Cameral de Certificación Digital - Certicámara S.A.,C=CO

# Serial Number:07:7e:52:93:7b:e0:15:e3:57:f0:69:8c:cb:ec:0c

# Subject: CN=AC Raíz Certicámara S.A.,O=Sociedad Cameral de Certificación  
Digital - Certicámara S.A.,C=CO

# Not Valid Before: Mon Nov 27 20:46:29 2006

# Not Valid After: Tue Apr 02 21:42:02 2030

# Fingerprint (MD5): 93:2a:3e:f6:fd:23:69:0d:71:20:d4:2b:47:99:2b:a6

# Fingerprint (SHA1): cb:a1:c5:f8:b0:e3:5e:b8:b9:45:12:d3:f9:34:a2:e9:06:10:d3:36

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "AC Raíz Certicámara S.A."

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\313\241\305\370\260\343\136\270\271\105\022\323\371\064\242\351
\006\020\323\066
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\223\052\076\366\375\043\151\015\161\040\324\053\107\231\053\246
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\173\061\013\060\011\006\003\125\004\006\023\002\103\117\061
\107\060\105\006\003\125\004\012\014\076\123\157\143\151\145\144
\141\144\040\103\141\155\145\162\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\303\263\156\040\104\151\147
\151\164\141\154\040\055\040\103\145\162\164\151\143\303\241\155
\141\162\141\040\123\056\101\056\061\043\060\041\006\003\125\004
```

\003\014\032\101\103\040\122\141\303\255\172\040\103\145\162\164

\151\143\303\241\155\141\162\141\040\123\056\101\056

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\017\007\176\122\223\173\340\025\343\127\360\151\214\313\354

\014

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Cisco Root CA 2048"

# Issuer: CN=Cisco Root CA 2048,O=Cisco Systems

# Serial Number:5f:f8:7b:28:2b:54:dc:8d:42:a3:15:b5:68:c9:ad:ff

# Subject: CN=Cisco Root CA 2048,O=Cisco Systems

# Not Valid Before: Fri May 14 20:17:12 2004

# Not Valid After: Mon May 14 20:25:42 2029

# Fingerprint (MD5): be:39:5a:be:07:8a:b1:12:17:25:cc:1d:46:34:3c:b2

# Fingerprint (SHA1): de:99:0c:ed:99:e0:43:1f:60:ed:c3:93:7e:7c:d5:bf:0e:d9:e5:fa

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Cisco Root CA 2048"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\065\061\026\060\024\006\003\125\004\012\023\015\103\151\163

\143\157\040\123\171\163\164\145\155\163\061\033\060\031\006\003

\125\004\003\023\022\103\151\163\143\157\040\122\157\157\164\040

\103\101\040\062\060\064\070

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\065\061\026\060\024\006\003\125\004\012\023\015\103\151\163

\143\157\040\123\171\163\164\145\155\163\061\033\060\031\006\003

\125\004\003\023\022\103\151\163\143\157\040\122\157\157\164\040

\103\101\040\062\060\064\070

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\137\370\173\050\053\124\334\215\102\243\025\265\150\311

\255\377

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\103\060\202\002\053\240\003\002\001\002\002\020\137

\370\173\050\053\124\334\215\102\243\025\265\150\311\255\377\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\065  
\061\026\060\024\006\003\125\004\012\023\015\103\151\163\143\157  
\040\123\171\163\164\145\155\163\061\033\060\031\006\003\125\004  
\003\023\022\103\151\163\143\157\040\122\157\157\164\040\103\101  
\040\062\060\064\070\060\036\027\015\060\064\060\065\061\064\062  
\060\061\067\061\062\132\027\015\062\071\060\065\061\064\062\060  
\062\065\064\062\132\060\065\061\026\060\024\006\003\125\004\012  
\023\015\103\151\163\143\157\040\123\171\163\164\145\155\163\061  
\033\060\031\006\003\125\004\003\023\022\103\151\163\143\157\040  
\122\157\157\164\040\103\101\040\062\060\064\070\060\202\001\040  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\001\015\000\060\202\001\010\002\202\001\001\000\260\232\271  
\253\247\257\012\167\247\342\161\266\264\146\142\224\170\210\107  
\306\142\125\204\100\062\277\300\253\056\245\034\161\326\274\156  
\173\250\252\272\156\322\025\210\110\105\235\242\374\203\320\314  
\271\214\340\046\150\160\112\170\337\041\027\236\364\141\005\311  
\025\310\317\026\332\065\141\211\224\103\250\204\250\061\230\170  
\233\271\116\157\054\123\022\154\315\035\255\053\044\273\061\304  
\053\377\203\104\157\266\075\044\167\011\352\277\052\250\037\152  
\126\366\040\017\021\124\227\201\165\247\045\316\131\152\202\145  
\357\267\352\347\342\215\165\213\156\362\335\117\246\136\142\234  
\317\020\012\144\320\116\155\316\053\314\133\365\140\245\047\107  
\215\151\364\177\316\033\160\336\160\033\040\326\156\315\246\001  
\250\074\022\322\251\077\240\153\136\273\216\040\213\172\221\343  
\265\150\356\240\347\304\001\164\250\123\013\053\112\232\017\145  
\022\016\202\115\216\143\375\357\353\233\032\333\123\246\023\140  
\257\302\175\327\307\154\027\045\324\163\373\107\144\120\201\200  
\224\114\341\277\256\113\034\337\222\355\056\005\337\002\001\003  
\243\121\060\117\060\013\006\003\125\035\017\004\004\003\002\001  
\206\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\035\006\003\125\035\016\004\026\004\024\047\363\310  
\025\036\156\232\002\011\026\255\053\240\211\140\137\332\173\057  
\252\060\020\006\011\053\006\001\004\001\202\067\025\001\004\003  
\002\001\000\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\003\202\001\001\000\235\235\204\204\243\101\251\174\167  
\014\267\123\312\116\104\120\142\357\124\174\323\165\027\034\350  
\340\306\110\113\266\376\114\072\031\201\126\260\126\356\031\226  
\142\252\132\243\144\301\366\116\124\063\306\167\376\305\034\272  
\345\135\045\312\365\360\223\232\203\021\056\346\313\370\164\105  
\376\347\005\270\253\347\337\313\113\341\067\204\332\271\213\227  
\160\036\360\342\213\327\260\330\016\235\261\151\326\052\221\173  
\251\111\117\176\346\216\225\330\203\047\074\325\150\111\016\324  
\235\366\056\353\247\276\353\060\244\254\037\104\374\225\253\063  
\006\373\175\140\012\336\264\212\143\260\234\251\362\244\271\123  
\001\207\320\150\244\047\177\253\377\351\372\311\100\070\210\147  
\264\071\306\204\157\127\311\123\333\272\216\356\300\103\262\370  
\011\203\156\377\146\317\076\357\027\263\130\030\045\011\064\136



```
\343\313\326\024\266\354\362\222\157\164\344\057\201\052\325\222
\221\340\340\227\074\062\150\005\205\113\321\367\127\342\122\035
\223\032\124\237\005\160\300\112\161\140\036\103\013\140\036\376
\243\316\201\031\341\013\065
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Cisco Root CA 2048"

# Issuer: CN=Cisco Root CA 2048,O=Cisco Systems

# Serial Number:5f:f8:7b:28:2b:54:dc:8d:42:a3:15:b5:68:c9:ad:ff

# Subject: CN=Cisco Root CA 2048,O=Cisco Systems

# Not Valid Before: Fri May 14 20:17:12 2004

# Not Valid After: Mon May 14 20:25:42 2029

# Fingerprint (MD5): be:39:5a:be:07:8a:b1:12:17:25:cc:1d:46:34:3c:b2

# Fingerprint (SHA1): de:99:0c:ed:99:e0:43:1f:60:ed:c3:93:7e:7c:d5:bf:0e:d9:e5:fa

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE

CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Cisco Root CA 2048"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\336\231\014\355\231\340\103\037\140\355\303\223\176\174\325\277
\016\331\345\372
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\276\071\132\276\007\212\261\022\027\045\314\035\106\064\074\262
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\065\061\026\060\024\006\003\125\004\012\023\015\103\151\163
\143\157\040\123\171\163\164\145\155\163\061\033\060\031\006\003
\125\004\003\023\022\103\151\163\143\157\040\122\157\157\164\040
\103\101\040\062\060\064\070
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\020\137\370\173\050\053\124\334\215\102\243\025\265\150\311
\255\377
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

```

Certificate "CA Disig"
Issuer: CN=CA Disig,O=Disig
a.s.,L=Bratislava,C=SK
Serial Number: 1 (0x1)
Subject: CN=CA Disig,O=Disig a.s.,L=Bratislava,C=SK
Not Valid Before: Wed Mar 22 01:39:34 2006
Not Valid After: Tue Mar 22 01:39:34 2016
Fingerprint (MD5): 3f:45:96:39:e2:50:87:f7:bb:fe:98:0c:3c:20:98:e6
Fingerprint (SHA1): 2a:c8:d5:8b:57:ce:bf:2f:49:af:f2:fc:76:8f:51:14:62:90:7a:41
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\021\060\017\006\003\125
\004\003\023\010\103\101\040\104\151\163\151\147
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\021\060\017\006\003\125
\004\003\023\010\103\101\040\104\151\163\151\147
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\017\060\202\002\367\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\112\061\013\060\011\006\003\125\004\006\023\002\123\113\061\023
\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163\154
\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104\151
\163\151\147\040\141\056\163\056\061\021\060\017\006\003\125\004
\003\023\010\103\101\040\104\151\163\151\147\060\036\027\015\060
\066\060\063\062\062\060\061\063\071\063\064\132\027\015\061\066
\060\063\062\062\060\061\063\071\063\064\132\060\112\061\013\060
\011\006\003\125\004\006\023\002\123\113\061\023\060\021\006\003
\125\004\007\023\012\102\162\141\164\151\163\154\141\166\141\061
\023\060\021\006\003\125\004\012\023\012\104\151\163\151\147\040
\141\056\163\056\061\021\060\017\006\003\125\004\003\023\010\103

```

\101\040\104\151\163\151\147\060\202\001\042\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060  
\202\001\012\002\202\001\001\000\222\366\061\301\175\210\375\231  
\001\251\330\173\362\161\165\361\061\306\363\165\146\372\121\050  
\106\204\227\170\064\274\154\374\274\105\131\210\046\030\112\304  
\067\037\241\112\104\275\343\161\004\365\104\027\342\077\374\110  
\130\157\134\236\172\011\272\121\067\042\043\146\103\041\260\074  
\144\242\370\152\025\016\077\353\121\341\124\251\335\006\231\327  
\232\074\124\213\071\003\077\017\305\316\306\353\203\162\002\250  
\037\161\363\055\370\165\010\333\142\114\350\372\316\371\347\152  
\037\266\153\065\202\272\342\217\026\222\175\005\014\154\106\003  
\135\300\355\151\277\072\301\212\240\350\216\331\271\105\050\207  
\010\354\264\312\025\276\202\335\265\104\213\055\255\206\014\150  
\142\155\205\126\362\254\024\143\072\306\321\231\254\064\170\126  
\113\317\266\255\077\214\212\327\004\345\343\170\114\365\206\252  
\365\217\372\075\154\161\243\055\312\147\353\150\173\156\063\251  
\014\202\050\250\114\152\041\100\025\040\014\046\133\203\302\251  
\026\025\300\044\202\135\053\026\255\312\143\366\164\000\260\337  
\103\304\020\140\126\147\143\105\002\003\001\000\001\243\201\377  
\060\201\374\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\215  
\262\111\150\235\162\010\045\271\300\047\365\120\223\126\110\106  
\161\371\217\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\066\006\003\125\035\021\004\057\060\055\201\023  
\143\141\157\160\145\162\141\164\157\162\100\144\151\163\151\147  
\056\163\153\206\026\150\164\164\160\072\057\057\167\167\167\056  
\144\151\163\151\147\056\163\153\057\143\141\060\146\006\003\125  
\035\037\004\137\060\135\060\055\240\053\240\051\206\047\150\164  
\164\160\072\057\057\167\167\167\056\144\151\163\151\147\056\163  
\153\057\143\141\057\143\162\154\057\143\141\137\144\151\163\151  
\147\056\143\162\154\060\054\240\052\240\050\206\046\150\164\164  
\160\072\057\057\143\141\056\144\151\163\151\147\056\163\153\057  
\143\141\057\143\162\154\057\143\141\137\144\151\163\151\147\056  
\143\162\154\060\032\006\003\125\035\040\004\023\060\021\060\017  
\006\015\053\201\036\221\223\346\012\000\000\000\001\001\001\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202  
\001\001\000\135\064\164\141\114\257\073\330\377\237\155\130\066  
\034\075\013\201\015\022\053\106\020\200\375\347\074\047\320\172  
\310\251\266\176\164\060\063\243\072\212\173\164\300\171\171\102  
\223\155\377\261\051\024\202\253\041\214\057\027\371\077\046\057  
\365\131\306\357\200\006\267\232\111\051\354\316\176\161\074\152  
\020\101\300\366\323\232\262\174\132\221\234\300\254\133\310\115  
\136\367\341\123\377\103\167\374\236\113\147\154\327\363\203\321  
\240\340\177\045\337\270\230\013\232\062\070\154\060\240\363\377  
\010\025\063\367\120\112\173\076\243\076\040\251\334\057\126\200  
\012\355\101\120\260\311\364\354\262\343\046\104\000\016\157\236  
\006\274\042\226\123\160\145\304\120\012\106\153\244\057\047\201  
\022\047\023\137\020\241\166\316\212\173\067\352\303\071\141\003

```
\225\230\072\347\154\210\045\010\374\171\150\015\207\175\142\370
\264\137\373\305\330\114\275\130\274\077\103\133\324\036\001\115
\074\143\276\043\357\214\315\132\120\270\150\124\371\012\231\063
\021\000\341\236\302\106\167\202\365\131\006\214\041\114\207\011
\315\345\250
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CA Disig"

# Issuer: CN=CA Disig,O=Disig a.s.,L=Bratislava,C=SK

# Serial Number: 1 (0x1)

# Subject: CN=CA Disig,O=Disig a.s.,L=Bratislava,C=SK

# Not Valid Before: Wed Mar 22 01:39:34 2006

# Not Valid After: Tue Mar 22 01:39:34 2016

#

Fingerprint (MD5): 3f:45:96:39:e2:50:87:f7:bb:fe:98:0c:3c:20:98:e6

# Fingerprint (SHA1): 2a:c8:d5:8b:57:ce:bf:2f:49:af:f2:fc:76:8f:51:14:62:90:7a:41

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CA Disig"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\052\310\325\213\127\316\277\057\111\257\362\374\166\217\121\024
\142\220\172\101
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\077\105\226\071\342\120\207\367\273\376\230\014\074\040\230\346
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\112\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\021\060\017\006\003\125
\004\003\023\010\103\101\040\104\151\163\151\147
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\001\001
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

```
Microsoft Code Signing Only Certificate
Certificate "UCA Global Root"
Issuer: CN=UCA Global Root,O=UniTrust,C=CN
Serial Number: 8 (0x8)
Subject: CN=UCA Global Root,O=UniTrust,C=CN
Not Valid Before: Tue Jan 01 00:00:00 2008
Not Valid After: Thu Dec 31 00:00:00 2037
Fingerprint (MD5): c1:d9:51:c0:84:b8:6a:75:e8:2f:d7:d6:5f:7e:ac:46
Fingerprint (SHA1): 0b:97:2c:9e:a6:e7:cc:58:d9:3b:20:bf:71:ec:41:2e:72:09:fa:bf
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Global Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\030\060\026\006\003\125\004\003\023\017\125\103\101
\040\107\154\157\142\141\154\040\122\157\157\164
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\030\060\026\006\003\125\004\003\023\017\125\103\101
\040\107\154\157\142\141\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\010
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\222\060\202\003\172\240\003\002\001\002\002\001\010
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\072\061\013\060\011\006\003\125\004\006\023\002\103\116\061\021
\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165\163
\164\061\030\060\026\006\003\125\004\003\023\017\125\103\101\040
\107\154\157\142\141\154\040\122\157\157\164\060\036\027\015\060
\070\060\061\060\061\060\060\060\060\060\060\132\027\015\063\067
\061\062\063\061\060\060\060\060\060\060\132\060\072\061\013\060
\011\006\003\125\004\006\023\002\103\116\061\021\060\017\006\003
\125\004\012\023\010\125\156\151\124\162\165\163\164\061\030\060
\026\006\003\125\004\003\023\017\125\103\101\040\107\154\157\142
\141\154\040\122\157\157\164\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\332\263\345\006\120\077\366\163
```

\367\304\062\277\106\245\045\142\063\207\260\150\376\247\337\210  
\003\143\175\002\226\375\353\207\311\356\342\010\273\235\273\273  
\344\101\217\307\060\211\017\155\044\300\004\154\024\224\201\115  
\240\015\164\146\363\360\205\257\370\144\031\336\271\351\201\223  
\320\050\205\231\107\102\112\054\074\070\047\112\314\377\371\154  
\031\327\265\363\357\233\256\133\064\006\327\217\242\023\006\234  
\212\204\102\325\263\243\220\150\155\201\220\356\115\204\354\114  
\160\116\055\336\044\071\316\031\000\103\223\170\371\010\206\035  
\103\321\364\162\274\005\300\147\372\300\121\322\311\205\007\044  
\256\071\036\172\315\101\322\066\253\141\352\053\253\360\040\125  
\231\074\155\055\034\056\056\165\226\330\162\227\340\014\312\151  
\163\356\165\053\025\011\340\216\155\273\332\023\377\106\250\350  
\000\014\254\007\057\035\271\272\271\321\240\367\231\236\164\134  
\031\005\146\061\317\076\052\122\376\157\237\363\271\275\371\301  
\201\365\067\332\056\114\201\045\135\366\331\224\232\323\065\213  
\040\050\067\137\121\353\175\142\307\251\223\321\371\320\064\313  
\251\047\046\054\050\220\222\073\125\143\267\027\016\124\163\253  
\257\174\354\072\253\160\063\254\041\373\042\046\263\206\254\043  
\251\327\177\155\313\010\040\362\257\100\365\377\104\107\161\335  
\047\335\023\050\241\352\166\071\371\020\240\240\115\100\244\047  
\262\131\025\053\154\055\044\267\044\143\170\367\103\030\172\017  
\115\021\343\350\254\207\102\215\347\130\161\244\253\156\242\300  
\227\174\273\343\023\113\312\333\273\153\010\371\151\264\004\162  
\325\303\106\271\167\352\377\272\373\351\360\072\014\065\366\217  
\017\256\006\204\026\335\224\125\324\357\312\047\267\003\074\305  
\034\046\052\365\074\250\245\225\233\206\361\212\211\147\370\307  
\014\146\261\355\101\277\202\246\000\150\072\042\064\356\036\353  
\345\157\211\164\117\152\252\152\250\127\147\122\324\040\141\301  
\316\123\313\375\044\177\137\046\337\241\010\151\226\240\236\376  
\111\103\342\323\352\332\304\361\210\061\041\156\034\341\315\363  
\165\016\040\104\026\314\175\163\164\065\105\054\073\201\324\040  
\354\266\011\214\076\110\262\111\002\003\001\000\001\243\201\242  
\060\201\237\060\013\006\003\125\035\017\004\004\003\002\001\006  
\060\014\006\003\125\035\023\004\005\060\003\001\001\377\060\143  
\006\003\125\035\045\004\134\060\132\006\010\053\006\001\005\005  
\007\003\001\006\010\053\006\001\005\005\007\003\002\006\010\053  
\006\001\005\005\007\003\003\006\010\053\006\001\005\005\007\003  
\004\006\010\053\006\001\005\005\007\003\005\006\010\053\006\001  
\005\005\007\003\006\006\010\053\006\001\005\005\007\003\007\006  
\010\053\006\001\005\005\007\003\010\006\010\053\006\001\005\005  
\007\003\011\060\035\006\003\125\035\016\004\026\004\024\331\303  
\323\370\200\222\147\314\135\322\072\242\327\161\242\264\304\070  
\200\055\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\003\202\002\001\000\320\210\171\312\010\252\367\013\064\240  
\116\011\302\351\176\065\110\211\160\204\043\057\121\303\053\057  
\136\333\123\153\133\165\010\052\124\272\062\016\325\306\161\205  
\261\227\111\200\366\204\320\360\272\267\161\224\310\171\153\246  
\305\104\350\102\242\255\045\055\127\057\346\326\061\051\372\031

\211\124\051\176\267\176\107\066\151\055\156\062\274\324\165\332  
\102\163\270\116\345\203\100\163\262\135\337\324\104\163\246\142  
\013\333\252\156\005\214\310\177\106\117\071\205\220\235\274\033  
\124\051\254\245\327\376\345\130\126\127\155\054\231\241\111\041  
\325\141\306\214\141\341\165\044\301\001\335\055\033\066\303\057  
\022\314\013\326\170\213\165\200\351\101\271\210\261\312\074\251  
\026\306\116\025\343\162\066\366\324\240\101\205\257\212\145\160  
\115\265\104\020\120\354\355\337\155\346\331\306\300\022\361\113  
\072\057\163\351\074\251\356\033\252\057\065\245\233\237\115\305  
\064\204\137\046\024\151\263\043\261\211\162\024\370\351\115\121  
\042\003\377\112\206\304\034\350\173\171\012\333\107\045\201\176  
\374\064\204\254\131\270\130\103\344\075\103\011\124\164\302\320  
\375\331\357\156\131\367\162\140\231\166\157\365\047\247\273\203  
\244\112\201\354\051\201\364\167\113\341\102\022\125\324\206\052  
\022\266\360\125\233\001\056\335\366\250\343\031\303\316\107\057  
\300\170\141\030\132\307\145\374\235\106\133\127\334\174\016\273  
\226\203\020\174\125\030\011\004\256\321\367\213\052\076\240\346  
\120\326\060\066\327\347\213\070\123\354\111\104\340\317\244\337  
\361\123\173\213\132\266\366\021\220\113\326\165\363\376\002\363  
\051\257\360\043\162\175\024\355\251\135\337\172\201\236\233\222  
\042\374\036\370\001\105\101\227\307\153\001\141\276\063\150\362  
\240\145\204\146\274\340\052\244\150\323\161\354\307\010\336\243  
\303\311\066\112\064\361\027\342\200\257\040\041\223\224\036\346  
\025\323\124\142\361\265\070\057\343\314\271\147\004\251\272\345  
\356\371\020\156\313\056\176\023\257\222\024\376\363\047\163\173  
\070\374\163\155\271\271\210\366\156\214\013\365\374\377\011\016  
\263\055\136\173\165\343\222\044\342\346\341\130\076\113\050\003  
\165\153\030\233\107\014

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "UCA Global Root"

# Issuer: CN=UCA Global Root,O=UniTrust,C=CN

# Serial Number: 8 (0x8)

# Subject: CN=UCA Global Root,O=UniTrust,C=CN

# Not Valid Before: Tue Jan 01 00:00:00 2008

# Not Valid After: Thu Dec 31 00:00:00 2037

# Fingerprint (MD5): c1:d9:51:c0:84:b8:6a:75:e8:2f:d7:d6:5f:7e:ac:46

# Fingerprint (SHA1): 0b:97:2c:9e:a6:e7:cc:58:d9:3b:20:bf:71:ec:41:2e:72:09:fa:bf

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "UCA Global Root"

```

CKA_CERT_SHA1_HASH
MULTILINE_OCTAL
\013\227\054\236\246\347\314\130\331\073\040\277\161\354\101\056
\162\011\372\277
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\301\331\121\300\204\270\152\165\350\057\327\326\137\176\254\106
END
CKA_ISSUER MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\030\060\026\006\003\125\004\003\023\017\125\103\101
\040\107\154\157\142\141\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\010
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "UCA Root"
Issuer: CN=UCA Root,O=UniTrust,C=CN
Serial Number: 9 (0x9)
Subject: CN=UCA Root,O=UniTrust,C=CN
Not Valid Before: Thu Jan 01 00:00:00 2004
Not Valid After: Mon Dec 31 00:00:00
2029
Fingerprint (MD5): 8f:91:e7:ee:e3:fc:da:86:ca:fc:dc:70:ed:b7:b7:0c
Fingerprint (SHA1): 82:50:be:d5:a2:14:43:3a:66:37:7c:bc:10:ef:83:f6:69:da:3a:67
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\063\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\021\060\017\006\003\125\004\003\023\010\125\103\101
\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\063\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165

```



\163\164\061\021\060\017\006\003\125\004\003\023\010\125\103\101  
\040\122\157\157\164

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\011

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\204\060\202\002\154\240\003\002\001\002\002\001\011  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\063\061\013\060\011\006\003\125\004\006\023\002\103\116\061\021  
\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165\163  
\164\061\021\060\017\006\003\125\004\003\023\010\125\103\101\040  
\122\157\157\164\060\036\027\015\060\064\060\061\060\061\060\060  
\060\060\060\060\132\027\015\062\071\061\062\063\061\060\060\060  
\060\060\060\132\060\063\061\013\060\011\006\003\125\004\006\023  
\002\103\116\061\021\060\017\006\003\125\004\012\023\010\125\156  
\151\124\162\165\163\164\061\021\060\017\006\003\125\004\003\023  
\010\125\103\101\040\122\157\157\164\060\202\001\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017  
\000\060\202\001\012\002\202\001\001\000\263\135\007\312\206\046  
\175\153\342\373\070\011\016\314\202\302\152\032\000\242\025\137  
\326\351\324\001\267\126\003\001\131\217\365\070\151\044\166\302  
\136\053\305\366\053\277\257\373\101\375\017\132\374\253\327\203  
\160\115\060\230\321\236\262\166\273\222\326\273\351\020\050\151  
\050\066\104\350\361\054\327\130\174\044\326\177\002\072\360\201  
\153\141\140\077\364\063\336\155\345\352\050\122\117\374\251\035  
\143\174\013\272\352\256\304\150\106\344\336\217\301\247\262\266  
\130\132\155\035\054\331\214\072\267\210\313\205\324\367\350\003  
\136\375\262\115\120\350\326\037\377\256\002\077\213\117\226\041  
\074\233\327\045\311\035\077\373\230\261\131\344\360\251\073\257  
\263\315\205\054\342\140\106\314\157\216\240\353\360\064\305\361  
\102\030\140\256\022\355\106\165\034\345\330\251\226\132\276\336  
\132\326\170\147\226\133\223\167\120\362\156\033\336\226\121\112  
\246\326\113\103\165\041\146\215\167\354\002\204\166\134\104\020  
\266\035\141\154\344\243\040\175\267\215\272\017\221\165\307\215  
\337\274\002\140\250\051\250\275\075\103\002\003\001\000\001\243  
\201\242\060\201\237\060\013\006\003\125\035\017\004\004\003\002  
\001\006\060\014\006\003\125\035\023\004\005\060\003\001\001\377  
\060\143\006\003\125\035\045\004\134\060\132\006\010\053\006\001  
\005\005\007\003\001\006\010\053\006\001\005\005\007\003\002\006  
\010\053\006\001\005\005\007\003\003\006\010\053\006\001\005\005  
\007\003\004\006\010\053\006\001\005\005\007\003\005\006\010\053  
\006\001\005\005\007\003\006\006\010\053\006\001\005\005\007\003  
\007\006\010\053\006\001\005\005\007\003\010\006\010\053\006\001  
\005\005\007\003\011\060\035\006\003\125\035\016\004\026\004\024  
\333\037\065\363\153\114\377\102\061\144\233\315\273\132\036\035  
\110\020\267\356\060\015\006\011\052\206\110\206\367\015\001\001  
\005\005\000\003\202\001\001\000\070\154\267\210\361\255\372\130

```
\067\164\321\350\160\336\234\047\131\313\344\025\327\240\303\140
\327\210\200\004\305\060\114\075\324\032\353\006\136\131\107\346
\274\146\313\340\010\374\350\065\354\142\175\312\300\332\301\170
\257\345\106\157\373\211\202\043\217\366\327\123\146\125\240\336
\045\022\073\161\066\026\125\022\166\373\075\370\124\133\061\272
\000\006\370\175\125\345\247\166\203\252\134\112\227\246\052\050
\337\275\306\154\013\043\225\216\063\177\036\136\100\037\023\124
\054\234\345\265\016\335\027\050\256\153\001\323\122\051\365\042
\037\220\071\364\334\142\150\360\074\206\107\354\270\005\105\273
\267\014\226\224\306\147\313\043\161\320\216\164\042\326\101\353
\003\250\266\352\276\304\001\022\265\263\135\100\166\006\040\324
\144\270\051\106\006\212\316\037\223\232\020\356\373\252\132\264
\334\057\325\053\313\366\327\005\204\230\005\221\013\204\367\075
\372\326\371\172\372\054\025\352\066\202\103\267\267\270\343\363
\161\001\355\103\103\242\005\105\303\050\005\007\065\343\001\245
\070\036\200\324\327\303\331\336
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "UCA Root"

# Issuer: CN=UCA Root,O=UniTrust,C=CN

# Serial Number: 9 (0x9)

# Subject: CN=UCA Root,O=UniTrust,C=CN

# Not Valid Before: Thu Jan 01 00:00:00 2004

# Not Valid

After: Mon Dec 31 00:00:00 2029

# Fingerprint (MD5): 8f:91:e7:ee:e3:fc:da:86:ca:fc:dc:70:ed:b7:b7:0c

# Fingerprint (SHA1): 82:50:be:d5:a2:14:43:3a:66:37:7c:bc:10:ef:83:f6:69:da:3a:67

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "UCA Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\202\120\276\325\242\024\103\072\146\067\174\274\020\357\203\366
\151\332\072\147
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\217\221\347\356\343\374\332\206\312\374\334\160\355\267\267\014
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\063\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\021\060\017\006\003\125\004\003\023\010\125\103\101
```

```

\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\011
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Starfield Services Root Certificate Authority"
Issuer: CN=Starfield Services Root Certificate
Authority,OU=http://certificates.starfieldtech.com/repository/,O=Starfield Technologies,
Inc.,L=Scottsdale,ST=Arizona,C=US
Serial Number: 0 (0x0)
Subject: CN=Starfield Services Root Certificate
Authority,OU=http://certificates.starfieldtech.com/repository/,O=Starfield Technologies,
Inc.,L=Scottsdale,ST=Arizona,C=US
Not Valid Before: Mon Jun 02 00:00:00 2008
Not Valid After: Mon Dec 31 23:59:59 2029
Fingerprint (MD5): cf:8f:3b:62:a3:ca:ca:71:1b:a3:e1:cb:48:57:35:1f
Fingerprint (SHA1): 5d:00:38:60:f0:02:ed:82:9d:ea:a4:18:68:f7:88:18:6d:62:12:7f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Services Root Certificate Authority"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\317\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\072
\060\070\006\003\125\004\013\023\061\150\164\164\160\072\057\057
\143\145\162\164\151\146\151\143\141\164\145\163\056\163\164\141
\162\146\151\145\154\144\164\145\143\150\056\143\157\155\057\162
\145\160\157\163\151\164\157\162\171\057\061\066\060\064\006\003
\125\004\003\023\055\123\164\141\162\146\151\145\154\144\040\123
\145\162\166\151\143\145\163\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171
END
CKA_ID UTF8 "0"

```

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\317\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157  
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157  
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012  
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150  
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\072  
\060\070\006\003\125\004\013\023\061\150\164\164\160\072\057\057  
\143\145\162\164\151\146\151\143\141\164\145\163\056\163\164\141  
\162\146\151\145\154\144\164\145\143\150\056\143\157\155\057\162  
\145\160\157\163\151\164\157\162\171\057\061\066\060\064\006\003  
\125\004\003\023\055\123\164\141\162\146\151\145\154\144\040\123  
\145\162\166\151\143\145\163\040\122\157\157\164\040\103\145\162  
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151  
\164\171

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\176\060\202\003\146\240\003\002\001\002\002\001\000  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\201\317\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156  
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164  
\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012\023  
\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150\156  
\157\154\157\147\151\145\163\054\040\111\156\143\056\061\072\060  
\070\006\003\125\004\013\023\061\150\164\164\160\072\057\057\143  
\145\162\164\151\146\151\143\141\164\145\163\056\163\164\141\162  
\146\151\145\154\144\164\145\143\150\056\143\157\155\057\162\145  
\160\157\163\151\164\157\162\171\057\061\066\060\064\006\003\125  
\004\003\023\055\123\164\141\162\146\151\145\154\144\040\123\145  
\162\166\151\143\145\163\040\122\157\157\164\040\103\145\162\164  
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164  
\171\060\036\027\015\060\070\060\066\060\062\060\060\060\060\060  
\060\132\027\015\062\071\061\062\063\061\062\063\065\071\065\071  
\132\060\201\317\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172  
\157\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143  
\157\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004  
\012\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143  
\150\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061  
\072\060\070\006\003\125\004\013\023\061\150\164\164\160\072\057  
\057\143\145\162\164\151\146\151\143\141\164\145\163\056\163\164  
\141\162\146\151\145\154\144\164\145\143\150\056\143\157\155\057  
\162\145\160\157\163\151\164\157\162\171\057\061\066\060\064\006

\003\125\004\003\023\055\123\164\141\162\146\151\145\154\144\040  
\123\145\162\166\151\143\145\163\040\122\157\157\164\040\103\145  
\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162  
\151\164\171\060\202\001\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002  
\202\001\001\000\362\314\126\052\115\346\026\067\132\227\352\155  
\065\070\321\020\233\333\270\334\251\004\011\225\063\056\011\305  
\000\173\032\170\102\217\310\364\005\216\376\322\150\203\036\116  
\231\315\027\333\107\076\120\363\211\322\347\334\230\373\005\370  
\252\326\143\364\124\115\301\161\003\260\037\033\166\263\032\064  
\060\163\361\050\062\140\203\375\264\234\327\266\322\042\067\174  
\031\252\073\336\023\020\151\156\134\006\323\157\243\362\146\132  
\166\102\110\257\200\321\124\131\075\324\271\324\333\355\271\253  
\071\231\364\356\142\253\341\170\162\173\330\070\215\100\266\314  
\334\022\000\160\103\205\151\330\030\343\312\127\162\237\264\337  
\077\374\042\250\102\122\365\167\133\231\360\126\055\046\160\026  
\066\022\302\047\236\127\246\174\320\043\361\171\334\243\223\130  
\050\070\075\237\255\066\103\356\067\373\370\371\103\255\310\126  
\362\224\022\136\102\353\163\270\023\015\313\246\325\206\271\252  
\050\152\124\003\241\077\017\051\353\011\000\350\077\136\242\177  
\027\075\241\053\370\276\320\165\035\244\204\343\253\027\145\006  
\122\000\257\261\002\003\001\000\001\243\143\060\141\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035  
\006\003\125\035\016\004\026\004\024\264\306\177\032\103\314\233  
\165\135\057\304\113\362\213\230\020\351\361\121\020\060\037\006  
\003\125\035\043\004\030\060\026\200\024\264\306\177\032\103\314  
\233\165\135\057\304\113\362\213\230\020\351\361\121\020\060\015  
\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001  
\001\000\254\200\273\304\045\005\013\130\244\344\176\051\176\257  
\274\073\354\055\300\104\056\371\221\340\322\073\062\047\220\055  
\366\200\011\134\302\253\145\044\332\070\020\106\304\111\322\375  
\232\253\050\110\167\210\306\351\157\321\107\221\325\065\117\024  
\011\250\133\100\007\035\174\161\126\313\211\102\324\277\141\300  
\042\367\056\337\253\363\162\103\213\100\350\224\353\260\046\332  
\321\023\323\253\320\066\055\056\072\225\263\167\056\025\071\030  
\014\151\272\252\200\355\361\123\116\063\233\150\004\342\240\060  
\056\327\321\135\324\246\146\235\204\346\347\273\074\211\273\066  
\235\374\027\251\075\125\053\212\373\233\304\114\204\377\337\322  
\276\151\033\164\260\250\366\352\260\234\262\051\164\201\114\150  
\072\232\177\163\045\071\365\023\340\146\221\151\324\127\113\267  
\356\255\105\340\054\303\210\323\276\224\111\211\037\377\160\325  
\133\155\071\023\260\035\313\230\346\147\143\015\143\366\373\303  
\327\141\162\203\210\077\160\176\123\311\236\211\124\326\117\177  
\175\161\271\256\361\140\213\167\140\354\370\277\372\152\243\234  
\001\042

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

```

CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "Starfield Services Root Certificate Authority"
Issuer: CN=Starfield Services Root Certificate
Authority,OU=http://certificates.starfieldtech.com/repository/,O=Starfield Technologies\,
Inc.,L=Scottsdale,ST=Arizona,C=US
#
Serial Number: 0 (0x0)
Subject: CN=Starfield Services Root Certificate
Authority,OU=http://certificates.starfieldtech.com/repository/,O=Starfield Technologies\,
Inc.,L=Scottsdale,ST=Arizona,C=US
Not Valid Before: Mon Jun 02 00:00:00 2008
Not Valid After: Mon Dec 31 23:59:59 2029
Fingerprint (MD5): cf:8f:3b:62:a3:ca:ca:71:1b:a3:e1:cb:48:57:35:1f
Fingerprint (SHA1): 5d:00:38:60:f0:02:ed:82:9d:ea:a4:18:68:f7:88:18:6d:62:12:7f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Services Root Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\135\000\070\140\360\002\355\202\235\352\244\030\150\367\210\030
\155\142\022\177
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\317\217\073\142\243\312\312\161\033\243\341\313\110\127\065\037
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\317\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\072
\060\070\006\003\125\004\013\023\061\150\164\164\160\072\057\057
\143\145\162\164\151\146\151\143\141\164\145\163\056\163\164\141
\162\146\151\145\154\144\164\145\143\150\056\143\157\155\057\162
\145\160\157\163\151\164\157\162\171\057\061\066\060\064\006\003
\125\004\003\023\055\123\164\141\162\146\151\145\154\144\040\123
\145\162\166\151\143\145\163\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171
END
CKA_SERIAL_NUMBER

```

```

MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "I.CA - Qualified root certificate"
Issuer: O=První certifikační autorita\, a.s.,CN=I.CA - Qualified root certificate,C=CZ
Serial Number:9d:2a:60
Subject: O=První certifikační autorita\, a.s.,CN=I.CA - Qualified root certificate,C=CZ
Not Valid Before: Tue Apr 01 00:00:00 2008
Not Valid After: Sun Apr 01 00:00:00 2018
Fingerprint (MD5): 48:d1:1e:62:78:01:c2:6e:43:69:a4:2c:ee:13:0a:b5
Fingerprint (SHA1): 64:90:2a:d7:27:7a:f3:e3:2c:d8:cc:1d:c7:9d:e1:fd:7f:80:69:ea
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA - Qualified root certificate"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\052\060\050\006\003\125\004\003\014\041\111\056\103\101\040\055
\040\121\165\141\154\151\146\151\145\144\040\162\157\157\164\040
\143\145\162\164\151\146\151\143\141\164\145\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\052\060\050\006\003\125\004\003\014\041\111\056\103\101\040\055
\040\121\165\141\154\151\146\151\145\144\040\162\157\157\164\040
\143\145\162\164\151\146\151\143\141\164\145\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\000\235\052\140
END
CKA_VALUE MULTILINE_OCTAL

```

\060\202\004\071\060\202\003\041\240\003\002\001\002\002\004\000  
\235\052\140\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\060\150\061\013\060\011\006\003\125\004\006\023\002\103  
\132\061\052\060\050\006\003\125\004\003\014\041\111\056\103\101  
\040\055\040\121\165\141\154\151\146\151\145\144\040\162\157\157  
\164\040\143\145\162\164\151\146\151\143\141\164\145\061\055\060  
\053\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143  
\145\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165  
\164\157\162\151\164\141\054\040\141\056\163\056\060\036\027\015  
\060\070\060\064\060\061\060\060\060\060\060\132\027\015\061  
\070\060\064\060\061\060\060\060\060\060\132\060\150\061\013  
\060\011\006\003\125\004\006\023\002\103\132\061\052\060\050\006  
\003\125\004\003\014\041\111\056\103\101\040\055\040\121\165\141  
\154\151\146\151\145\144\040\162\157\157\164\040\143\145\162\164  
\151\146\151\143\141\164\145\061\055\060\053\006\003\125\004\012  
\014\044\120\162\166\156\303\255\040\143\145\162\164\151\146\151  
\153\141\304\215\156\303\255\040\141\165\164\157\162\151\164\141  
\054\040\141\056\163\056\060\202\001\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202  
\001\012\002\202\001\001\000\253\010\210\244\360\164\362\237\370  
\333\326\167\215\060\031\076\246\305\307\212\305\275\335\346\002  
\256\216\075\120\165\270\257\175\066\253\376\365\355\010\147\264  
\000\212\230\301\003\143\210\121\362\033\066\211\164\132\055\310  
\304\202\304\077\271\210\375\154\375\072\035\025\005\104\225\200  
\032\246\206\313\041\165\220\205\134\260\160\000\207\064\250\321  
\037\111\375\154\070\155\152\254\270\105\237\274\024\327\146\324  
\041\343\047\012\215\165\340\132\057\012\113\264\347\176\163\243  
\052\275\160\361\221\206\010\217\277\220\204\034\207\251\365\231  
\045\045\224\301\343\156\007\301\113\007\133\124\374\064\313\106  
\067\234\305\241\040\316\246\254\207\251\203\074\070\117\300\100  
\363\351\377\233\327\071\166\344\023\043\165\265\377\241\102\256  
\134\206\117\305\116\103\266\231\013\122\123\040\250\263\302\114  
\323\000\054\025\322\131\154\012\237\041\265\163\026\171\036\206  
\045\356\032\373\223\236\255\143\361\114\342\166\061\136\067\357  
\374\320\251\066\344\371\021\351\172\374\120\347\101\043\003\064  
\270\175\272\016\317\335\123\002\003\001\000\001\243\201\352\060  
\201\347\060\017\006\003\125\035\023\001\001\377\004\005\060\003  
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\201\244\006\003\125\035\040\004\201\234\060\201  
\231\060\201\226\006\014\053\006\001\004\001\201\270\110\001\004  
\000\001\060\201\205\060\201\202\006\010\053\006\001\005\005\007  
\002\002\060\166\032\164\124\145\156\164\157\040\143\145\162\164  
\151\146\151\153\141\164\040\152\145\040\166\171\144\141\156\040  
\152\141\153\157\040\153\166\141\154\151\146\151\153\157\166\141  
\156\171\040\163\171\163\164\145\155\157\166\171\040\143\145\162  
\164\151\146\151\153\141\164\040\166\040\163\157\165\154\141\144  
\165\040\163\145\040\172\141\153\157\156\145\155\040\062\062\067  
\057\062\060\060\060\040\123\142\056\040\166\040\160\154\141\164



```
\156\145\155\040\172\156\145\156\151\056\060\035\006\003\125\035
\016\004\026\004\024\150\235\176\326\304\045\071\373\073\240\067
\326\117\334\214\321\172\360\126\131\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\001\001\000\162\365\274
\006\215\322\054\226\362\202\333\130\173\107\360\100\144\345\056
\033\357\372\340\372\323\361\162\110\001\104\362\210\364\336\230
\201\123\204\347\175\116\107\347\061\067\126\256\263\301\060\157
\306\253\110\203\365\230\123\122\151\052\050\301\100\145\353\145
\347\264\060\013\360\253\016\245\022\045\277\364\120\135\277\243
\176\345\321\164\370\012\050\256\102\234\260\024\122\304\240\140
\135\367\105\027\102\272\102\055\233\222\373\156\224\263\160\107
\040\010\235\123\360\260\255\275\251\204\132\335\007\052\014\315
\053\155\141\050\337\073\222\050\354\121\201\177\121\174\216\056
\177\235\351\274\301\064\075\213\255\201\255\361\036\164\146\103
\074\101\115\270\056\063\117\261\072\036\333\022\337\066\216\161
\377\127\143\261\326\217\264\075\206\022\152\317\102\060\264\223
\026\352\231\352\002\133\376\010\356\262\117\160\277\063\000\347
\172\112\070\241\362\110\221\246\036\313\043\262\070\235\360\056
\111\242\311\210\126\145\145\216\072\147\105\214\214\013\342\252
\261\113\007\377\261\037\272\024\317\162\372\247\170
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "I.CA - Qualified root certificate"

# Issuer: O=První certifikační autorita, a.s.,CN=I.CA - Qualified root certificate,C=CZ

# Serial Number:9d:2a:60

# Subject: O=První certifikační autorita, a.s.,CN=I.CA - Qualified root certificate,C=CZ

# Not Valid Before: Tue Apr 01 00:00:00 2008

# Not Valid After: Sun Apr 01 00:00:00 2018

# Fingerprint (MD5): 48:d1:1e:62:78:01:c2:6e:43:69:a4:2c:ee:13:0a:b5

# Fingerprint (SHA1): 64:90:2a:d7:27:7a:f3:e3:2c:d8:cc:1d:c7:9d:e1:fd:7f:80:69:ea

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL

CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "I.CA - Qualified root certificate"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\144\220\052\327\047\172\363\343\054\330\314\035\307\235\341\375
\177\200\151\352
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\110\321\036\142\170\001\302\156\103\151\244\054\356\023\012\265
```

END

```
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\052\060\050\006\003\125\004\003\014\041\111\056\103\101\040\055
\040\121\165\141\154\151\146\151\145\144\040\162\157\157\164\040
\143\145\162\164\151\146\151\143\141\164\145\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\000\235\052\140
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST
CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "I.CA - Standard root certificate"
Issuer: O=Prvni certifikacni autorita a.s.,CN=I.CA - Standard root certificate,C=CZ
Serial Number:13:d6:20
Subject: O=Prvni certifikacni autorita a.s.,CN=I.CA - Standard root certificate,C=CZ
Not Valid Before: Tue Apr 01 00:00:00 2008
Not Valid After: Sun Apr 01 00:00:00 2018
Fingerprint (MD5): 04:68:e9:24:7e:41:ce:d7:6c:44:16:30:70:3d:dd:b9
Fingerprint (SHA1): ab:16:dd:14:4e:cd:c0:fc:4b:aa:b6:2e:cf:04:08:89:6f:de:52:b7
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA - Standard root certificate"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\143\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\051\060\047\006\003\125\004\003\023\040\111\056\103\101\040\055
\040\123\164\141\156\144\141\162\144\040\162\157\157\164\040\143
\145\162\164\151\146\151\143\141\164\145\061\051\060\047\006\003
\125\004\012\023\040\120\162\166\156\151\040\143\145\162\164\151
\146\151\153\141\143\156\151\040\141\165\164\157\162\151\164\141
\040\141\056\163\056
```

```
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\051\060\047\006\003\125\004\003\023\040\111\056\103\101\040\055
\040\123\164\141\156\144\141\162\144\040\162\157\157\164\040\143
```

\145\162\164\151\146\151\143\141\164\145\061\051\060\047\006\003  
\125\004\012\023\040\120\162\166\156\151\040\143\145\162\164\151  
\146\151\153\141\143\156\151\040\141\165\164\157\162\151\164\141  
\040\141\056\163\056

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\003\023\326\040

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\056\060\202\003\026\240\003\002\001\002\002\003\023  
\326\040\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\060\143\061\013\060\011\006\003\125\004\006\023\002\103\132  
\061\051\060\047\006\003\125\004\003\023\040\111\056\103\101\040  
\055\040\123\164\141\156\144\141\162\144\040\162\157\157\164\040  
\143\145\162\164\151\146\151\143\141\164\145\061\051\060\047\006  
\003\125\004\012\023\040\120\162\166\156\151\040\143\145\162\164  
\151\146\151\153\141\143\156\151\040\141\165\164\157\162\151\164  
\141\040\141\056\163\056\060\036\027\015\060\070\060\064\060\061  
\060\060\060\060\060\060\132\027\015\061\070\060\064\060\061\060  
\060\060\060\060\060\132\060\143\061\013\060\011\006\003\125\004  
\006\023\002\103\132\061\051\060\047\006\003\125\004\003\023\040  
\111\056\103\101\040\055\040\123\164\141\156\144\141\162\144\040  
\162\157\157\164\040\143\145\162\164\151\146\151\143\141\164\145  
\061\051\060\047\006\003\125\004\012\023\040\120\162\166\156\151  
\040\143\145\162\164\151\146\151\153\141\143\156\151\040\141\165  
\164\157\162\151\164\141\040\141\056\163\056\060\202\001\042\060  
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202  
\001\017\000\060\202\001\012\002\202\001\001\000\321\055\025\304  
\071\114\152\241\304\345\363\053\264\375\251\026\351\270\121\217  
\067\221\331\247\323\227\220\266\160\151\207\365\257\131\322\142  
\101\130\325\363\225\215\002\025\372\146\234\301\041\024\330\037  
\255\372\052\154\164\126\241\142\341\361\260\255\270\376\322\243  
\340\221\241\265\256\123\255\215\244\015\017\131\140\227\052\374  
\243\056\163\065\043\163\314\250\246\241\024\155\277\211\303\204  
\070\363\144\131\314\061\363\340\371\047\140\012\074\101\005\157  
\132\122\360\217\156\122\156\354\136\210\157\340\100\214\041\107  
\127\042\351\070\156\346\372\363\044\264\256\257\057\163\077\200  
\325\062\217\214\331\204\031\330\140\316\333\151\215\076\257\002  
\257\256\336\257\120\365\317\346\263\141\030\304\340\335\360\116  
\112\146\015\172\163\040\267\344\324\223\206\107\141\330\117\312  
\072\216\253\302\077\306\042\027\243\135\235\040\306\305\016\044  
\151\310\246\175\146\006\315\106\346\063\341\103\164\223\365\203  
\142\322\260\105\042\001\244\166\275\353\121\223\130\154\372\032  
\241\237\165\200\332\330\000\342\361\210\115\077\002\003\001\000  
\001\243\201\352\060\201\347\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\035\006\003\125\035\016\004  
\026\004\024\353\067\244\276\271\157\140\027\373\323\377\055\140

\341\004\036\257\317\306\323\060\201\244\006\003\125\035\040\004  
\201\234\060\201\231\060\201\226\006\014\053\006\001\004\001\201  
\270\110\001\001\000\001\060\201\205\060\201\202\006\010\053\006  
\001\005\005\007\002\002\060\166\032\164\124\145\156\164\157\040  
\143\145\162\164\151\146\151\153\141\164\040\152\145\040\166\171  
\144\141\156\040\152\141\153\157\040\153\166\141\154\151\146\151  
\153\157\166\141\156\171\040\163\171\163\164\145\155\157\166\171  
\040\143\145\162\164\151\146\151\153\141\164\040\166\040\163\157  
\165\154\141\144\165\040\163\145\040\172\141\153\157\156\145\155  
\040\062\062\067\057\062\060\060\060\040\123\142\056\040\166\040  
\160\154\141\164\156\145\155\040\172\156\145\156\151\056\060\015  
\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001  
\001\000\027\042\130\252\057\030\125\002\241\114\066\111\067\113  
\233\163\272\256\143\066\016\213\053\204\105\067\314\372\340\147  
\367\240\163\152\147\150\126\274\141\250\064\232\050\272\146\054  
\141\233\213\034\370\004\160\214\206\343\101\357\224\171\015\335  
\064\207\004\356\265\236\061\153\071\364\176\130\345\362\260\004  
\115\251\127\045\111\340\013\325\344\354\175\016\076\073\001\340  
\214\374\122\220\223\346\362\260\253\365\061\167\314\321\311\103  
\202\253\017\056\264\371\230\256\076\343\104\364\244\003\151\125  
\332\134\216\333\301\271\254\344\230\325\166\025\106\241\056\132  
\014\042\140\240\302\353\160\177\161\003\260\150\323\061\144\315  
\352\313\113\125\211\202\076\134\146\313\032\010\230\107\302\336  
\331\056\070\114\005\375\055\214\372\343\042\045\271\222\375\326  
\262\055\312\242\064\234\337\111\357\325\204\001\054\222\377\005  
\101\012\147\306\102\153\236\313\330\237\220\274\015\017\020\175  
\307\146\275\352\163\007\340\030\352\121\201\264\105\100\074\017  
\241\042\067\025\001\205\251\056\174\016\137\135\316\152\223\276  
\331\276

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "I.CA - Standard root certificate"

# Issuer: O=Prvni certifikacni autorita a.s.,CN=I.CA - Standard root certificate,C=CZ

# Serial Number:13:d6:20

# Subject: O=Prvni certifikacni autorita a.s.,CN=I.CA - Standard root certificate,C=CZ

# Not Valid Before: Tue Apr 01 00:00:00 2008

# Not Valid After: Sun Apr 01 00:00:00 2018

# Fingerprint (MD5): 04:68:e9:24:7e:41:ce:d7:6c:44:16:30:70:3d:dd:b9

# Fingerprint (SHA1): ab:16:dd:14:4e:cd:c0:fc:4b:aa:b6:2e:cf:04:08:89:6f:de:52:b7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

```

CKA_LABEL UTF8
"I.CA - Standard root certificate"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\253\026\335\024\116\315\300\374\113\252\266\056\317\004\010\211
\157\336\122\267
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\004\150\351\044\176\101\316\327\154\104\026\060\160\075\335\271
END
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\051\060\047\006\003\125\004\003\023\040\111\056\103\101\040\055
\040\123\164\141\156\144\141\162\144\040\162\157\157\164\040\143
\145\162\164\151\146\151\143\141\164\145\061\051\060\047\006\003
\125\004\012\023\040\120\162\166\156\151\040\143\145\162\164\151
\146\151\153\141\143\156\151\040\141\165\164\157\162\151\164\141
\040\141\056\163\056
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\023\326\040
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code
 Signing Only Certificate
Certificate "e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi"
Issuer: CN=e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi,O=Elektronik Bilgi Guvenligi A.S.,C=TR
Serial Number:44:99:8d:3c:c0:03:27:bd:9c:76:95:b9:ea:db:ac:b5
Subject: CN=e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi,O=Elektronik Bilgi Guvenligi A.S.,C=TR
Not Valid Before: Thu Jan 04 11:32:48 2007
Not Valid After: Wed Jan 04 11:32:48 2017
Fingerprint (MD5): 3d:41:29:cb:1e:aa:11:74:cd:5d:b0:62:af:b0:43:5b
Fingerprint (SHA1): dd:e1:d2:a9:01:80:2e:1d:87:5e:84:b3:80:7e:4b:b1:fd:99:41:34
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\050\060\046\006\003\125\004\012\023\037\105\154\145\153\164\162
\157\156\151\153\040\102\151\154\147\151\040\107\165\166\145\156
\154\151\147\151\040\101\056\123\056\061\074\060\072\006\003\125
\004\003\023\063\145\055\107\165\166\145\156\040\113\157\153\040

```

\105\154\145\153\164\162\157\156\151\153\040\123\145\162\164\151  
\146\151\153\141\040\110\151\172\155\145\164\040\123\141\147\154  
\141\171\151\143\151\163\151

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\165\061\013\060\011\006\003\125\004\006\023\002\124\122\061  
\050\060\046\006\003\125\004\012\023\037\105\154\145\153\164\162  
\157\156\151\153\040\102\151\154\147\151\040\107\165\166\145\156  
\154\151\147\151\040\101\056\123\056\061\074\060\072\006\003\125  
\004\003\023\063\145\055\107\165\166\145\156\040\113\157\153\040  
\105\154\145\153\164\162\157\156\151\153\040\123\145\162\164\151  
\146\151\153\141\040\110\151\172\155\145\164\040\123\141\147\154  
\141\171\151\143\151\163\151

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\104\231\215\074\300\003\047\275\234\166\225\271\352\333  
\254\265

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\003\266\060\202\002\236\240\003\002\001\002\002\020\104  
\231\215\074\300\003\047\275\234\166\225\271\352\333\254\265\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\165  
\061\013\060\011\006\003\125\004\006\023\002\124\122\061\050\060  
\046\006\003\125\004\012\023\037\105\154\145\153\164\162\157\156  
\151\153\040\102\151\154\147\151\040\107\165\166\145\156\154\151  
\147\151\040\101\056\123\056\061\074\060\072\006\003\125\004\003  
\023\063\145\055\107\165\166\145\156\040\113\157\153\040\105\154  
\145\153\164\162\157\156\151\153\040\123\145\162\164\151\146\151  
\153\141\040\110\151\172\155\145\164\040\123\141\147\154\141\171  
\151\143\151\163\151\060\036\027\015\060\067\060\061\060\064\061  
\061\063\062\064\070\132\027\015\061\067\060\061\060\064\061\061  
\063\062\064\070\132\060\165\061\013\060\011\006\003\125\004\006  
\023\002\124\122\061\050\060\046\006\003\125\004\012\023\037\105  
\154\145\153\164\162\157\156\151\153\040\102\151\154\147\151\040  
\107\165\166\145\156\154\151\147\151\040\101\056\123\056\061\074  
\060\072\006\003\125\004\003\023\063\145\055\107\165\166\145\156  
\040\113\157\153\040\105\154\145\153\164\162\157\156\151\153\040  
\123\145\162\164\151\146\151\153\141\040\110\151\172\155\145\164  
\040\123\141\147\154\141\171\151\143\151\163\151\060\202\001\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\001\017\000\060\202\001\012\002\202\001\001\000\303\022\040  
\236\260\136\000\145\215\116\106\273\200\134\351\054\006\227\325  
\363\162\311\160\271\347\113\145\200\301\113\276\176\074\327\124  
\061\224\336\325\022\272\123\026\002\352\130\143\357\133\330\363  
\355\052\032\252\161\110\243\334\020\055\137\137\353\134\113\234

\226\010\102\045\050\021\314\212\132\142\001\120\325\353\011\123  
\057\370\303\217\376\263\374\375\235\242\343\137\175\276\355\013  
\340\140\353\151\354\063\355\330\215\373\022\111\203\000\311\213  
\227\214\073\163\052\062\263\022\367\271\115\362\364\115\155\307  
\346\326\046\067\010\362\331\375\153\134\243\345\110\134\130\274  
\102\276\003\132\201\272\034\065\014\000\323\365\043\176\161\060  
\010\046\070\334\045\021\107\055\363\272\043\020\245\277\274\002  
\367\103\136\307\376\260\067\120\231\173\017\223\316\346\103\054  
\303\176\015\362\034\103\146\140\313\141\061\107\207\243\117\256  
\275\126\154\114\274\274\370\005\312\144\364\351\064\241\054\265  
\163\341\302\076\350\310\311\064\045\010\134\363\355\246\307\224  
\237\255\210\103\045\327\341\071\140\376\254\071\131\002\003\001  
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\237\356\104\263\224\325\372\221\117\056\331\125\232\004  
\126\333\055\304\333\245\060\015\006\011\052\206\110\206\367\015  
\001\001\005\005\000\003\202\001\001\000\177\137\271\123\133\143  
\075\165\062\347\372\304\164\032\313\106\337\106\151\034\122\317  
\252\117\302\150\353\377\200\251\121\350\075\142\167\211\075\012  
\165\071\361\156\135\027\207\157\150\005\301\224\154\331\135\337  
\332\262\131\313\245\020\212\312\314\071\315\237\353\116\336\122  
\377\014\360\364\222\251\362\154\123\253\233\322\107\240\037\164  
\367\233\232\361\057\025\237\172\144\060\030\007\074\052\017\147  
\312\374\017\211\141\235\145\245\074\345\274\023\133\010\333\343  
\377\355\273\006\273\152\006\261\172\117\145\306\202\375\036\234  
\213\265\015\356\110\273\270\275\252\010\264\373\243\174\313\237  
\315\220\166\134\206\226\170\127\012\146\371\130\032\235\375\227  
\051\140\336\021\246\220\034\031\034\356\001\226\042\064\064\056  
\221\371\267\304\047\321\173\346\277\373\200\104\132\026\345\353  
\340\324\012\070\274\344\221\343\325\353\134\301\254\337\033\152  
\174\236\345\165\322\266\227\207\333\314\207\053\103\072\204\010  
\257\253\074\333\367\074\146\061\206\260\235\123\171\355\370\043  
\336\102\343\055\202\361\017\345\372\227

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL

CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi"

# Issuer: CN=e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi,O=Elektronik Bilgi Guvenligi A.S.,C=TR

# Serial Number:44:99:8d:3c:c0:03:27:bd:9c:76:95:b9:ea:db:ac:b5

# Subject: CN=e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi,O=Elektronik Bilgi Guvenligi A.S.,C=TR

# Not Valid Before: Thu Jan 04 11:32:48 2007

# Not Valid After: Wed Jan 04 11:32:48 2017

```

Fingerprint (MD5): 3d:41:29:cb:1e:aa:11:74:cd:5d:b0:62:af:b0:43:5b
Fingerprint (SHA1): dd:e1:d2:a9:01:80:2e:1d:87:5e:84:b3:80:7e:4b:b1:fd:99:41:34
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\335\341\322\251\001\200\056\035\207\136\204\263\200\176\113\261
\375\231\101\064
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\075\101\051\313\036\252\021\164\315\135\260\142\257\260\103\133
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\050\060\046\006\003\125\004\012\023\037\105\154\145\153\164\162
\157\156\151\153\040\102\151\154\147\151\040\107\165\166\145\156
\154\151\147\151\040\101\056\123\056\061\074\060\072\006\003\125
\004\003\023\063\145\055\107\165\166\145\156\040\113\157\153\040
\105\154\145\153\164\162\157\156\151\153\040\123\145\162\164\151
\146\151\153\141\040\110\151\172\155\145\164\040\123\141\147\154
\141\171\151\143\151\163\151
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\104\231\215\074\300\003\047\275\234\166\225\271\352\333
\254\265
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
#
Certificate "Japanese Government"
Issuer: OU=ApplicationCA,O=Japanese Government,C=JP
Serial Number: 49 (0x31)
Subject: OU=ApplicationCA,O=Japanese Government,C=JP
Not Valid Before: Wed Dec 12 15:00:00 2007
Not Valid After: Tue Dec 12 15:00:00 2017
Fingerprint (MD5): 7e:23:4e:5b:a7:a5:b4:25:e9:00:07:74:11:62:ae:d6
Fingerprint (SHA1): 7f:8a:b0:cf:d0:51:87:6a:66:f3:36:0f:47:c8:8d:8c:d3:35:fc:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```



```
CKA_LABEL UTF8 "Japanese Government"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\026\060
\024\006\003\125\004\013\023\015\101\160\160\154\151\143\141\164
\151\157\156\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\026\060
\024\006\003\125\004\013\023\015\101\160\160\154\151\143\141\164
\151\157\156\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\061
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\240\060\202\002\210\240\003\002\001\002\002\001\061
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\103\061\013\060\011\006\003\125\004\006\023\002\112\120\061\034
\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145\163
\145\040\107\157\166\145\162\156\155\145\156\164\061\026\060\024
\006\003\125\004\013\023\015\101\160\160\154\151\143\141\164\151
\157\156\103\101\060\036\027\015\060\067\061\062\061\062\061\065
\060\060\060\060\132\027\015\061\067\061\062\061\062\061\065\060
\060\060\060\132\060\103\061\013\060\011\006\003\125\004\006\023
\002\112\120\061\034\060\032\006\003\125\004\012\023\023\112\141
\160\141\156\145\163\145\040\107\157\166\145\162\156\155\145\156
\164\061\026\060\024\006\003\125\004\013\023\015\101\160\160\154
\151\143\141\164\151\157\156\103\101\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\247\155\340\164\116\207
\217\245\006\336\150\242\333\206\231\113\144\015\161\360\012\005
\233\216\252\341\314\056\322\152\073\301\172\264\227\141\215\212
\276\306\232\234\006\264\206\121\344\067\016\164\170\176\137\212
\177\224\244\327\107\010\375\120\132\126\344\150\254\050\163\240
\173\351\177\030\222\100\117\055\235\365\256\104\110\163\066\006
\236\144\054\073\064\043\333\134\046\344\161\171\217\324\156\171
\042\271\223\301\312\315\301\126\355\210\152\327\240\071\041\004
\127\054\242\365\274\107\101\117\136\064\042\225\265\037\051\155
\136\112\363\115\162\276\101\126\040\207\374\351\120\107\327\060
\024\356\134\214\125\272\131\215\207\374\043\336\223\320\004\214
\375\357\155\275\320\172\311\245\072\152\162\063\306\112\015\005
```

\027\052\055\173\261\247\330\326\360\276\364\077\352\016\050\155  
\101\141\043\166\170\303\270\145\244\363\132\256\314\302\252\331  
\347\130\336\266\176\235\205\156\237\052\012\157\237\003\051\060  
\227\050\035\274\267\317\124\051\116\121\061\371\047\266\050\046  
\376\242\143\346\101\026\360\063\230\107\002\003\001\000\001\243  
\201\236\060\201\233\060\035\006\003\125\035\016\004\026\004\024  
\124\132\313\046\077\161\314\224\106\015\226\123\352\153\110\320  
\223\376\102\165\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\131\006\003\125\035\021\004\122\060\120\244  
\116\060\114\061\013\060\011\006\003\125\004\006\023\002\112\120  
\061\030\060\026\006\003\125\004\012\014\017\346\227\245\346\234  
\254\345\233\275\346\224\277\345\272\234\061\043\060\041\006\003  
\125\004\013\014\032\343\202\242\343\203\227\343\203\252\343\202  
\261\343\203\274\343\202\267\343\203\247\343\203\263\103\101\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\071\152\104\166\167\070\072\354\243\147\106\017  
\371\213\006\250\373\152\220\061\316\176\354\332\321\211\174\172  
\353\056\014\275\231\062\347\260\044\326\303\377\365\262\210\011  
\207\054\343\124\341\243\246\262\010\013\300\205\250\310\322\234  
\161\366\035\237\140\374\070\063\023\341\236\334\013\137\332\026  
\120\051\173\057\160\221\017\231\272\064\064\215\225\164\305\176  
\170\251\146\135\275\312\041\167\102\020\254\146\046\075\336\221  
\253\375\025\360\157\355\154\137\020\370\363\026\366\003\212\217  
\247\022\021\014\313\375\077\171\301\234\375\142\356\243\317\124  
\014\321\053\137\027\076\343\076\277\300\053\076\011\233\376\210  
\246\176\264\222\027\374\043\224\201\275\156\247\305\214\302\353  
\021\105\333\370\101\311\226\166\352\160\137\171\022\153\344\243  
\007\132\005\357\047\111\317\041\237\212\114\011\160\146\251\046  
\301\053\021\116\063\322\016\374\326\154\322\016\062\144\150\377  
\255\005\170\137\003\035\250\343\220\254\044\340\017\100\247\113  
\256\213\050\267\202\312\030\007\346\267\133\164\351\040\031\177  
\262\033\211\124

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Japanese Government"

# Issuer: OU=ApplicationCA,O=Japanese Government,C=JP

# Serial Number: 49 (0x31)

# Subject: OU=ApplicationCA,O=Japanese Government,C=JP

# Not Valid Before: Wed Dec 12 15:00:00 2007

# Not Valid After: Tue Dec 12 15:00:00 2017

# Fingerprint (MD5): 7e:23:4e:5b:a7:a5:b4:25:e9:00:07:74:11:62:ae:d6

# Fingerprint (SHA1): 7f:8a:b0:cf:d0:51:87:6a:66:f3:36:0f:47:c8:8d:8c:d3:35:fc:74

```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Japanese Government"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\177\212\260\317\320\121\207\152\146\363\066\017\107\310\215\214
\323\065\374\164
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\176\043\116\133\247\245\264\045\351\000\007\164\021\142\256\326
END
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\026\060
\024\006\003\125\004\013\023\015\101\160\160\154\151\143\141\164
\151\157\156\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\061
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "AdminCA-CD-T01"
Issuer: CN=AdminCA-CD-T01,OU=Certification Authorities,OU=Services,O=admin,C=CH
Serial Number: 1 (0x1)
Subject: CN=AdminCA-CD-T01,OU=Certification Authorities,OU=Services,O=admin,C=CH
Not Valid Before: Wed Jan
25 13:36:19 2006
Not Valid After: Mon Jan 25 12:36:19 2016
Fingerprint (MD5): 5b:9e:fd:3b:60:35:ea:68:8e:52:fe:13:19:14:4a:a3
Fingerprint (SHA1): 6b:81:44:6a:5c:dd:f4:74:a0:f8:00:ff:be:69:fd:0d:b6:28:75:16
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AdminCA-CD-T01"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143

```

\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\151\145\163\061\027\060\025\006\003\125\004\003\023  
\016\101\144\155\151\156\103\101\055\103\104\055\124\060\061

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061  
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061  
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143  
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\151\145\163\061\027\060\025\006\003\125\004\003\023  
\016\101\144\155\151\156\103\101\055\103\104\055\124\060\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\115\060\202\003\065\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061\016  
\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061\021  
\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145  
\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\151\145\163\061\027\060\025\006\003\125\004\003\023\016  
\101\144\155\151\156\103\101\055\103\104\055\124\060\061\060\036  
\027\015\060\066\060\061\062\065\061\063\063\066\061\071\132\027  
\015\061\066\060\061\062\065\061\062\063\066\061\071\132\060\155  
\061\013\060\011\006\003\125\004\006\023\002\103\110\061\016\060  
\014\006\003\125\004\012\023\005\141\144\155\151\156\061\021\060  
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163  
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\151\145\163\061\027\060\025\006\003\125\004\003\023\016\101  
\144\155\151\156\103\101\055\103\104\055\124\060\061\060\202\001  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\322\064  
\045\061\231\251\054\070\125\370\143\121\365\060\050\110\331\136  
\046\004\001\343\020\027\044\102\320\177\237\362\110\307\350\024  
\016\014\232\062\252\141\164\044\007\243\006\076\344\012\301\037  
\127\105\024\217\177\255\157\251\277\030\076\307\143\106\150\051  
\157\041\301\161\107\171\267\103\174\105\176\260\105\225\047\074  
\305\276\154\040\250\331\132\200\123\205\305\156\171\134\332\001  
\312\151\251\264\301\324\355\154\024\327\022\113\364\211\342\007  
\177\020\237\027\025\352\112\304\253\353\102\044\027\375\277\305

\272\300\201\137\320\017\234\207\223\242\036\361\367\200\125\154  
\042\345\113\132\026\253\156\340\270\205\022\035\220\063\054\154  
\073\054\365\071\313\312\316\103\066\203\316\367\267\050\204\356  
\074\314\201\223\376\133\015\355\211\271\066\027\337\236\351\227  
\242\007\176\323\054\351\225\266\370\051\232\274\054\341\370\210  
\254\123\127\021\204\226\005\132\324\115\271\374\325\116\073\311  
\154\316\201\376\137\020\163\364\355\264\125\345\003\202\314\051  
\275\366\243\142\232\306\313\350\041\273\235\076\374\011\002\003  
\001\000\001\243\201\367\060\201\364\060\022\006\003\125\035\023  
\001\001\377\004\010\060\006\001\001\377\002\001\000\060\201\256  
\006\003\125\035\040\004\201\246\060\201\243\060\201\240\006\010  
\140\205\164\001\021\003\025\001\060\201\223\060\110\006\010\053  
\006\001\005\005\007\002\002\060\074\032\072\124\150\151\163\040  
\151\163\040\164\150\145\040\101\144\155\151\156\103\101\055\103  
\104\055\124\060\061\040\103\145\162\164\151\146\151\143\141\164  
\145\040\120\162\141\143\164\151\143\145\040\123\164\141\164\145  
\155\145\156\164\056\060\107\006\010\053\006\001\005\005\007\002  
\001\026\073\150\164\164\160\072\057\057\167\167\167\056\160\153  
\151\056\141\144\155\151\156\056\143\150\057\160\157\154\151\143  
\171\057\103\120\123\137\062\137\061\066\137\067\065\066\137\061  
\137\061\067\137\063\137\062\061\137\061\056\160\144\146\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035  
\006\003\125\035\016\004\026\004\024\052\304\151\012\241\306\125  
\306\003\156\160\316\206\201\263\244\017\252\031\333\060\015\006  
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001  
\000\237\176\172\155\273\254\214\216\140\224\145\321\103\120\321  
\277\155\152\101\375\022\342\315\306\037\046\146\355\312\235\072  
\101\145\170\316\364\002\260\123\372\103\217\344\331\273\256\124  
\200\027\045\140\022\111\201\164\350\073\263\333\145\134\051\124  
\311\346\105\236\236\224\021\204\124\162\050\317\067\300\365\125  
\243\121\053\243\310\120\346\351\014\024\023\320\057\244\001\374  
\106\367\076\057\333\324\364\113\024\370\262\000\035\013\374\120  
\027\053\371\360\132\175\154\371\373\243\013\212\300\247\062\010  
\175\127\113\050\277\006\236\027\024\102\345\054\346\242\200\026  
\116\377\017\235\074\034\370\025\302\122\165\230\324\370\026\211  
\320\115\347\050\010\307\225\050\116\346\213\201\111\231\332\047  
\075\351\372\171\060\331\154\250\337\253\072\033\020\212\321\166  
\344\110\376\071\212\170\210\033\201\146\303\006\144\242\166\005  
\312\224\047\264\166\361\332\202\373\265\104\020\143\103\303\243  
\306\306\004\307\017\313\361\266\217\347\134\212\246\121\226\311  
\337\200\314\265\321\040\263\103\323\024\307\335\261\120\155\225  
\172

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```

Microsoft Code Signing Only Certificate
Trust for "AdminCA-CD-T01"
Issuer: CN=AdminCA-CD-T01,OU=Certification Authorities,OU=Services,O=admin,C=CH
Serial Number: 1 (0x1)
Subject: CN=AdminCA-CD-T01,OU=Certification Authorities,OU=Services,O=admin,C=CH
Not Valid Before: Wed Jan 25 13:36:19 2006
Not Valid After: Mon Jan 25 12:36:19 2016
Fingerprint (MD5): 5b:9e:fd:3b:60:35:ea:68:8e:52:fe:13:19:14:4a:a3
Fingerprint (SHA1): 6b:81:44:6a:5c:dd:f4:74:a0:f8:00:ff:be:69:fd:0d:b6:28:75:16
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AdminCA-CD-T01"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\153\201\104\152\134\335\364\164\240\370\000\377\276\151\375\015
\266\050\165\026
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\133\236\375\073\140\065\352\150\216\122\376\023\031\024\112\243
END
CKA_ISSUER
MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\027\060\025\006\003\125\004\003\023
\016\101\144\155\151\156\103\101\055\103\104\055\124\060\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "Admin-Root-CA"
Issuer: CN=Admin-Root-CA,OU=Certification Authorities,OU=Services,O=admin,C=ch
Serial Number:3b:f3:81:d0
Subject: CN=Admin-Root-CA,OU=Certification Authorities,OU=Services,O=admin,C=ch
#
Not Valid Before: Thu Nov 15 08:51:07 2001
Not Valid After: Wed Nov 10 07:51:07 2021
Fingerprint (MD5): f3:7e:3a:13:dc:74:63:06:74:1a:3c:38:32:8c:fb:a9

```

# Fingerprint (SHA1): 25:3f:77:5b:0e:77:97:ab:64:5f:15:91:55:97:c3:9e:26:36:31:d1

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Admin-Root-CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\026\060\024\006\003\125\004\003\023
\015\101\144\155\151\156\055\122\157\157\164\055\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\026\060\024\006\003\125\004\003\023
\015\101\144\155\151\156\055\122\157\157\164\055\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\073\363\201\320
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\125\060\202\004\075\240\003\002\001\002\002\004\073
\363\201\320\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\154\061\013\060\011\006\003\125\004\006\023\002\143
\150\061\016\060\014\006\003\125\004\012\023\005\141\144\155\151
\156\061\021\060\017\006\003\125\004\013\023\010\123\145\162\166
\151\143\145\163\061\042\060\040\006\003\125\004\013\023\031\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\151\145\163\061\026\060\024\006\003\125\004
\003\023\015\101\144\155\151\156\055\122\157\157\164\055\103\101
\060\036\027\015\060\061\061\061\061\065\060\070\065\061\060\067
\132\027\015\062\061\061\061\061\060\060\067\065\061\060\067\132
\060\154\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\026\060\024\006\003\125\004\003\023
```

\015\101\144\155\151\156\055\122\157\157\164\055\103\101\060\202  
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\313  
\340\257\104\024\042\376\152\027\111\362\135\235\317\134\002\142  
\013\200\271\132\277\250\125\063\173\243\022\044\136\114\157\073  
\101\211\116\203\075\237\263\225\046\064\246\314\022\364\314\235  
\207\136\075\014\015\027\057\205\046\076\052\046\131\163\241\250  
\274\073\353\345\106\270\363\131\173\040\261\136\100\001\155\272  
\147\263\153\353\357\305\342\371\065\335\014\152\006\266\232\050  
\232\160\263\100\051\166\300\161\106\021\153\103\257\345\126\101  
\373\346\034\071\203\115\267\366\242\261\146\311\250\015\262\360  
\167\276\066\301\040\047\062\271\314\327\132\312\366\027\101\066  
\115\373\273\125\201\143\234\223\136\203\153\177\270\025\167\162  
\174\175\115\011\153\131\225\346\355\060\253\104\106\331\025\001  
\245\133\211\145\266\340\050\331\050\010\225\176\010\043\262\042  
\350\337\045\114\074\150\367\156\347\113\307\220\375\204\101\046  
\276\134\203\072\327\043\171\267\032\370\007\031\202\132\151\130  
\305\377\210\162\053\307\276\370\323\055\063\167\247\026\022\250  
\213\041\306\102\256\172\144\257\362\263\300\355\167\344\151\002  
\003\001\000\001\243\202\001\375\060\202\001\371\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\201\231  
\006\003\125\035\040\004\201\221\060\201\216\060\201\213\006\010  
\140\205\164\001\021\003\001\000\060\177\060\053\006\010\053\006  
\001\005\005\007\002\002\060\037\032\035\124\150\151\163\040\151  
\163\040\164\150\145\040\101\144\155\151\156\055\122\157\157\164  
\055\103\101\040\103\120\123\060\120\006\010\053\006\001\005\005  
\007\002\001\026\104\150\164\164\160\072\057\057\167\167\167\056  
\151\156\146\157\162\155\141\164\151\153\056\141\144\155\151\156  
\056\143\150\057\120\113\111\057\154\151\156\153\163\057\103\120  
\123\137\062\137\061\066\137\067\065\066\137\061\137\061\067\137  
\063\137\061\137\060\056\160\144\146\060\177\006\003\125\035\037  
\004\170\060\166\060\164\240\162\240\160\244\156\060\154\061\026  
\060\024\006\003\125\004\003\023\015\101\144\155\151\156\055\122  
\157\157\164\055\103\101\061\042\060\040\006\003\125\004\013\023  
\031\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\151\145\163\061\021\060\017\006\003  
\125\004\013\023\010\123\145\162\166\151\143\145\163\061\016\060  
\014\006\003\125\004\012\023\005\141\144\155\151\156\061\013\060  
\011\006\003\125\004\006\023\002\143\150\060\035\006\003\125\035  
\016\004\026\004\024\202\237\372\043\163\040\361\227\213\262\114  
\115\276\102\305\177\146\315\144\350\060\201\231\006\003\125\035  
\043\004\201\221\060\201\216\200\024\202\237\372\043\163\040\361  
\227\213\262\114\115\276\102\305\177\146\315\144\350\241\160\244  
\156\060\154\061\013\060\011\006\003\125\004\006\023\002\143\150  
\061\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156  
\061\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151  
\143\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150



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\157\162\151\164\151\145\163\061\026\060\024\006\003\125\004\003
\023\015\101\144\155\151\156\055\122\157\157\164\055\103\101\202
\004\073\363\201\320\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\001\001\000\170\117\172\134\046\021\247
\056\256\232\103\312\134\065\202\106\176\310\066\217\172\146\265
\251\062\010\034\014\344\156\241\361\310\301\324\344\200\347\214
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\364\133\017\015\041\104\307\052\053\075\032\013\300\240\301\314
\210\312\034\077\254\122\266\366\147\315\114\155\304\276\043\375
\101\053\004\156\167\245\026\170\351\233\134\043\317\201\032\006
\041\143\152\334\051\121\262\072\371\233\367\135\261\055\365\004
\027\006\177\234\350\067\205\055\356\061\274\056\001\370\304\353
\153\216\064\305\071\071\366\224\230\273\037\016\036\021\057\250
\214\007\012\110\242\214\152\231\205\064\267\052\141\205\170\032
\051\151\037\235\045\120\121\004\312\027\303\071\070\007\161\347
\321\230\233\325\321\030\025\226\274\342\363\311\147\053\361\011
\262\316\234\364\103\046\001\372\127\153\220\251\261\276\350\065
\325\151\377\360\071\025\116\274\137\360\317\073\364\276\043\077
\105\146\304\264\226\135\276\217\015\336\307\155\011\102\363\211
\371\361\077\365\164\117\337\270\145
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Admin-Root-CA"

# Issuer: CN=Admin-Root-CA,OU=Certification Authorities,OU=Services,O=admin,C=ch

# Serial Number:3b:f3:81:d0

# Subject: CN=Admin-Root-CA,OU=Certification Authorities,OU=Services,O=admin,C=ch

# Not Valid Before: Thu Nov 15 08:51:07 2001

# Not Valid After: Wed Nov 10 07:51:07 2021

# Fingerprint (MD5): f3:7e:3a:13:dc:74:63:06:74:1a:3c:38:32:8c:fb:a9

# Fingerprint (SHA1): 25:3f:77:5b:0e:77:97:ab:64:5f:15:91:55:97:c3:9e:26:36:31:d1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Admin-Root-CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\045\077\167\133\016\167\227\253\144\137\025\221\125\227\303\236
\046\066\061\321
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\363\176\072\023\334\164\143\006\164\032\074\070\062\214\373\251
```

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\143\150\061  
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061  
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143  
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162  
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END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\004\073\363\201\320

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs  
- Sürüm 3"

# Issuer: CN=TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3,OU=Kamu Sertifikasyon  
Merkezi,OU=Ulusal Elektronik ve Kriptoloji Aratırma Enstitüsü - UEKAE,O=Türkiye Bilimsel ve Teknolojik  
Aratırma Kurumu - TÜBTAK,L=Gebze - Kocaeli,C=TR

# Serial Number: 17 (0x11)

# Subject: CN=TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3,OU=Kamu Sertifikasyon  
Merkezi,OU=Ulusal Elektronik ve Kriptoloji Aratırma Enstitüsü - UEKAE,O=Türkiye Bilimsel ve Teknolojik  
Aratırma Kurumu - TÜBTAK,L=Gebze - Kocaeli,C=TR

# Not Valid Before: Fri Aug 24 11:37:07 2007

# Not Valid After: Mon Aug 21 11:37:07 2017

# Fingerprint (MD5): ed:41:f5:8c:50:c5:2b:9c:73:e6:ee:6c:eb:c2:a8:26

# Fingerprint (SHA1): 1b:4b:39:61:26:27:6b:64:91:a2:68:6d:d7:02:43:21:2d:1f:1d:96

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3"

CKA\_CERTIFICATE\_TYPE

CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

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\145\040\055\040\113\157\143\141\145\154\151\061\107\060\105\006  
\003\125\004\012\014\076\124\303\274\162\153\151\171\145\040\102  
\151\154\151\155\163\145\154\040\166\145\040\124\145\153\156\157  
\154\157\152\151\153\040\101\162\141\305\237\164\304\261\162\155  
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\260\124\101\113\061\110\060\106\006\003\125\004\013\014\077\125

\154\165\163\141\154\040\105\154\145\153\164\162\157\156\151\153  
\040\166\145\040\113\162\151\160\164\157\154\157\152\151\040\101  
\162\141\305\237\164\304\261\162\155\141\040\105\156\163\164\151  
\164\303\274\163\303\274\040\055\040\125\105\113\101\105\061\043  
\060\041\006\003\125\004\013\014\032\113\141\155\165\040\123\145  
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153  
\145\172\151\061\112\060\110\006\003\125\004\003\014\101\124\303  
\234\102\304\260\124\101\113\040\125\105\113\101\105\040\113\303  
\266\153\040\123\145\162\164\151\146\151\153\141\040\110\151\172  
\155\145\164\040\123\141\304\237\154\141\171\304\261\143\304\261  
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END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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\151\154\151\155\163\145\154\040\166\145\040\124\145\153\156\157  
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\141\040\113\165\162\165\155\165\040\055\040\124\303\234\102\304  
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\164\303\274\163\303\274\040\055\040\125\105\113\101\105\061\043  
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\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153  
\145\172\151\061\112\060\110\006\003\125\004\003\014\101\124\303  
\234\102\304\260\124\101\113\040\125\105\113\101\105\040\113\303  
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\021

END

CKA\_VALUE MULTILINE\_OCTAL

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\145\164\040\123\141\304\237\154\141\171\304\261\143\304\261\163  
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\001\053\061\013\060\011\006\003\125\004\006\023\002\124\122\061  
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\015\001\001\005\005\000\003\202\001\001\000\035\174\372\111\217  
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\303\043\237\151\074\206\070\034\236\357\332\047\170\321\204\067  
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\206\201\307\204\306\037\325\113\201\022\262\026\041\054\023\241  
\200\262\136\014\112\023\236\040\330\142\100\253\220\352\144\112  
\057\254\015\001\022\171\105\250\057\207\031\150\310\342\205\307  
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\240\337\211\326\255\214\166\243\023\303\224\141\053\153\331\154  
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3"

# Issuer: CN=TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3,OU=Kamu Sertifikasyon

Merkezi,OU=Ulusal Elektronik ve Kriptoloji Aratırma Enstitüsü - UEKAE,O=Türkiye Bilimsel ve Teknolojik  
Aratırma Kurumu - TÜBTAK,L=Gebze - Kocaeli,C=TR

# Serial Number: 17 (0x11)

# Subject: CN=TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3,OU=Kamu Sertifikasyon

Merkezi,OU=Ulusal Elektronik ve Kriptoloji Aratırma Enstitüsü - UEKAE,O=Türkiye Bilimsel ve Teknolojik  
Aratırma Kurumu - TÜBTAK,L=Gebze - Kocaeli,C=TR

# Not Valid Before: Fri Aug 24 11:37:07 2007

# Not Valid After: Mon Aug 21 11:37:07 2017

# Fingerprint (MD5): ed:41:f5:8c:50:c5:2b:9c:73:e6:ee:6c:eb:c2:a8:26

# Fingerprint (SHA1): 1b:4b:39:61:26:27:6b:64:91:a2:68:6d:d7:02:43:21:2d:1f:1d:96

CKA\_CLASS CK\_OBJECT\_CLASS

```

CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\033\113\071\141\046\047\153\144\221\242\150\155\327\002\103\041
\055\037\035\226
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\355\101\365\214\120\305\053\234\163\346\356\154\353\302\250\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\202\001\053\061\013\060\011\006\003\125\004\006\023\002\124
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\145\040\055\040\113\157\143\141\145\154\151\061\107\060\105\006
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END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\021
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Halcom
CA FO"
Issuer: CN=Halcom CA FO,O=Halcom,C=SI
Serial Number: 113253 (0x1ba65)
Subject: CN=Halcom CA FO,O=Halcom,C=SI

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Not Valid Before: Sun Jun 05 10:33:31 2005
Not Valid After: Fri Jun 05 10:33:31 2020
Fingerprint (MD5): 0b:09:2c:1c:d7:21:86:6f:94:37:6f:e6:a7:f3:22:4d
Fingerprint (SHA1): 04:09:56:5b:77:da:58:2e:64:95:ac:00:60:a7:23:54:e6:4b:01:92
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom CA FO"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\025\060\023\006\003\125\004\003\023\014\110\141\154\143\157
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CKA_ID UTF8 "0"
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\155\040\103\101\040\106\117
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MULTILINE_OCTAL
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END
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\252\254\271\336\067\242\037\364\232\034\033\310\356\020\203\326
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\336\341\171\112\237\351\140\076\155\065\344\115\121\321\034\300  
\032\060\134\006\077\163\103\310\315\066\364\036\302\207\214\117  
\110\237\332\165\127\052\114\257\215\124\074\104\137\230\074\120  
\332\320\030\006\174\140\156\322\204\377\147\205\220\075\136\306  
\353\330\172\243\265\155\014\276\165\270\251\332\126\161\066\132  
\356\353\111\123\076\342\031\166\174\102\253\241\220\361\367\057  
\270\272\112\101\264\053\244\056\141\066\347\326\332\177\365\237  
\215\270\113\133\204\065\120\305\275\005\252\252\302\014\164\101  
\143\127\031\216\377\341\106\346\173\005\044\376\231\335\061\275  
\002\003\001\000\001\243\063\060\061\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\021\006\003\125\035  
\016\004\012\004\010\110\040\034\142\015\130\122\045\060\013\006  
\003\125\035\017\004\004\003\002\001\006\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\133\165  
\365\346\060\106\130\212\367\017\321\117\013\001\130\004\271\144  
\344\060\015\076\166\331\153\023\255\034\156\311\114\360\154\346  
\102\021\375\353\203\357\120\330\273\124\235\264\221\212\132\265  
\204\017\214\106\315\074\202\250\245\036\040\234\320\365\101\006  
\312\001\053\230\260\352\051\120\037\342\164\173\131\202\312\012  
\345\156\116\256\260\067\355\076\314\272\062\331\077\013\150\054  
\262\323\074\334\070\305\021\326\033\063\356\271\242\152\104\223  
\033\120\352\141\033\171\127\121\126\236\062\320\063\170\264\317  
\107\052\373\367\315\361\347\155\340\272\144\373\025\233\276\312  
\261\362\107\001\177\340\114\267\245\101\254\036\331\032\154\221  
\341\320\250\112\303\136\170\053\172\200\300\117\315\045\137\120  
\047\306\274\130\165\234\035\265\232\135\225\163\363\204\146\323  
\315\155\035\315\340\132\316\040\070\357\222\163\170\136\002\326  
\215\371\164\324\267\211\330\214\373\173\325\213\161\325\031\027  
\046\330\044\111\074\125\274\202\207\332\143\273\071\327\216\221  
\317\064\160\134\163\117\320\120\107\132\373\345\132\121

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Halcom CA FO"

# Issuer: CN=Halcom CA FO,O=Halcom,C=SI

# Serial Number: 113253 (0x1ba65)

# Subject: CN=Halcom CA FO,O=Halcom,C=SI

# Not Valid Before: Sun Jun 05 10:33:31 2005

# Not Valid After: Fri Jun 05 10:33:31 2020

# Fingerprint (MD5): 0b:09:2c:1c:d7:21:86:6f:94:37:6f:e6:a7:f3:22:4d

# Fingerprint (SHA1): 04:09:56:5b:77:da:58:2e:64:95:ac:00:60:a7:23:54:e6:4b:01:92

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE



```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom CA FO"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\004\011\126\133\167\332\130\056\144\225\254\000\140\247\043\124
\346\113\001\222
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\013\011\054\034\327\041\206\157\224\067\157\346\247\363\042\115
END
CKA_ISSUER MULTILINE_OCTAL
\060\065\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\025\060\023\006\003\125\004\003\023\014\110\141\154\143\157
\155\040\103\101\040\106\117
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\001\272\145
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Halcom CA PO 2"
Issuer:
 CN=Halcom CA PO 2,O=Halcom,C=SI
Serial Number: 79074 (0x134e2)
Subject: CN=Halcom CA PO 2,O=Halcom,C=SI
Not Valid Before: Sat Feb 07 18:33:31 2004
Not Valid After: Thu Feb 07 18:33:31 2019
Fingerprint (MD5): 1d:64:96:af:2d:82:1a:30:0b:a0:62:0d:76:bc:53:aa
Fingerprint (SHA1): 7f:bb:6a:cd:7e:0a:b4:38:da:af:6f:d5:02:10:d0:07:c6:c0:82:9c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom CA PO 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\103\101\040\120\117\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL

```

\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061  
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155  
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157  
\155\040\103\101\040\120\117\040\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\003\001\064\342

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\031\060\202\001\202\240\003\002\001\002\002\003\001  
\064\342\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111  
\061\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157  
\155\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143  
\157\155\040\103\101\040\120\117\040\062\060\036\027\015\060\064  
\060\062\060\067\061\070\063\063\063\061\132\027\015\061\071\060  
\062\060\067\061\070\063\063\063\061\132\060\067\061\013\060\011  
\006\003\125\004\006\023\002\123\111\061\017\060\015\006\003\125  
\004\012\023\006\110\141\154\143\157\155\061\027\060\025\006\003  
\125\004\003\023\016\110\141\154\143\157\155\040\103\101\040\120  
\117\040\062\060\201\237\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\201\215\000\060\201\211\002\201\201\000  
\224\027\362\111\067\060\062\011\010\074\276\365\067\267\164\154  
\020\073\313\042\161\007\006\271\306\354\332\110\363\237\047\155  
\144\215\125\336\171\107\120\373\150\316\171\001\276\247\033\366  
\141\255\175\061\013\123\040\255\061\361\133\316\043\372\377\314  
\022\002\132\000\234\374\315\153\022\122\350\254\324\063\073\163  
\046\020\161\220\100\277\003\210\337\274\137\041\015\214\326\212  
\223\037\347\256\025\124\306\114\344\231\141\222\340\367\215\162  
\307\334\142\023\063\243\076\111\051\373\204\277\160\072\221\041  
\002\003\001\000\001\243\063\060\061\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\021\006\003\125\035  
\016\004\012\004\010\110\257\127\146\277\322\300\002\060\013\006  
\003\125\035\017\004\004\003\002\001\006\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\201\201\000\220\026\127  
\166\270\171\316\374\304\321\067\000\242\315\377\070\007\021\163  
\023\005\111\355\337\301\305\316\306\100\330\367\002\226\015\267  
\157\021\204\070\146\373\161\367\020\001\147\174\135\175\044\332  
\366\144\073\010\200\110\246\116\275\104\342\260\007\062\217\174  
\206\067\106\157\300\203\003\223\265\364\363\022\174\243\350\313  
\342\072\043\170\372\150\157\376\130\312\014\247\127\121\055\142  
\220\371\344\250\334\365\312\337\016\207\121\156\067\165\046\016  
\327\176\170\212\003\242\225\031\266\136\221\001\126

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Trust for "Halcom CA PO 2"  
# Issuer: CN=Halcom CA PO 2,O=Halcom,C=SI  
# Serial Number: 79074 (0x134e2)  
# Subject: CN=Halcom CA PO 2,O=Halcom,C=SI  
# Not Valid Before: Sat Feb 07 18:33:31 2004  
# Not Valid After: Thu Feb 07 18:33:31 2019  
# Fingerprint (MD5): 1d:64:96:af:2d:82:1a:30:0b:a0:62:0d:76:bc:53:aa  
# Fingerprint (SHA1): 7f:bb:6a:cd:7e:0a:b4:38:da:af:6f:d5:02:10:d0:07:c6:c0:82:9c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Halcom CA PO 2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\177\273\152\315\176\012\264\070\332\257\157\325\002\020\320\007  
\306\300\202\234

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\035\144\226\257\055\202\032\060\013\240\142\015\166\274\123\252

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061  
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155  
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157  
\155\040\103\101\040\120\117\040\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\003\001\064\342

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "ACNLB"

# Issuer: O=ACNLB,C=SI

# Serial Number:3e:c3:86:8e

#

Subject: O=ACNLB,C=SI

# Not Valid Before: Thu May 15 11:52:45 2003

# Not Valid After: Mon May 15 12:22:45 2023

# Fingerprint (MD5): ba:92:64:42:16:1f:cb:a1:16:48:1a:f6:40:5c:59:87

# Fingerprint (SHA1): 04:56:f2:3d:1e:9c:43:ae:cb:0d:80:7f:1c:06:47:55:1a:05:f4:56

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACNLB"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\035\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\016\060\014\006\003\125\004\012\023\005\101\103\116\114\102
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\035\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\016\060\014\006\003\125\004\012\023\005\101\103\116\114\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\076\303\206\216
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\267\060\202\002\237\240\003\002\001\002\002\004\076
\303\206\216\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\035\061\013\060\011\006\003\125\004\006\023\002\123
\111\061\016\060\014\006\003\125\004\012\023\005\101\103\116\114
\102\060\036\027\015\060\063\060\065\061\065\061\061\065\062\064
\065\132\027\015\062\063\060\065\061\065\061\062\062\064\065
\132\060\035\061\013\060\011\006\003\125\004\006\023\002\123\111
\061\016\060\014\006\003\125\004\012\023\005\101\103\116\114\102
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\277\166\165\075\014\174\100\072\146\137\115\214\373\335\074
\056\376\175\224\144\355\112\324\111\110\241\356\221\161\262\171
\310\216\053\037\252\360\062\264\050\262\243\302\165\117\244\351
\246\032\366\242\146\141\043\047\141\054\156\027\220\013\372\336
\036\161\122\002\051\004\231\171\254\300\260\300\146\230\230\021
\067\144\020\317\234\274\073\102\034\051\134\125\220\366\172\042
\116\126\257\067\150\277\164\072\154\074\306\230\314\140\041\277
\342\010\047\344\331\053\274\343\204\225\327\324\044\140\374\176
\055\057\235\041\353\235\221\306\273\244\321\353\311\022\255\243
\350\310\265\177\125\113\353\231\002\124\304\201\034\014\256\071
\344\152\172\005\330\116\160\240\372\003\167\263\256\330\270\024
\222\373\101\167\023\065\152\267\242\312\210\113\255\055\121\274
\166\232\154\273\100\275\347\044\114\042\246\346\375\116\010\173
\235\013\020\326\022\322\246\306\241\144\062\364\001\163\226\201
\342\110\260\301\050\143\075\073\347\147\254\156\305\024\365\027
\023\242\234\037\053\127\360\025\047\165\135\335\261\064\326\223
\021\002\003\001\000\001\243\201\376\060\201\373\060\021\006\011
\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007\060
\077\006\003\125\035\037\004\070\060\066\060\064\240\062\240\060
```

\244\056\060\054\061\013\060\011\006\003\125\004\006\023\002\123  
\111\061\016\060\014\006\003\125\004\012\023\005\101\103\116\114  
\102\061\015\060\013\006\003\125\004\003\023\004\103\122\114\061  
\060\053\006\003\125\035\020\004\044\060\042\200\017\062\060\060  
\063\060\065\061\065\061\061\065\062\064\065\132\201\017\062\060  
\062\063\060\065\061\065\061\062\062\062\064\065\132\060\013\006  
\003\125\035\017\004\004\003\002\001\006\060\037\006\003\125\035  
\043\004\030\060\026\200\024\314\273\273\206\326\157\370\276\264  
\107\042\167\263\266\255\327\001\131\226\115\060\035\006\003\125  
\035\016\004\026\004\024\314\273\273\206\326\157\370\276\264\107  
\042\167\263\266\255\327\001\131\226\115\060\014\006\003\125\035  
\023\004\005\060\003\001\001\377\060\035\006\011\052\206\110\206  
\366\175\007\101\000\004\020\060\016\033\010\126\066\056\060\072  
\064\056\060\003\002\004\220\060\015\006\011\052\206\110\206\367  
\015\001\001\005\005\000\003\202\001\001\000\021\147\313\313\232  
\153\040\041\335\157\151\203\325\077\015\272\223\025\227\116\160  
\166\046\134\350\236\044\347\067\376\074\120\364\324\371\052\057  
\014\023\241\135\004\274\320\260\351\302\003\027\205\005\141\075  
\300\247\252\166\114\303\270\072\203\251\206\317\003\371\167\016  
\053\262\075\166\033\145\321\152\161\140\161\333\273\270\172\216  
\362\371\041\203\370\127\114\250\307\335\145\306\356\357\157\263  
\266\231\273\264\303\320\253\137\262\240\176\335\164\041\054\303  
\132\353\215\241\312\330\360\310\027\355\166\272\204\143\156\133  
\271\265\312\155\327\374\064\071\200\057\272\117\337\215\330\374  
\030\304\074\212\065\057\167\202\226\255\040\222\030\262\347\066  
\364\256\062\164\270\107\321\330\017\330\054\313\152\302\000\165  
\371\054\370\102\016\313\376\163\223\251\217\341\307\256\041\067  
\363\312\271\014\264\347\211\176\161\034\126\064\040\303\361\064  
\271\125\113\323\123\122\361\007\055\053\076\133\031\100\237\020  
\355\323\051\063\305\257\017\020\126\207\332\073\310\261\355\070  
\331\031\373\113\360\120\055\244\315\324\130

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ACNLB"

# Issuer: O=ACNLB,C=SI

#

Serial Number:3e:c3:86:8e

# Subject: O=ACNLB,C=SI

# Not Valid Before: Thu May 15 11:52:45 2003

# Not Valid After: Mon May 15 12:22:45 2023

# Fingerprint (MD5): ba:92:64:42:16:1f:cb:a1:16:48:1a:f6:40:5c:59:87

# Fingerprint (SHA1): 04:56:f2:3d:1e:9c:43:ae:cb:0d:80:7f:1c:06:47:55:1a:05:f4:56

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACNLB"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\004\126\362\075\036\234\103\256\313\015\200\177\034\006\107\125
\032\005\364\126
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\272\222\144\102\026\037\313\241\026\110\032\366\100\134\131\207
END
CKA_ISSUER MULTILINE_OCTAL
\060\035\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\016\060\014\006\003\125\004\012\023\005\101\103\116\114\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\076\303\206\216
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "state-institutions"
Issuer: OU=sigen-ca,O=state-institutions,C=si
Serial Number:3b:3c:f9:c9
Subject: OU=sigen-ca,O=state-institutions,C=si
Not Valid Before: Fri Jun 29 21:27:46 2001
Not Valid After: Tue Jun 29 21:57:46 2021
Fingerprint (MD5): 49:ef:a6:a1:f0:de:8e:a7:6a:ee:5b:7d:1e:5f:c4:46
Fingerprint (SHA1): 3e:42:a1:87:06:bd:0c:9c:cf:59:47:50:d2:e4:d6:ab:00:48:fd:c4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "state-institutions"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\163\151\061
\033\060\031\006\003\125\004\012\023\022\163\164\141\164\145\055
\151\156\163\164\151\164\165\164\151\157\156\163\061\021\060\017
\006\003\125\004\013\023\010\163\151\147\145\156\055\143\141
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL

```

\060\075\061\013\060\011\006\003\125\004\006\023\002\163\151\061  
\033\060\031\006\003\125\004\012\023\022\163\164\141\164\145\055  
\151\156\163\164\151\164\165\164\151\157\156\163\061\021\060\017  
\006\003\125\004\013\023\010\163\151\147\145\156\055\143\141

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\004\073\074\371\311

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\031\060\202\003\001\240\003\002\001\002\002\004\073  
\074\371\311\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\060\075\061\013\060\011\006\003\125\004\006\023\002\163  
\151\061\033\060\031\006\003\125\004\012\023\022\163\164\141\164  
\145\055\151\156\163\164\151\164\165\164\151\157\156\163\061\021  
\060\017\006\003\125\004\013\023\010\163\151\147\145\156\055\143  
\141\060\036\027\015\060\061\060\066\062\071\062\061\062\067\064  
\066\132\027\015\062\061\060\066\062\071\062\061\065\067\064\066  
\132\060\075\061\013\060\011\006\003\125\004\006\023\002\163\151  
\061\033\060\031\006\003\125\004\012\023\022\163\164\141\164\145  
\055\151\156\163\164\151\164\165\164\151\157\156\163\061\021\060  
\017\006\003\125\004\013\023\010\163\151\147\145\156\055\143\141  
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001  
\000\260\345\145\262\300\254\144\226\362\210\033\263\355\236\344  
\002\306\117\053\210\316\056\212\121\200\165\257\020\133\362\313  
\070\146\233\242\016\155\064\107\226\245\222\021\257\366\065\107  
\242\167\042\014\316\026\210\142\252\323\111\156\030\274\056\104  
\330\276\306\236\302\032\031\254\101\216\374\060\007\002\362\306  
\152\324\133\043\000\357\101\064\330\244\163\143\337\042\222\063  
\204\001\245\215\363\203\134\372\270\324\172\065\337\354\370\155  
\017\340\114\355\255\234\072\175\206\326\245\010\224\276\175\172  
\021\037\376\205\077\124\132\210\143\207\234\245\261\247\116\315  
\267\104\163\257\317\212\111\153\037\343\315\327\111\115\132\053  
\027\346\134\166\263\273\162\271\157\047\322\233\211\025\210\337  
\020\137\166\041\001\152\307\025\061\012\321\234\130\370\050\026  
\005\155\331\116\331\241\327\007\040\313\113\046\211\115\222\262  
\247\272\226\350\343\130\217\042\234\001\226\132\304\367\061\115  
\013\111\265\341\170\141\342\124\030\006\273\236\124\064\176\014  
\076\353\356\265\200\037\335\026\204\035\150\070\146\147\163\370  
\221\002\003\001\000\001\243\202\001\037\060\202\001\033\060\021  
\006\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000  
\007\060\137\006\003\125\035\037\004\130\060\126\060\124\240\122  
\240\120\244\116\060\114\061\013\060\011\006\003\125\004\006\023  
\002\163\151\061\033\060\031\006\003\125\004\012\023\022\163\164  
\141\164\145\055\151\156\163\164\151\164\165\164\151\157\156\163  
\061\021\060\017\006\003\125\004\013\023\010\163\151\147\145\156  
\055\143\141\061\015\060\013\006\003\125\004\003\023\004\103\122  
\114\061\060\053\006\003\125\035\020\004\044\060\042\200\017\062

\060\060\061\060\066\062\071\062\061\062\067\064\066\132\201\017  
\062\060\062\061\060\066\062\071\062\061\065\067\064\066\132\060  
\013\006\003\125\035\017\004\004\003\002\001\006\060\037\006\003  
\125\035\043\004\030\060\026\200\024\161\173\212\006\037\061\005  
\125\253\140\022\167\107\040\036\003\210\030\354\211\060\035\006  
\003\125\035\016\004\026\004\024\161\173\212\006\037\061\005\125  
\253\140\022\167\107\040\036\003\210\030\354\211\060\014\006\003  
\125\035\023\004\005\060\003\001\001\377\060\035\006\011\052\206  
\110\206\366\175\007\101\000\004\020\060\016\033\010\126\065\056  
\060\072\064\056\060\003\002\004\220\060\015\006\011\052\206\110  
\206\367\015\001\001\005\005\000\003\202\001\001\000\000\272\143  
\064\363\030\030\356\256\176\215\222\307\065\365\302\023\324\326  
\000\252\041\062\026\326\320\133\372\051\260\215\372\027\167\222  
\371\245\266\366\371\207\077\006\017\040\356\142\075\064\367\251  
\057\307\251\073\320\047\210\114\254\335\311\251\345\132\130\205  
\327\022\065\075\334\260\202\133\162\364\273\163\267\373\376\070  
\041\230\004\200\262\210\142\017\036\254\072\026\251\346\263\012  
\366\025\020\105\003\243\227\342\315\254\020\334\371\000\036\277  
\163\154\103\354\167\042\026\006\057\226\203\211\173\260\270\123  
\104\101\010\334\200\037\005\333\031\011\166\207\276\065\235\116  
\041\113\264\223\301\150\072\235\137\066\376\241\256\060\054\113  
\336\170\044\072\130\326\026\103\357\235\231\070\213\052\230\376  
\060\321\302\352\326\257\045\325\245\166\013\271\357\100\071\056  
\366\353\337\062\136\035\175\207\265\104\314\002\071\322\046\225  
\162\330\157\205\103\250\217\016\243\106\316\327\316\350\271\126  
\251\370\211\027\022\037\103\111\006\172\062\347\077\276\157\171  
\276\326\063\327\114\074\050\374\022\361\166\166\030

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "state-institutions"

# Issuer: OU=sigen-ca,O=state-institutions,C=si

#

Serial Number:3b:3c:f9:c9

# Subject: OU=sigen-ca,O=state-institutions,C=si

# Not Valid Before: Fri Jun 29 21:27:46 2001

# Not Valid After: Tue Jun 29 21:57:46 2021

# Fingerprint (MD5): 49:ef:a6:a1:f0:de:8e:a7:6a:ee:5b:7d:1e:5f:c4:46

# Fingerprint (SHA1): 3e:42:a1:87:06:bd:0c:9c:cf:59:47:50:d2:e4:d6:ab:00:48:fd:c4

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "state-institutions"



```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\076\102\241\207\006\275\014\234\317\131\107\120\322\344\326\253
\000\110\375\304
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\111\357\246\241\360\336\216\247\152\356\133\175\036\137\304\106
END
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\163\151\061
\033\060\031\006\003\125\004\012\023\022\163\164\141\164\145\055
\151\156\163\164\151\164\165\164\151\157\156\163\061\021\060\017
\006\003\125\004\013\023\010\163\151\147\145\156\055\143\141
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\073\074\371\311
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "SECOM Trust Systems CO.,LTD."
Issuer: OU=Security Communication EV RootCA1,O=SECOM Trust Systems CO.,LTD.,C=JP
Serial Number: 0 (0x0)
Subject: OU=Security Communication EV RootCA1,O=SECOM Trust Systems CO.,LTD.,C=JP
Not Valid Before: Wed Jun 06 02:12:32 2007
Not Valid After: Sat Jun 06 02:12:32 2037
Fingerprint (MD5): 22:2d:a6:01:ea:7c:0a:f7:f0:6c:56:43:3f:77:76:d3
Fingerprint (SHA1): fe:b8:c4:32:dc:f9:76:9a:ce:ae:3d:d8:90:8f:fd:28:86:65:64:7d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SECOM Trust Systems CO.,LTD."
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\140\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\052\060\050\006\003\125\004\013\023
\041\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\126\040\122\157\157\164\103
\101\061
END
CKA_ID UTF8 "0"

```

CKA\_ISSUER MULTILINE\_OCTAL

\060\140\061\013\060\011\006\003\125\004\006\023\002\112\120\061  
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040  
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117  
\056\054\114\124\104\056\061\052\060\050\006\003\125\004\013\023  
\041\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156  
\151\143\141\164\151\157\156\040\105\126\040\122\157\157\164\103  
\101\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\175\060\202\002\145\240\003\002\001\002\002\001\000  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\140\061\013\060\011\006\003\125\004\006\023\002\112\120\061\045  
\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040\124  
\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117\056  
\054\114\124\104\056\061\052\060\050\006\003\125\004\013\023\041  
\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156\151  
\143\141\164\151\157\156\040\105\126\040\122\157\157\164\103\101  
\061\060\036\027\015\060\067\060\066\060\066\060\062\061\062\063  
\062\132\027\015\063\067\060\066\060\066\060\062\061\062\063\062  
\132\060\140\061\013\060\011\006\003\125\004\006\023\002\112\120  
\061\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115  
\040\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103  
\117\056\054\114\124\104\056\061\052\060\050\006\003\125\004\013  
\023\041\123\145\143\165\162\151\164\171\040\103\157\155\155\165  
\156\151\143\141\164\151\157\156\040\105\126\040\122\157\157\164  
\103\101\061\060\202\001\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002  
\202\001\001\000\274\177\354\127\233\044\340\376\234\272\102\171  
\251\210\212\372\200\340\365\007\051\103\352\216\012\064\066\215  
\034\372\247\265\071\170\377\227\165\367\057\344\252\153\004\204  
\104\312\246\342\150\216\375\125\120\142\017\244\161\016\316\007  
\070\055\102\205\120\255\074\226\157\213\325\242\016\317\336\111  
\211\075\326\144\056\070\345\036\154\265\127\212\236\357\110\016  
\315\172\151\026\207\104\265\220\344\006\235\256\241\004\227\130  
\171\357\040\112\202\153\214\042\277\354\037\017\351\204\161\355  
\361\016\344\270\030\023\314\126\066\135\321\232\036\121\153\071  
\156\140\166\210\064\013\363\263\321\260\235\312\141\342\144\035  
\301\106\007\270\143\335\036\063\145\263\216\011\125\122\075\265  
\275\377\007\353\255\141\125\030\054\251\151\230\112\252\100\305  
\063\024\145\164\000\371\221\336\257\003\110\305\100\124\334\017  
\204\220\150\040\305\222\226\334\056\345\002\105\252\300\137\124  
\370\155\352\111\317\135\154\113\257\357\232\302\126\134\306\065  
\126\102\152\060\137\302\253\366\342\075\077\263\311\021\217\061  
\114\327\237\111\002\003\001\000\001\243\102\060\100\060\035\006

\003\125\035\016\004\026\004\024\065\112\365\115\257\077\327\202  
\070\254\253\161\145\027\165\214\235\125\223\346\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\015\006  
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001  
\000\250\207\351\354\370\100\147\135\303\301\146\307\100\113\227  
\374\207\023\220\132\304\357\240\312\137\213\267\247\267\361\326  
\265\144\267\212\263\270\033\314\332\373\254\146\210\101\316\350  
\374\344\333\036\210\246\355\047\120\033\002\060\044\106\171\376  
\004\207\160\227\100\163\321\300\301\127\031\232\151\245\047\231  
\253\235\142\204\366\121\301\054\311\043\025\330\050\267\253\045  
\023\265\106\341\206\002\377\046\214\304\210\222\035\126\376\031  
\147\362\125\344\200\243\153\234\253\167\341\121\161\015\040\333  
\020\232\333\275\166\171\007\167\231\050\255\232\136\332\261\117  
\104\054\065\216\245\226\307\375\203\360\130\306\171\326\230\174  
\250\215\376\206\076\007\026\222\341\173\347\035\354\063\166\176  
\102\056\112\205\371\221\211\150\204\003\201\245\233\232\276\343  
\067\305\124\253\126\073\030\055\101\244\014\370\102\333\231\240  
\340\162\157\273\135\341\026\117\123\012\144\371\116\364\277\116  
\124\275\170\154\210\352\277\234\023\044\302\160\151\242\177\017  
\310\074\255\010\311\260\230\100\243\052\347\210\203\355\167\217  
\164

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SECOM Trust Systems CO.,LTD."

# Issuer: OU=Security Communication EV RootCA1,O=SECOM Trust Systems CO.,LTD.,C=JP

# Serial Number: 0 (0x0)

# Subject: OU=Security Communication

EV RootCA1,O=SECOM Trust Systems CO.,LTD.,C=JP

# Not Valid Before: Wed Jun 06 02:12:32 2007

# Not Valid After: Sat Jun 06 02:12:32 2037

# Fingerprint (MD5): 22:2d:a6:01:ea:7c:0a:f7:f0:6c:56:43:3f:77:76:d3

# Fingerprint (SHA1): fe:b8:c4:32:dc:f9:76:9a:ce:ae:3d:d8:90:8f:fd:28:86:65:64:7d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SECOM Trust Systems CO.,LTD."

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\376\270\304\062\334\371\166\232\316\256\075\330\220\217\375\050  
\206\145\144\175

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\042\055\246\001\352\174\012\367\360\154\126\103\077\167\166\323

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\140\061\013\060\011\006\003\125\004\006\023\002\112\120\061

\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040

\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117

\056\054\114\124\104\056\061\052\060\050\006\003\125\004\013\023

\041\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156

\151\143\141\164\151\157\156\040\105\126\040\122\157\157\164\103

\101\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\000

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "D-TRUST Root Class 2 CA 2007"

# Issuer: CN=D-TRUST Root Class 2 CA 2007,O=D-Trust GmbH,C=DE

# Serial Number: 200341 (0x30e95)

# Subject: CN=D-TRUST Root Class 2 CA 2007,O=D-Trust GmbH,C=DE

# Not Valid Before: Wed May 16 05:20:47 2007

# Not Valid After: Mon May 16 05:20:47 2022

# Fingerprint (MD5): 2c:c2:b0:d5:d6:22:c5:2e:90:1e:f4:63:3f:0f:bb:32

# Fingerprint (SHA1): 4a:05:8f:df:d7:61:db:21:b0:c2:ee:48:57:9b:e2:7f:42:a4:da:1c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE

CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "D-TRUST Root Class 2 CA 2007"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061

\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163

\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014

\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154

\141\163\163\040\062\040\103\101\040\062\060\060\067

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061

\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163

\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014

\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154  
\141\163\163\040\062\040\103\101\040\062\060\060\067

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\003\003\016\225

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\225\060\202\003\175\240\003\002\001\002\002\003\003  
\016\225\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105  
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165  
\163\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003  
\014\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103  
\154\141\163\163\040\062\040\103\101\040\062\060\060\067\060\036  
\027\015\060\067\060\065\061\066\060\065\062\060\064\067\132\027  
\015\062\062\060\065\061\066\060\065\062\060\064\067\132\060\113  
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\025\060  
\023\006\003\125\004\012\014\014\104\055\124\162\165\163\164\040  
\107\155\142\110\061\045\060\043\006\003\125\004\003\014\034\104  
\055\124\122\125\123\124\040\122\157\157\164\040\103\154\141\163  
\163\040\062\040\103\101\040\062\060\060\067\060\202\001\042\060  
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202  
\001\017\000\060\202\001\012\002\202\001\001\000\263\315\344\204  
\025\111\370\344\326\316\204\263\232\255\366\060\165\220\015\204  
\353\356\332\263\172\165\052\342\073\244\352\060\054\353\075\167  
\215\201\204\150\112\246\244\150\334\220\163\141\064\145\007\035  
\043\245\014\346\277\323\335\063\135\332\062\355\246\015\123\246  
\164\152\134\031\131\246\114\265\057\171\001\136\236\177\112\372  
\272\311\047\176\324\377\315\000\131\040\353\006\314\263\104\317  
\326\205\351\355\073\014\154\301\352\214\134\340\271\251\002\360  
\023\000\047\223\234\120\376\315\023\117\155\033\152\252\335\017  
\377\106\045\031\334\341\136\120\254\032\177\016\313\332\356\040  
\374\303\364\234\112\170\065\156\356\061\307\105\026\162\205\322  
\202\040\333\122\105\174\074\277\131\127\371\207\164\126\230\133  
\035\120\216\314\057\263\263\077\213\356\354\067\111\001\210\357  
\330\041\014\223\323\366\156\211\117\272\027\313\104\201\267\173  
\247\043\273\164\012\323\330\352\067\105\047\377\334\360\236\103  
\343\272\173\212\033\232\175\351\206\240\376\057\321\326\366\207  
\127\252\362\051\224\207\163\025\372\152\116\255\002\003\001\000  
\001\243\202\001\200\060\202\001\174\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035  
\016\004\026\004\024\221\060\253\366\363\306\104\267\353\335\050  
\274\017\024\237\122\135\142\177\002\060\071\006\010\053\006\001  
\005\005\007\001\001\004\055\060\053\060\051\006\010\053\006\001  
\005\005\007\060\001\206\035\150\164\164\160\072\057\057\165\163  
\145\162\163\056\157\143\163\160\056\144\055\164\162\165\163\164  
\056\156\145\164\060\063\006\003\125\035\021\004\054\060\052\201  
\020\151\156\146\157\100\144\055\164\162\165\163\164\056\156\145

\164\206\026\150\164\164\160\072\057\057\167\167\167\056\144\055  
\164\162\165\163\164\056\156\145\164\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\006\060\201\311\006\003\125\035  
\037\004\201\301\060\201\276\060\201\273\240\201\270\240\201\265  
\206\166\154\144\141\160\072\057\057\144\151\162\145\143\164\157  
\162\171\056\144\055\164\162\165\163\164\056\156\145\164\057\103  
\116\075\104\055\124\122\125\123\124\045\062\060\122\157\157\164  
\045\062\060\103\154\141\163\163\045\062\060\062\045\062\060\103  
\101\045\062\060\062\060\060\067\054\117\075\104\055\124\162\165  
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143  
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141  
\164\151\157\156\154\151\163\164\206\073\150\164\164\160\072\057  
\057\167\167\167\056\144\055\164\162\165\163\164\056\156\145\164  
\057\143\162\154\057\144\055\164\162\165\163\164\137\162\157\157  
\164\137\143\154\141\163\163\137\062\137\143\141\137\062\060\060  
\067\056\143\162\154\060\015\006\011\052\206\110\206\367\015\001  
\001\005\005\000\003\202\001\001\000\133\213\362\103\343\005\056  
\144\037\325\222\251\121\153\144\374\016\106\314\007\231\342\267  
\374\223\051\040\334\374\057\140\344\254\175\045\062\355\020\341  
\017\157\333\362\274\116\356\101\311\263\324\007\110\172\012\257  
\244\266\377\121\060\355\313\322\234\353\177\120\356\113\342\142  
\247\064\302\040\366\363\366\365\066\300\313\221\020\353\355\056  
\215\364\007\032\041\014\065\167\364\174\055\215\111\245\327\013  
\104\150\325\322\342\345\014\170\070\023\312\261\114\122\252\052  
\345\325\257\134\005\071\235\055\255\276\043\126\325\057\125\363  
\336\235\253\202\066\240\115\267\131\221\107\356\336\203\245\352  
\073\136\047\005\200\013\155\054\120\364\001\067\325\243\167\027  
\354\376\335\204\364\305\370\120\222\320\113\306\056\243\213\100  
\344\303\067\243\167\275\316\054\125\342\254\337\135\144\000\272  
\276\247\152\061\006\374\231\153\120\025\045\235\251\166\232\247  
\115\052\232\002\143\353\160\347\376\021\046\320\030\305\246\037  
\012\103\223\362\030\331\365\071\171\270\007\135\214\037\346\077  
\363\305\313\041\146\061\173\173\317

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "D-TRUST Root Class 2 CA 2007"

# Issuer: CN=D-TRUST Root Class 2 CA 2007,O=D-Trust GmbH,C=DE

# Serial Number:

200341 (0x30e95)

# Subject: CN=D-TRUST Root Class 2 CA 2007,O=D-Trust GmbH,C=DE

# Not Valid Before: Wed May 16 05:20:47 2007

# Not Valid After: Mon May 16 05:20:47 2022

# Fingerprint (MD5): 2c:c2:b0:d5:d6:22:c5:2e:90:1e:f4:63:3f:0f:bb:32

```

Fingerprint (SHA1): 4a:05:8f:df:d7:61:db:21:b0:c2:ee:48:57:9b:e2:7f:42:a4:da:1c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 2 CA 2007"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\112\005\217\337\327\141\333\041\260\302\356\110\127\233\342\177
\102\244\332\034
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\054\302\260\325\326\042\305\056\220\036\364\143\077\017\273\062
END
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\062\040\103\101\040\062\060\060\067
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\003\016\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "D-TRUST Root Class 3 CA 2007"
Issuer: CN=D-TRUST Root Class 3 CA 2007,O=D-Trust GmbH,C=DE
Serial Number: 200342 (0x30e96)
Subject: CN=D-TRUST Root Class 3 CA 2007,O=D-Trust GmbH,C=DE
Not Valid Before: Wed May 16 05:20:47 2007
Not Valid After: Mon May 16 05:20:47 2022
Fingerprint (MD5): 1e:24:0e:a0:f8:76:d7:85:a3:f5:f8:a1:49:3d:2e:ba
Fingerprint (SHA1): fd:1e:d1:e2:02:1b:0b:9f:73:e8:eb:75:ce:23:43:6b:bc:c7:46:eb
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3
CA 2007"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163

```

\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014  
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154  
\141\163\163\040\063\040\103\101\040\062\060\060\067

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163  
\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014  
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154  
\141\163\163\040\063\040\103\101\040\062\060\060\067

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\003\003\016\226

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\225\060\202\003\175\240\003\002\001\002\002\003\003  
\016\226\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105  
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165  
\163\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003  
\014\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103  
\154\141\163\163\040\063\040\103\101\040\062\060\060\067\060\036  
\027\015\060\067\060\065\061\066\060\065\062\060\064\067\132\027  
\015\062\062\060\065\061\066\060\065\062\060\064\067\132\060\113  
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\025\060  
\023\006\003\125\004\012\014\014\104\055\124\162\165\163\164\040  
\107\155\142\110\061\045\060\043\006\003\125\004\003\014\034\104  
\055\124\122\125\123\124\040\122\157\157\164\040\103\154\141\163  
\163\040\063\040\103\101\040\062\060\060\067\060\202\001\042\060  
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202  
\001\017\000\060\202\001\012\002\202\001\001\000\272\215\315\065  
\123\062\356\246\275\110\220\232\362\352\350\130\017\107\146\250  
\314\156\011\022\344\241\313\133\337\223\270\366\351\071\071\370  
\306\330\351\317\032\206\274\246\256\017\214\257\010\105\343\362  
\216\053\302\134\131\053\372\214\066\263\160\035\310\120\074\245  
\126\276\352\256\351\107\366\347\111\017\257\177\224\046\324\002  
\032\007\270\272\071\125\316\237\273\042\071\051\330\065\305\231  
\003\041\330\247\070\143\361\344\064\337\107\256\237\067\361\154  
\240\231\302\042\260\155\162\334\042\311\061\071\350\126\327\240  
\217\072\041\133\206\232\117\050\371\034\166\367\314\117\077\371  
\116\167\213\052\234\212\252\171\101\212\325\034\331\071\157\230  
\311\136\105\227\035\011\224\031\331\120\121\205\162\163\277\254  
\113\235\164\064\161\207\041\026\017\176\356\322\111\176\312\111  
\323\371\222\052\107\110\117\017\135\132\241\313\325\050\354\360  
\222\305\162\103\106\353\263\003\246\363\127\045\112\012\141\204  
\012\046\326\357\246\270\330\024\215\170\271\323\267\045\321\116  
\343\132\026\252\354\237\007\356\043\020\175\265\002\003\001\000



\001\243\202\001\200\060\202\001\174\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035  
\016\004\026\004\024\202\057\066\043\111\170\040\102\327\260\122  
\130\240\326\164\124\025\170\277\252\060\071\006\010\053\006\001  
\005\005\007\001\001\004\055\060\053\060\051\006\010\053\006\001  
\005\005\007\060\001\206\035\150\164\164\160\072\057\057\165\163  
\145\162\163\056\157\143\163\160\056\144\055\164\162\165\163\164  
\056\156\145\164\060\063\006\003\125\035\021\004\054\060\052\201  
\020\151\156\146\157\100\144\055\164\162\165\163\164\056\156\145  
\164\206\026\150\164\164\160\072\057\057\167\167\167\056\144\055  
\164\162\165\163\164\056\156\145\164\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\006\060\201\311\006\003\125\035  
\037\004\201\301\060\201\276\060\201\273\240\201\270\240\201\265  
\206\166\154\144\141\160\072\057\057\144\151\162\145\143\164\157  
\162\171\056\144\055\164\162\165\163\164\056\156\145\164\057\103  
\116\075\104\055\124\122\125\123\124\045\062\060\122\157\157\164  
\045\062\060\103\154\141\163\163\045\062\060\063\045\062\060\103  
\101\045\062\060\062\060\060\067\054\117\075\104\055\124\162\165  
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143  
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141  
\164\151\157\156\154\151\163\164\206\073\150\164\164\160\072\057  
\057\167\167\167\056\144\055\164\162\165\163\164\056\156\145\164  
\057\143\162\154\057\144\055\164\162\165\163\164\137\162\157\157  
\164\137\143\154\141\163\163\137\063\137\143\141\137\062\060\060  
\067\056\143\162\154\060\015\006\011\052\206\110\206\367\015\001  
\001\005\005\000\003\202\001\001\000\125\016\150\012\215\334\331  
\250\206\140\002\151\171\215\175\351\220\302\331\035\035\265\016  
\273\163\222\144\143\024\106\114\320\152\273\243\165\135\206\031  
\070\141\206\035\270\212\042\064\243\264\065\025\263\251\140\114  
\124\027\237\261\336\133\062\342\176\153\336\117\042\360\055\035  
\042\004\236\266\112\117\253\054\126\235\343\335\354\261\046\116  
\052\327\125\302\076\275\202\327\276\125\273\105\310\051\133\206  
\074\235\077\150\104\104\104\066\015\150\277\256\001\242\031\265  
\114\227\377\362\226\074\147\262\102\336\017\341\240\227\116\312  
\347\064\145\256\225\202\141\147\046\163\055\335\173\347\225\113  
\016\041\252\222\256\114\374\306\263\251\345\231\203\062\071\360  
\140\302\114\121\250\301\107\024\065\211\245\115\066\017\237\033  
\002\161\101\215\102\112\044\370\257\156\235\015\160\206\215\252  
\142\023\036\003\213\044\371\303\124\223\111\205\033\165\166\142  
\177\042\377\111\275\166\163\014\077\230\255\052\262\372\347\305  
\337\164\365\377\151\061\125\012\072\300\031\142\065\304\111\271  
\053\031\035\364\160\231\356\330\334

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```
Microsoft Code Signing Only Certificate
Trust for "D-TRUST Root Class 3 CA 2007"
Issuer: CN=D-TRUST Root Class 3 CA 2007,O=D-Trust GmbH,C=DE
Serial Number: 200342 (0x30e96)
Subject: CN=D-TRUST Root Class 3 CA 2007,O=D-Trust
 GmbH,C=DE
Not Valid Before: Wed May 16 05:20:47 2007
Not Valid After: Mon May 16 05:20:47 2022
Fingerprint (MD5): 1e:24:0e:a0:f8:76:d7:85:a3:f5:f8:a1:49:3d:2e:ba
Fingerprint (SHA1): fd:1e:d1:e2:02:1b:0b:9f:73:e8:eb:75:ce:23:43:6b:bc:c7:46:eb
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2007"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\375\036\321\342\002\033\013\237\163\350\353\165\316\043\103\153
\274\307\106\353
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\036\044\016\240\370\166\327\205\243\365\370\241\111\075\056\272
END
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\060\060\067
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\003\016\226
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "SSC Root CA A"
Issuer: CN=SSC Root CA A,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
Serial Number:66:07:a3:d2:9d:29:56:18:0e:e1:5e:59:98:b1:84:55
Subject: CN=SSC Root CA A,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
Not Valid Before: Wed Dec 27 12:18:52 2006
Not Valid After: Mon Dec 28 12:05:04 2026
Fingerprint (MD5): 46:8c:21:0e:ab:92:21:46:59:db:a6:db:00:61:de:26
Fingerprint (SHA1): 5a:5a:4d:af:78:61:26:7c:4b:1f:1e:67:58:6b:ae:6e:d4:fe:b9:3f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8
"SSC Root CA A"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
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CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SSC Root CA A"

# Issuer: CN=SSC Root CA A,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT

# Serial Number:66:07:a3:d2:9d:29:56:18:0e:e1:5e:59:98:b1:84:55

#

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Subject: CN=SSC Root CA A,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
Not Valid Before: Wed Dec 27 12:18:52 2006
Not Valid After: Mon Dec 28 12:05:04 2026
Fingerprint (MD5): 46:8c:21:0e:ab:92:21:46:59:db:a6:db:00:61:de:26
Fingerprint (SHA1): 5a:5a:4d:af:78:61:26:7c:4b:1f:1e:67:58:6b:ae:6e:d4:fe:b9:3f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC Root CA A"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
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\324\376\271\077
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
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END
CKA_ISSUER MULTILINE_OCTAL
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MULTILINE_OCTAL
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
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```
Microsoft Code Signing Only Certificate
Certificate "SSC Root CA B"
Issuer: CN=SSC Root CA B,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
Serial Number:be:92:83:18:f3:55:8a:78:a3:67:59:1c:69:24:09:3f
Subject: CN=SSC Root CA B,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
Not Valid Before: Wed Dec 27 12:22:50 2006
Not Valid
After: Fri Dec 25 12:08:26 2026
Fingerprint (MD5): da:26:b6:e6:c7:c2:f7:b7:9e:46:59:b3:57:77:18:65
Fingerprint (SHA1): 3e:84:d3:bc:c5:44:c0:f6:fa:19:43:5c:85:1f:3f:2f:cb:a8:e8:14
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
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CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
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CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\134\274\057\374\256\001\044\246\020\076\254\250\341\247\047\231  
\215\312\210\301\035\075\221\366\242\176\245\361\230\101\377\252  
\141\370\011\276\315\032\045\141\164\264\303\257\102\132\011\017  
\221\001\276\110\225\364\312\167\136\013\203\316\204\235\317\100  
\375\200\054\275\343\146\065\012\270\261\372\140\332\345\330\124  
\265\113\227\272\242\032\303\040\151\215\264\106\163\134\252\277  
\275\173\377\032\060\064\130\100\371\053\140\013\171\104\371\367  
\242\226\013\153\122\173\360\053\113\073\322\213\240\153\223\075  
\311\127\143\212\153\314\120\023\217\167\250\121\276\032\114\055  
\114\135\014\220\133\216\363\357\120\040\155\201\346\121\111\253  
\304\347\327\135\010\053\121\374\075\106\022\347\321\245\166\305  
\123\044\005\311\252\323\216\130\305\363\212\164\222\062\355\360  
\057\335\253\255\351\322\065\217\164\043\343\231\000\342\213\060  
\344\303\102\256\360\273\351\342\010\033\112\160\055\175\370\322  
\232\047\221\102\160\165\172\010\176\276\057\034\177\067\075\250  
\213\334\106\162\365\350\157\066\150\372\156\215\040\235\324\365  
\007\161\277\275\047\102\271\163\050\326\354\111\264\005\205\117  
\150\110\366\253\224\337\016\243\106\024\140\302\061\040\073\353  
\056\133\336\325\241\054\155\345\122\372\201\137\227\210\311\143  
\275\001\354\343\315\153\012\065\302\311\070\343\016\363\130\033  
\175\332\220\155\267\365\310\130\126\235\256\001\337\221\235\255  
\125\202\003\014\021\164\004\221\206\307\174\223\214\363\047\373  
\305\044\127\156\213\331\033\230\235\210\061\360\257\167\270\015  
\264\314\317\366\012\157\022\233\354\011\053\123\211\354\104\340  
\241\151\213\250\164\206\164\030\122\340\322\277\240\241\145\041  
\271\010\203\172\363\244\365\370\136\067\045\107\231\246\135\327  
\042\132\333\223\147\027\333\020\343\214\321\022\221\107\212\225  
\245\107\241\003\370\113\056\041\305\220\142\260\177\047\243\333  
\025\177\070\177\154\177\116\005\305\003\264\055\337\105\137\165  
\054\035\361\137\246\265\366\027\071\101\351\370\145\302\036\130  
\021\312\174\216\342\265\272\222\017\147\267\217\353\231\324\061  
\373\162\173\132\230\137\222\224\307\004\352\060\366\273\032

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SSC Root CA B"

# Issuer: CN=SSC Root CA B,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT

# Serial Number:be:92:83:18:f3:55:8a:78:a3:67:59:1c:69:24:09:3f

# Subject: CN=SSC Root CA B,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT

# Not Valid Before: Wed Dec 27 12:22:50 2006

# Not Valid After: Fri Dec 25 12:08:26 2026

```

Fingerprint (MD5): da:26:b6:e6:c7:c2:f7:b7:9e:46:59:b3:57:77:18:65
Fingerprint (SHA1): 3e:84:d3:bc:c5:44:c0:f6:fa:19:43:5c:85:1f:3f:2f:cb:a8:e8:14
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC Root CA B"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\076\204\323\274\305\104\300\366\372\031\103\134\205\037\077\057
\313\250\350\024
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\332\046\266\346\307\302\367\267\236\106\131\263\127\167\030\145
END
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\276\222\203\030\363\125\212\170\243\147\131\034\151
\044\011\077
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate

```

```

#

```

```

Certificate "SSC Root CA C"

```

```

Issuer: CN=SSC Root CA C,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT

```

```

Serial Number:34:b9:12:9f:ac:c7:92:55:42:5c:de:57:ff:e3:c0:05

```

```

Subject: CN=SSC Root CA C,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT

```

```

Not Valid Before: Wed Dec 27 12:26:30 2006

```

```

Not Valid After: Tue Dec 22 12:11:30 2026

```

```

Fingerprint (MD5): 3c:4c:25:cc:0a:19:ca:ee:6a:eb:55:16:00:86:72:5f

```

```

Fingerprint (SHA1): 23:e8:33:23:3e:7d:0c:c9:2b:7c:42:79:ac:19:c2:f4:74:d6:04:ca

```

```

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

```

```

CKA_TOKEN CK_BBOOL CK_TRUE

```

```

CKA_PRIVATE CK_BBOOL CK_FALSE

```

```

CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

```
CKA_LABEL UTF8 "SSC Root CA C"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\103
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\064\271\022\237\254\307\222\125\102\134\336\127\377\343
\300\005
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\052\060\202\004\022\240\003\002\001\002\002\020\064
\271\022\237\254\307\222\125\102\134\336\127\377\343\300\005\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\164
\061\013\060\011\006\003\125\004\006\023\002\114\124\061\053\060
\051\006\003\125\004\012\023\042\123\153\141\151\164\155\145\156
\151\156\151\157\040\163\145\162\164\151\146\151\153\141\166\151
\155\157\040\143\145\156\164\162\141\163\061\040\060\036\006\003
\125\004\013\023\027\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\026\060\024
\006\003\125\004\003\023\015\123\123\103\040\122\157\157\164\040
\103\101\040\103\060\036\027\015\060\066\061\062\062\067\061\062
\062\066\063\060\132\027\015\062\066\061\062\062\062\061\062\061
\061\063\060\132\060\164\061\013\060\011\006\003\125\004\006\023
\002\114\124\061\053\060\051\006\003\125\004\012\023\042\123\153
\141\151\164\155\145\156\151\156\151\157\040\163\145\162\164\151
\146\151\153\141\166\151\155\157\040\143\145\156\164\162\141\163
\061\040\060\036\006\003\125\004\013\023\027\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\061\026\060\024\006\003\125\004\003\023\015\123\123\103
```

\040\122\157\157\164\040\103\101\040\103\060\202\002\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002  
\017\000\060\202\002\012\002\202\002\001\000\241\105\042\372\214  
\314\251\157\004\263\364\150\062\026\151\021\117\171\337\103\275  
\121\140\160\032\230\335\170\170\226\230\142\367\160\113\201\250  
\340\035\004\211\364\217\353\156\351\360\377\201\330\056\175\257  
\027\040\361\042\357\360\077\105\107\100\264\313\262\270\040\077  
\076\112\150\120\377\232\006\327\227\305\267\212\026\056\161\322  
\107\163\135\030\145\057\357\071\063\350\266\125\257\046\255\002  
\200\351\143\327\041\160\007\076\314\276\137\211\300\370\316\035  
\045\156\303\374\177\126\071\141\321\216\302\046\172\347\170\002  
\012\131\335\125\043\260\370\065\247\342\253\363\253\057\327\265  
\213\012\052\162\124\053\155\171\274\362\331\351\103\371\317\361  
\216\146\022\367\227\131\052\331\327\224\334\370\224\263\105\243  
\257\026\055\263\200\312\075\316\350\246\307\012\224\164\374\067  
\232\351\077\014\067\026\040\103\311\107\160\273\214\205\374\230  
\211\051\313\207\031\176\031\123\020\211\200\165\256\023\361\277  
\244\135\060\005\051\174\250\367\266\136\007\060\025\210\256\115  
\025\240\312\315\327\377\253\243\006\127\017\247\343\211\151\034  
\326\032\321\324\047\337\226\306\070\134\257\167\376\025\253\104  
\101\175\323\230\273\250\040\030\257\213\155\324\132\302\330\226  
\215\110\365\007\061\176\141\364\141\233\122\201\100\216\112\047  
\004\262\007\323\002\020\224\363\373\335\261\173\160\270\264\310  
\201\365\000\007\246\215\210\005\115\304\217\226\316\324\266\300  
\301\146\214\052\254\150\112\311\106\334\015\346\056\250\171\050  
\175\167\103\160\026\176\034\032\072\246\171\117\023\100\211\261  
\062\273\011\106\021\015\164\274\047\345\330\355\055\372\120\051  
\334\045\312\227\020\347\251\242\141\056\072\211\246\104\141\276  
\117\136\222\011\355\334\056\246\357\123\273\141\045\330\047\245  
\024\106\051\205\046\000\330\371\371\005\325\173\026\061\102\103  
\005\027\221\234\112\140\100\044\155\265\155\172\171\373\234\232  
\143\303\230\151\345\167\142\043\052\121\211\017\154\262\375\303  
\312\330\364\032\103\224\320\175\013\341\130\076\032\310\164\204  
\233\367\254\202\256\121\105\222\322\006\131\341\263\301\336\245  
\037\223\042\171\330\315\304\171\140\043\225\002\003\001\000\001  
\243\201\267\060\201\264\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\075\006\003\125\035\040\004\066  
\060\064\060\062\006\013\053\006\001\004\001\201\257\145\001\002  
\000\060\043\060\041\006\010\053\006\001\005\005\007\002\001\026  
\025\150\164\164\160\072\057\057\167\167\167\056\163\163\143\056  
\154\164\057\143\160\163\060\063\006\003\125\035\037\004\054\060  
\052\060\050\240\046\240\044\206\042\150\164\164\160\072\057\057  
\143\162\154\056\163\163\143\056\154\164\057\162\157\157\164\055  
\143\057\143\141\143\162\154\056\143\162\154\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125  
\035\016\004\026\004\024\210\007\163\366\361\274\122\032\132\035  
\075\221\142\355\135\254\235\013\345\267\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\037\220

\161\120\230\325\331\064\322\226\204\030\302\254\106\002\040\034  
\313\071\261\267\257\005\244\327\130\363\221\121\175\216\201\047  
\234\350\222\261\347\034\237\072\213\020\122\163\114\302\307\102  
\035\320\353\336\052\312\042\121\175\214\164\172\032\374\274\244  
\363\163\310\146\043\304\056\103\020\107\340\212\151\127\356\057  
\362\000\122\260\060\222\252\326\324\025\305\127\313\140\172\364  
\016\215\376\036\011\143\164\217\340\376\276\120\331\001\071\126  
\272\120\114\366\343\105\232\273\122\166\336\176\235\373\215\302  
\124\061\076\307\261\074\076\337\343\117\375\335\233\044\151\174  
\355\350\161\266\102\006\307\037\305\137\373\040\165\333\301\375  
\351\154\242\052\220\324\206\375\315\015\377\340\005\212\130\141  
\075\237\304\231\057\355\333\174\304\015\230\230\125\234\164\242  
\027\136\333\252\021\344\067\014\044\377\040\147\321\045\333\232  
\211\240\145\210\061\221\004\161\137\040\224\130\063\066\035\062  
\336\157\327\147\010\251\240\073\375\333\244\120\045\226\036\251  
\137\211\027\245\227\231\121\225\151\333\304\361\217\364\157\060  
\053\131\363\254\165\207\063\175\006\335\341\301\153\326\304\311  
\136\160\104\172\152\307\234\167\073\026\376\376\165\276\237\054  
\321\300\003\356\021\171\165\354\251\133\034\172\205\265\050\120  
\040\251\032\035\346\173\214\063\030\377\301\355\310\166\145\037  
\035\360\114\073\247\333\352\315\126\330\224\127\077\340\110\251  
\177\214\063\113\275\364\014\145\024\200\202\364\065\167\330\004  
\020\160\316\017\154\301\131\313\231\255\201\356\336\075\110\320  
\172\210\057\100\223\327\234\272\171\204\030\200\165\337\320\132  
\337\121\167\076\130\211\151\165\107\061\344\152\026\160\124\004  
\354\275\134\171\123\143\322\342\136\275\115\045\332\021\266\017  
\252\351\054\256\365\321\251\215\002\126\313\374\260\044\352\214  
\272\160\377\062\320\267\306\004\052\143\325\312\106\221\325\231  
\162\011\007\136\050\003\253\022\034\045\263\154\072\131\145\264  
\164\155\055\055\031\162\157\375\347\230\021\207\036\163\043\277  
\065\361\233\266\303\331\314\073\120\174\162\350\317\136\300\230  
\314\056\003\375\037\057\312\164\134\261\034\321\354\151

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SSC Root CA C"

# Issuer: CN=SSC Root CA C,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT

# Serial Number:34:b9:12:9f:ac:c7:92:55:42:5c:de:57:ff:e3:c0:05

# Subject: CN=SSC Root CA C,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT

# Not Valid Before: Wed Dec 27 12:26:30 2006

# Not Valid After: Tue Dec 22 12:11:30 2026

# Fingerprint (MD5): 3c:4c:25:cc:0a:19:ca:ee:6a:eb:55:16:00:86:72:5f

# Fingerprint (SHA1): 23:e8:33:23:3e:7d:0c:c9:2b:7c:42:79:ac:19:c2:f4:74:d6:04:ca

CKA\_CLASS

```

CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC Root CA C"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\043\350\063\043\076\175\014\311\053\174\102\171\254\031\302\364
\164\326\004\312
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\074\114\045\314\012\031\312\356\152\353\125\026\000\206\162\137
END
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\064\271\022\237\254\307\222\125\102\134\336\127\377\343
\300\005
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Autoridad de Certificacion de la Abogacia"
Issuer: CN=Autoridad de Certificacion de la Abogacia,O=Consejo General de la Abogacia NIF:Q-2863006I,C=ES
Serial Number:90:8b:32:4f:c1:90:1a:ce:b4:c3:38:09:cd:cf:e4
Subject: CN=Autoridad de Certificacion de la Abogacia,O=Consejo General de la Abogacia NIF:Q-
2863006I,C=ES
Not Valid Before: Mon Jun 13 22:00:00 2005
Not Valid After: Thu Jun 13 22:00:00 2030
Fingerprint (MD5): 15:ee:9f:5a:a0:85:28:df:6b:dd:34:a3:a0:56:d8:30
Fingerprint (SHA1): 7f:8a:77:83:6b:dc:6d:06:8f:8b:07:37:fc:c5:72:54:13:06:8c:a4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion de la Abogacia"

```

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\171\061\013\060\011\006\003\125\004\006\023\002\105\123\061  
\066\060\064\006\003\125\004\012\023\055\103\157\156\163\145\152  
\157\040\107\145\156\145\162\141\154\040\144\145\040\154\141\040  
\101\142\157\147\141\143\151\141\040\116\111\106\072\121\055\062  
\070\066\063\060\060\066\111\061\062\060\060\006\003\125\004\003  
\023\051\101\165\164\157\162\151\144\141\144\040\144\145\040\103  
\145\162\164\151\146\151\143\141\143\151\157\156\040\144\145\040  
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END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\171\061\013\060\011\006\003\125\004\006\023\002\105\123\061  
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\101\142\157\147\141\143\151\141\040\116\111\106\072\121\055\062  
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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\317\344

END

CKA\_VALUE MULTILINE\_OCTAL

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\157\147\141\143\151\141\040\116\111\106\072\121\055\062\070\066  
\063\060\060\066\111\061\062\060\060\006\003\125\004\003\023\051  
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162  
\164\151\146\151\143\141\143\151\157\156\040\144\145\040\154\141  
\040\101\142\157\147\141\143\151\141\060\036\027\015\060\065\060  
\066\061\063\062\062\060\060\060\060\132\027\015\063\060\060\066  
\061\063\062\062\060\060\060\060\132\060\171\061\013\060\011\006  
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\141\143\151\141\060\202\001\042\060\015\006\011\052\206\110\206  
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\124\273\155\055\152\103\310\274\357\011\254\037\043\350\122\126  
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\170\321\256\371\036\272\241\256\111\042\355\145\161\037\177\367  
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\061\012\206\070\153\311\036\025\227\024\340\322\114\055\205\364  
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\106\230\266\106\007\216\146\205\155\160\300\272\114\200\363\244  
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\147\054\310\140\304\062\224\300\101\201\007\215\272\277\251\350  
\014\100\232\102\170\005\135\201\353\142\034\344\117\024\012\075



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\013\076\037\351\364\315\175\356\105\273\274\336\135\363\230\227
\046\173\306\023\051\370\053\177\032\324\352\372\262\156\040\236
\332\027\352\241\222\275\067\351\016\273\273\221\325\045\366\140
\135\205\041\120\133\377\124\135\365\113\073\264\303\051\021\130
\002\366\045\344\341\202\202\273\242\215\347\221\044\136\100\221
\236\107\007\214\063\127\324\142\061\121\166\165\205\103\157\011
\253\021\245\045\051\271\330\377\137\245\367\077\353\145\073\035
\357\206\345\026\042\325\036\312\062\151\175\176\005\327\060\047
END
```

```
CKA_NSS_MOZILLA_CA_POLICY
```

```
CK_BBOOL CK_FALSE
```

```
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
```

```
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
```

```
Trust for "Autoridad de Certificacion de la Abogacia"
```

```
Issuer: CN=Autoridad de Certificacion de la Abogacia,O=Consejo General de la Abogacia NIF:Q-2863006I,C=ES
```

```
Serial Number:90:8b:32:4f:c1:90:1a:ce:b4:c3:38:09:cd:cf:e4
```

```
Subject: CN=Autoridad de Certificacion de la Abogacia,O=Consejo General de la Abogacia NIF:Q-2863006I,C=ES
```

```
Not Valid Before: Mon Jun 13 22:00:00 2005
```

```
Not Valid After: Thu Jun 13 22:00:00 2030
```

```
Fingerprint (MD5): 15:ee:9f:5a:a0:85:28:df:6b:dd:34:a3:a0:56:d8:30
```

```
Fingerprint (SHA1):
```

```
7f:8a:77:83:6b:dc:6d:06:8f:8b:07:37:fc:c5:72:54:13:06:8c:a4
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
```

```
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

```
CKA_LABEL UTF8 "Autoridad de Certificacion de la Abogacia"
```

```
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
```

```
\177\212\167\203\153\334\155\006\217\213\007\067\374\305\162\124
\023\006\214\244
```

```
END
```

```
CKA_CERT_MD5_HASH MULTILINE_OCTAL
```

```
\025\356\237\132\240\205\050\337\153\335\064\243\240\126\330\060
END
```

```
CKA_ISSUER MULTILINE_OCTAL
```

```
\060\171\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\066\060\064\006\003\125\004\012\023\055\103\157\156\163\145\152
\157\040\107\145\156\145\162\141\154\040\144\145\040\154\141\040
\101\142\157\147\141\143\151\141\040\116\111\106\072\121\055\062
\070\066\063\060\060\066\111\061\062\060\060\006\003\125\004\003
\023\051\101\165\164\157\162\151\144\141\144\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\144\145\040
\154\141\040\101\142\157\147\141\143\151\141
```

```
END
```

```
CKA_SERIAL_NUMBER
```

```

MULTILINE_OCTAL
\002\020\000\220\213\062\117\301\220\032\316\264\303\070\011\315
\317\344
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Root CA Generalitat Valenciana"
Issuer: CN=Root CA Generalitat Valenciana,OU=PKIGVA,O=Generalitat Valenciana,C=ES
Serial Number:3b:45:e5:68
Subject: CN=Root CA Generalitat Valenciana,OU=PKIGVA,O=Generalitat Valenciana,C=ES
Not Valid Before: Fri Jul 06 16:22:47 2001
Not Valid After: Thu Jul 01 15:22:47 2021
Fingerprint (MD5): 2c:8c:17:5e:b1:54:ab:93:17:b5:36:5a:db:d1:c6:f2
Fingerprint (SHA1): a0:73:e5:c5:bd:43:61:0d:86:4c:21:13:0a:85:58:57:cc:9c:ea:46
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "Root CA Generalitat Valenciana"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\037\060\035\006\003\125\004\012\023\026\107\145\156\145\162\141
\154\151\164\141\164\040\126\141\154\145\156\143\151\141\156\141
\061\017\060\015\006\003\125\004\013\023\006\120\113\111\107\126
\101\061\047\060\045\006\003\125\004\003\023\036\122\157\157\164
\040\103\101\040\107\145\156\145\162\141\154\151\164\141\164\040
\126\141\154\145\156\143\151\141\156\141
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\037\060\035\006\003\125\004\012\023\026\107\145\156\145\162\141
\154\151\164\141\164\040\126\141\154\145\156\143\151\141\156\141
\061\017\060\015\006\003\125\004\013\023\006\120\113\111\107\126
\101\061\047\060\045\006\003\125\004\003\023\036\122\157\157\164
\040\103\101\040\107\145\156\145\162\141\154\151\164\141\164\040
\126\141\154\145\156\143\151\141\156\141
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\073\105\345\150
END

```

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\213\060\202\005\163\240\003\002\001\002\002\004\073  
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\123\061\037\060\035\006\003\125\004\012\023\026\107\145\156\145  
\162\141\154\151\164\141\164\040\126\141\154\145\156\143\151\141  
\156\141\061\017\060\015\006\003\125\004\013\023\006\120\113\111  
\107\126\101\061\047\060\045\006\003\125\004\003\023\036\122\157  
\157\164\040\103\101\040\107\145\156\145\162\141\154\151\164\141  
\164\040\126\141\154\145\156\143\151\141\156\141\060\036\027\015  
\060\061\060\067\060\066\061\066\062\062\064\067\132\027\015\062  
\061\060\067\060\061\061\065\062\062\064\067\132\060\150\061\013  
\060\011\006\003\125\004\006\023\002\105\123\061\037\060\035\006  
\003\125\004\012\023\026\107\145\156\145\162\141\154\151\164\141  
\164\040\126\141\154\145\156\143\151\141\156\141\061\017\060\015  
\006\003\125\004\013\023\006\120\113\111\107\126\101\061\047\060  
\045\006\003\125\004\003\023\036\122\157\157\164\040\103\101\040  
\107\145\156\145\162\141\154\151\164\141\164\040\126\141\154\145  
\156\143\151\141\156\141\060\202\001\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202  
\001\012\002\202\001\001\000\306\052\253\127\021\067\057\042\212  
\312\003\164\035\312\355\055\242\013\274\063\122\100\046\107\276  
\132\151\246\073\162\066\027\114\350\337\270\273\057\166\341\100  
\106\164\145\002\220\122\010\264\377\250\214\301\340\307\211\126  
\020\071\063\357\150\264\137\137\332\155\043\241\211\136\042\243  
\112\006\360\047\360\127\271\370\351\116\062\167\012\077\101\144  
\363\353\145\356\166\376\124\252\175\035\040\256\363\327\164\302  
\012\137\365\010\050\122\010\314\125\135\322\017\333\232\201\245  
\273\241\263\301\224\315\124\340\062\165\061\221\032\142\262\336  
\165\342\317\117\211\331\221\220\017\101\033\264\132\112\167\275  
\147\203\340\223\347\136\247\014\347\201\323\364\122\254\123\262  
\003\307\104\046\373\171\345\313\064\140\120\020\173\033\333\153  
\327\107\253\137\174\150\312\156\235\101\003\020\356\153\231\173  
\136\045\250\302\253\344\300\363\134\234\343\276\316\061\114\144  
\036\136\200\242\365\203\176\014\326\312\214\125\216\276\340\276  
\111\007\017\243\044\101\172\130\035\204\352\130\022\310\341\267  
\355\357\223\336\224\010\061\002\003\001\000\001\243\202\003\073  
\060\202\003\067\060\062\006\010\053\006\001\005\005\007\001\001  
\004\046\060\044\060\042\006\010\053\006\001\005\005\007\060\001  
\206\026\150\164\164\160\072\057\057\157\143\163\160\056\160\153  
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\043\006\012\053\006\001\004\001\277\125\002\001\000\060\202\002  
\023\060\202\001\350\006\010\053\006\001\005\005\007\002\002\060  
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\162\000\151\000\144\000\141\000\144\000\040\000\144\000\145\000  
\040\000\103\000\145\000\162\000\164\000\151\000\146\000\151\000

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\170\004\374\060\201\225\006\003\125\035\043\004\201\215\060\201  
\212\200\024\173\065\323\100\322\034\170\031\146\357\164\020\050  
\334\076\117\262\170\004\374\241\154\244\152\060\150\061\013\060  
\011\006\003\125\004\006\023\002\105\123\061\037\060\035\006\003  
\125\004\012\023\026\107\145\156\145\162\141\154\151\164\141\164  
\040\126\141\154\145\156\143\151\141\156\141\061\017\060\015\006  
\003\125\004\013\023\006\120\113\111\107\126\101\061\047\060\045  
\006\003\125\004\003\023\036\122\157\157\164\040\103\101\040\107  
\145\156\145\162\141\154\151\164\141\164\040\126\141\154\145\156  
\143\151\141\156\141\202\004\073\105\345\150\060\015\006\011\052  
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\044  
\141\116\365\265\310\102\002\052\263\134\165\255\305\155\312\347  
\224\077\245\150\225\210\301\124\300\020\151\242\022\057\030\077  
\045\120\250\174\112\352\306\011\331\364\165\306\100\332\257\120  
\235\075\245\026\273\155\061\306\307\163\012\110\376\040\162\355  
\157\314\350\203\141\026\106\220\001\225\113\175\216\232\122\011  
\057\366\157\034\344\241\161\317\214\052\132\027\163\203\107\115

```
\017\066\373\004\115\111\121\342\024\311\144\141\373\324\024\340
\364\236\267\064\217\012\046\275\227\134\364\171\072\112\060\031
\314\255\117\240\230\212\264\061\227\052\342\163\155\176\170\270
\370\210\211\117\261\042\221\144\113\365\120\336\003\333\345\305
\166\347\023\146\165\176\145\373\001\237\223\207\210\235\371\106
\127\174\115\140\257\230\163\023\043\244\040\221\201\372\320\141
\146\270\175\321\257\326\157\036\154\075\351\021\375\251\371\202
\042\206\231\063\161\132\352\031\127\075\221\315\251\300\243\156
\007\023\246\311\355\370\150\243\236\303\132\162\011\207\050\321
\304\163\304\163\030\137\120\165\026\061\237\267\350\174\303
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Root CA Generalitat Valenciana"

# Issuer: CN=Root CA Generalitat Valenciana,OU=PKIGVA,O=Generalitat Valenciana,C=ES

# Serial Number:3b:45:e5:68

# Subject: CN=Root CA Generalitat Valenciana,OU=PKIGVA,O=Generalitat Valenciana,C=ES

# Not Valid Before: Fri Jul 06 16:22:47 2001

# Not Valid After: Thu Jul 01 15:22:47 2021

# Fingerprint (MD5): 2c:8c:17:5e:b1:54:ab:93:17:b5:36:5a:db:d1:c6:f2

# Fingerprint (SHA1): a0:73:e5:c5:bd:43:61:0d:86:4c:21:13:0a:85:58:57:cc:9c:ea:46

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Root CA Generalitat Valenciana"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\240\163\345\305\275\103\141\015\206\114\041\023\012\205\130\127
\314\234\352\106
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\054\214\027\136\261\124\253\223\027\265\066\132\333\321\306\362
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\150\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\037\060\035\006\003\125\004\012\023\026\107\145\156\145\162\141
\154\151\164\141\164\040\126\141\154\145\156\143\151\141\156\141
\061\017\060\015\006\003\125\004\013\023\006\120\113\111\107\126
\101\061\047\060\045\006\003\125\004\003\023\036\122\157\157\164
\040\103\101\040\107\145\156\145\162\141\154\151\164\141\164\040
\126\141\154\145\156\143\151\141\156\141
```

END

```
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\073\105\345\150
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "EBG Elektronik Sertifika Hizmet Salaycs"
Issuer: C=TR,O=EBG Biliim Teknolojileri ve Hizmetleri A...,CN=EBG Elektronik Sertifika Hizmet Salaycs
Serial Number:4c:af:73:42:1c:8e:74:02
#
Subject: C=TR,O=EBG Biliim Teknolojileri ve Hizmetleri A...,CN=EBG Elektronik Sertifika Hizmet Salaycs
Not Valid Before: Thu Aug 17 00:21:09 2006
Not Valid After: Sun Aug 14 00:31:09 2016
Fingerprint (MD5): 2c:20:26:9d:cb:1a:4a:00:85:b5:b7:5a:ae:c2:01:37
Fingerprint (SHA1): 8c:96:ba:eb:dd:2b:07:07:48:ee:30:32:66:a0:f3:98:6e:7c:ae:58
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "EBG Elektronik Sertifika Hizmet Salaycs"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\070\060\066\006\003\125\004\003\014\057\105\102
\107\040\105\154\145\153\164\162\157\156\151\153\040\123\145\162
\164\151\146\151\153\141\040\110\151\172\155\145\164\040\123\141
\304\237\154\141\171\304\261\143\304\261\163\304\261\061\067\060
\065\006\003\125\004\012\014\056\105\102\107\040\102\151\154\151
\305\237\151\155\040\124\145\153\156\157\154\157\152\151\154\145
\162\151\040\166\145\040\110\151\172\155\145\164\154\145\162\151
\040\101\056\305\236\056\061\013\060\011\006\003\125\004\006\023
\002\124\122
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\070\060\066\006\003\125\004\003\014\057\105\102
\107\040\105\154\145\153\164\162\157\156\151\153\040\123\145\162
\164\151\146\151\153\141\040\110\151\172\155\145\164\040\123\141
\304\237\154\141\171\304\261\143\304\261\163\304\261\061\067\060
\065\006\003\125\004\012\014\056\105\102\107\040\102\151\154\151
\305\237\151\155\040\124\145\153\156\157\154\157\152\151\154\145
\162\151\040\166\145\040\110\151\172\155\145\164\154\145\162\151
\040\101\056\305\236\056\061\013\060\011\006\003\125\004\006\023
\002\124\122
END
```

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\010\114\257\163\102\034\216\164\002

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\347\060\202\003\317\240\003\002\001\002\002\010\114  
\257\163\102\034\216\164\002\060\015\006\011\052\206\110\206\367  
\015\001\001\005\005\000\060\201\200\061\070\060\066\006\003\125  
\004\003\014\057\105\102\107\040\105\154\145\153\164\162\157\156  
\151\153\040\123\145\162\164\151\146\151\153\141\040\110\151\172  
\155\145\164\040\123\141\304\237\154\141\171\304\261\143\304\261  
\163\304\261\061\067\060\065\006\003\125\004\012\014\056\105\102  
\107\040\102\151\154\151\305\237\151\155\040\124\145\153\156\157  
\154\157\152\151\154\145\162\151\040\166\145\040\110\151\172\155  
\145\164\154\145\162\151\040\101\056\305\236\056\061\013\060\011  
\006\003\125\004\006\023\002\124\122\060\036\027\015\060\066\060  
\070\061\067\060\060\062\061\060\071\132\027\015\061\066\060\070  
\061\064\060\060\063\061\060\071\132\060\201\200\061\070\060\066  
\006\003\125\004\003\014\057\105\102\107\040\105\154\145\153\164  
\162\157\156\151\153\040\123\145\162\164\151\146\151\153\141\040  
\110\151\172\155\145\164\040\123\141\304\237\154\141\171\304\261  
\143\304\261\163\304\261\061\067\060\065\006\003\125\004\012\014  
\056\105\102\107\040\102\151\154\151\305\237\151\155\040\124\145  
\153\156\157\154\157\152\151\154\145\162\151\040\166\145\040\110  
\151\172\155\145\164\154\145\162\151\040\101\056\305\236\056\061  
\013\060\011\006\003\125\004\006\023\002\124\122\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\356\240\204  
\141\320\072\152\146\020\062\330\061\070\177\247\247\345\375\241  
\341\373\227\167\270\161\226\350\023\226\106\203\117\266\362\137  
\162\126\156\023\140\245\001\221\342\133\305\315\127\037\167\143  
\121\377\057\075\333\271\077\252\251\065\347\171\320\365\320\044  
\266\041\352\353\043\224\376\051\277\373\211\221\014\144\232\005  
\112\053\314\014\356\361\075\233\202\151\244\114\370\232\157\347  
\042\332\020\272\137\222\374\030\047\012\250\252\104\372\056\054  
\264\373\106\232\010\003\203\162\253\210\344\152\162\311\345\145  
\037\156\052\017\235\263\350\073\344\014\156\172\332\127\375\327  
\353\171\213\136\040\006\323\166\013\154\002\225\243\226\344\313  
\166\121\321\050\235\241\032\374\104\242\115\314\172\166\250\015  
\075\277\027\117\042\210\120\375\256\266\354\220\120\112\133\237  
\225\101\252\312\017\262\112\376\200\231\116\243\106\025\253\370  
\163\102\152\302\146\166\261\012\046\025\335\223\222\354\333\251  
\137\124\042\122\221\160\135\023\352\110\354\156\003\154\331\335  
\154\374\353\015\003\377\246\203\022\233\361\251\223\017\305\046  
\114\061\262\143\231\141\162\347\052\144\231\322\270\351\165\342  
\174\251\251\232\032\252\303\126\333\020\232\074\203\122\266\173  
\226\267\254\207\167\250\271\362\147\013\224\103\263\257\076\163  
\372\102\066\261\045\305\012\061\046\067\126\147\272\243\013\175  
\326\367\211\315\147\241\267\072\036\146\117\366\240\125\024\045

\114\054\063\015\246\101\214\275\004\061\152\020\162\012\235\016  
\056\166\275\136\363\121\211\213\250\077\125\163\277\333\072\306  
\044\005\226\222\110\252\113\215\052\003\345\127\221\020\364\152  
\050\025\156\107\167\204\134\121\164\237\031\351\346\036\143\026  
\071\343\021\025\343\130\032\104\275\313\304\154\146\327\204\006  
\337\060\364\067\242\103\042\171\322\020\154\337\273\346\023\021  
\374\235\204\012\023\173\360\073\320\374\243\012\327\211\352\226  
\176\215\110\205\036\144\137\333\124\242\254\325\172\002\171\153  
\322\212\360\147\332\145\162\015\024\160\344\351\216\170\217\062  
\164\174\127\362\326\326\364\066\211\033\370\051\154\213\271\366  
\227\321\244\056\252\276\013\031\302\105\351\160\135\002\003\000  
\235\331\243\143\060\141\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001  
\377\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026  
\004\024\347\316\306\117\374\026\147\226\372\112\243\007\301\004  
\247\313\152\336\332\107\060\037\006\003\125\035\043\004\030\060  
\026\200\024\347\316\306\117\374\026\147\226\372\112\243\007\301  
\004\247\313\152\336\332\107\060\015\006\011\052\206\110\206\367  
\015\001\001\005\005\000\003\202\002\001\000\233\230\232\135\276  
\363\050\043\166\306\154\367\177\346\100\236\300\066\334\225\015  
\035\255\025\305\066\330\325\071\357\362\036\042\136\263\202\264  
\135\273\114\032\312\222\015\337\107\044\036\263\044\332\221\210  
\351\203\160\335\223\327\351\272\263\337\026\132\076\336\340\310  
\373\323\375\154\051\370\025\106\240\150\046\314\223\122\256\202  
\001\223\220\312\167\312\115\111\357\342\132\331\052\275\060\316  
\114\262\201\266\060\316\131\117\332\131\035\152\172\244\105\260  
\202\046\201\206\166\365\365\020\000\270\356\263\011\350\117\207  
\002\007\256\044\134\360\137\254\012\060\314\212\100\240\163\004  
\301\373\211\044\366\232\034\134\267\074\012\147\066\005\010\061  
\263\257\330\001\150\052\340\170\217\164\336\270\121\244\214\154  
\040\075\242\373\263\324\011\375\173\302\200\252\223\154\051\230  
\041\250\273\026\363\251\022\137\164\265\207\230\362\225\046\337  
\064\357\212\123\221\210\135\032\224\243\077\174\042\370\327\210  
\272\246\214\226\250\075\122\064\142\237\000\036\124\125\102\147  
\306\115\106\217\273\024\105\075\012\226\026\216\020\241\227\231  
\325\323\060\205\314\336\264\162\267\274\212\074\030\051\150\375  
\334\161\007\356\044\071\152\372\355\245\254\070\057\371\036\020  
\016\006\161\032\020\114\376\165\176\377\036\127\071\102\312\327  
\341\025\241\126\125\131\033\321\243\257\021\330\116\303\245\053  
\357\220\277\300\354\202\023\133\215\326\162\054\223\116\217\152  
\051\337\205\074\323\015\340\242\030\022\314\125\057\107\267\247  
\233\002\376\101\366\210\114\155\332\251\001\107\203\144\047\142  
\020\202\326\022\173\136\003\037\064\251\311\221\376\257\135\155  
\206\047\267\043\252\165\030\312\040\347\260\017\327\211\016\246  
\147\042\143\364\203\101\053\006\113\273\130\325\321\327\267\271  
\020\143\330\211\112\264\252\335\026\143\365\156\276\140\241\370  
\355\350\326\220\117\032\306\305\240\051\323\247\041\250\365\132  
\074\367\307\111\242\041\232\112\225\122\040\226\162\232\146\313



```
\367\322\206\103\174\042\276\226\371\275\001\250\107\335\345\073
\100\371\165\053\233\053\106\144\206\215\036\364\217\373\007\167
\320\352\111\242\034\215\122\024\246\012\223
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "EBG Elektronik Sertifika Hizmet Salaycs"

# Issuer: C=TR,O=EBG Biliim Teknolojileri ve Hizmetleri A.,CN=EBG Elektronik Sertifika Hizmet Salaycs

# Serial Number:4c:af:73:42:1c:8e:74:02

# Subject: C=TR,O=EBG Biliim Teknolojileri ve Hizmetleri A.,CN=EBG Elektronik Sertifika Hizmet Salaycs

# Not Valid Before: Thu Aug 17 00:21:09 2006

# Not Valid After: Sun Aug 14 00:31:09 2016

# Fingerprint (MD5): 2c:20:26:9d:cb:1a:4a:00:85:b5:b7:5a:ae:c2:01:37

# Fingerprint (SHA1): 8c:96:ba:eb:dd:2b:07:07:48:ee:30:32:66:a0:f3:98:6e:7c:ae:58

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "EBG Elektronik Sertifika Hizmet Salaycs"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\214\226\272\353\335\053\007\007\110\356\060\062\146\240\363\230
\156\174\256\130
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\054\040\046\235\313\032\112\000\205\265\267\132\256\302\001\067
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\200\061\070\060\066\006\003\125\004\003\014\057\105\102
\107\040\105\154\145\153\164\162\157\156\151\153\040\123\145\162
\164\151\146\151\153\141\040\110\151\172\155\145\164\040\123\141
\304\237\154\141\171\304\261\143\304\261\163\304\261\061\067\060
\065\006\003\125\004\012\014\056\105\102\107\040\102\151\154\151
\305\237\151\155\040\124\145\153\156\157\154\157\152\151\154\145
\162\151\040\166\145\040\110\151\172\155\145\164\154\145\162\151
\040\101\056\305\236\056\061\013\060\011\006\003\125\004\006\023
\002\124\122
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\010\114\257\163\102\034\216\164\002
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "VAS Latvijas Pastis SSI(RCA)"

# Issuer: CN=VAS Latvijas Pastis SSI(RCA),OU=Sertifikācijas pakalpojumi,O=VAS Latvijas Pastis -  
Vien.reg.Nr.40003052790,C=LV

# Serial Number:63:06:86:a7:c5:37:65:a5:43:90:a8:6a:58:cc:d4:32

# Subject: CN=VAS Latvijas Pastis SSI(RCA),OU=Sertifikācijas pakalpojumi,O=VAS Latvijas Pastis -  
Vien.reg.Nr.40003052790,C=LV

# Not Valid Before: Wed Sep 13 09:22:10 2006

# Not Valid After: Fri Sep 13 09:27:57 2024

# Fingerprint (MD5): fd:49:be:5b:18:5a:25:ec:f9:c3:54:85:10:40:e8:d4

# Fingerprint (SHA1): 08:64:18:e9:06:ce:e8:9c:23:53:b6:e2:7f:bd:9e:74:39:f7:63:16

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "VAS Latvijas Pastis SSI(RCA)"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\217\061\013\060\011\006\003\125\004\006\023\002\114\126  
\061\065\060\063\006\003\125\004\012\023\054\126\101\123\040\114  
\141\164\166\151\152\141\163\040\120\141\163\164\163\040\055\040  
\126\151\145\156\056\162\145\147\056\116\162\056\064\060\060\060  
\063\060\065\062\067\071\060\061\043\060\041\006\003\125\004\013  
\023\032\123\145\162\164\151\146\151\153\141\143\151\152\141\163  
\040\160\141\153\141\154\160\157\152\165\155\151\061\044\060\042  
\006\003\125\004\003\023\033\126\101\123\040\114\141\164\166\151  
\152\141\163\040\120\141\163\164\163\040\123\123\111\050\122\103  
\101\051

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\217\061\013\060\011\006\003\125\004\006\023\002\114\126  
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\141\164\166\151\152\141\163\040\120\141\163\164\163\040\055\040  
\126\151\145\156\056\162\145\147\056\116\162\056\064\060\060\060  
\063\060\065\062\067\071\060\061\043\060\041\006\003\125\004\013  
\023\032\123\145\162\164\151\146\151\153\141\143\151\152\141\163  
\040\160\141\153\141\154\160\157\152\165\155\151\061\044\060\042  
\006\003\125\004\003\023\033\126\101\123\040\114\141\164\166\151  
\152\141\163\040\120\141\163\164\163\040\123\123\111\050\122\103  
\101\051

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\143\006\206\247\305\067\145\245\103\220\250\152\130\314  
\324\062

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\007\251\060\202\005\221\240\003\002\001\002\002\020\143  
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\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201  
\217\061\013\060\011\006\003\125\004\006\023\002\114\126\061\065  
\060\063\006\003\125\004\012\023\054\126\101\123\040\114\141\164  
\166\151\152\141\163\040\120\141\163\164\163\040\055\040\126\151  
\145\156\056\162\145\147\056\116\162\056\064\060\060\060\063\060  
\065\062\067\071\060\061\043\060\041\006\003\125\004\013\023\032  
\123\145\162\164\151\146\151\153\141\143\151\152\141\163\040\160  
\141\153\141\154\160\157\152\165\155\151\061\044\060\042\006\003  
\125\004\003\023\033\126\101\123\040\114\141\164\166\151\152\141  
\163\040\120\141\163\164\163\040\123\123\111\050\122\103\101\051  
\060\036\027\015\060\066\060\071\061\063\060\071\062\062\061\060  
\132\027\015\062\064\060\071\061\063\060\071\062\067\065\067\132  
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\114\126  
\061\065\060\063\006\003\125\004\012\023\054\126\101\123\040\114  
\141\164\166\151\152\141\163\040\120\141\163\164\163\040\055\040  
\126\151\145\156\056\162\145\147\056\116\162\056\064\060\060\060  
\063\060\065\062\067\071\060\061\043\060\041\006\003\125\004\013  
\023\032\123\145\162\164\151\146\151\153\141\143\151\152\141\163  
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\152\141\163\040\120\141\163\164\163\040\123\123\111\050\122\103  
\101\051\060\202\002\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202  
\002\001\000\233\270\371\375\141\125\057\117\244\245\024\265\056  
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\173\123\223\373\065\202\065\250\120\056\224\122\240\333\203\076  
\165\332\025\160\254\011\317\356\202\111\255\066\111\271\264\161  
\213\264\000\241\102\006\312\010\012\143\227\266\010\374\356\264  
\334\230\170\031\202\311\370\177\144\076\252\311\376\261\215\353  
\260\144\365\274\363\304\076\072\220\352\116\216\077\033\031\274  
\152\203\303\221\074\154\125\373\012\122\300\350\341\135\167\205  
\063\305\111\337\354\152\277\277\154\067\376\216\111\242\025\030  
\316\213\216\153\036\070\243\060\157\210\201\176\162\126\104\032  
\304\172\071\017\366\304\217\226\324\262\353\000\116\134\336\273  
\347\073\267\346\044\005\223\153\115\346\221\104\277\356\230\033  
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\077\146\075\156\044\344\260\316\303\014\210\154\224\332\070\045  
\174\122\071\343\163\024\263\000\105\143\232\014\102\100\136\004  
\306\367\162\144\316\311\156\063\263\344\323\155\044\225\067\223  
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\303\031\201\267\275\277\100\216\276\056\232\242\014\252\116\002  
\056\273\052\341\010\135\061\003\311\254\047\260\257\334\325\310  
\024\175\100\235\125\211\041\371\220\314\324\311\140\101\163\253  
\350\315\330\072\125\071\012\202\231\376\233\365\365\074\034\221  
\313\300\372\106\124\256\041\374\052\254\134\173\336\172\227\161  
\375\154\153\315\110\232\244\333\201\174\030\067\057\220\175\141  
\224\275\027\311\134\266\124\026\167\312\011\112\252\351\274\117  
\224\165\001\132\126\274\222\322\217\271\327\227\336\126\164\001  
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\165\151\051\162\103\003\370\233\037\372\070\364\236\354\100\020  
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\142\104\347\002\003\001\000\001\243\202\001\375\060\202\001\371  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\030\006\010\053\006\001\005\005\007\001\003\004\014\060\012  
\060\010\006\006\004\000\216\106\001\001\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125  
\035\016\004\026\004\024\314\303\365\146\377\163\254\070\132\226  
\033\041\211\270\201\114\037\313\136\045\060\020\006\011\053\006  
\001\004\001\202\067\025\001\004\003\002\001\000\060\202\001\211  
\006\003\125\035\040\004\202\001\200\060\202\001\174\060\202\001  
\170\006\013\053\006\001\004\001\201\304\131\001\001\002\060\202  
\001\147\060\202\001\070\006\010\053\006\001\005\005\007\002\002  
\060\202\001\052\036\202\001\046\000\123\000\151\000\163\000\040  
\000\151\000\162\000\040\000\163\000\145\000\162\000\164\000\151  
\000\146\000\151\000\153\000\141\000\164\000\163\000\054\000\040  
\000\153\000\157\000\040\000\151\000\172\000\144\000\145\000\166  
\000\151\000\163\000\040\000\126\000\101\000\123\000\040\000\114  
\000\141\000\164\000\166\000\151\000\152\000\141\000\163\000\040  
\000\120\000\141\000\163\000\164\000\163\000\054\000\040\000\156  
\000\157\000\144\000\162\000\157\000\163\000\151\000\156\000\157  
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\000\164\000\151\000\142\000\165\000\040\000\105\000\154\000\145  
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\000\156\000\164\000\165\000\040\000\154\000\151\000\153\000\165  
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\000\151\000\162\000\157\000\160\000\141\000\163\000\040\000\120  
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\006\010\053\006\001\005\005\007\002\001\026\035\150\164\164\160  
\072\057\057\167\167\167\056\145\055\155\145\056\154\166\057\162  
\145\160\157\163\151\164\157\162\171\060\015\006\011\052\206\110  
\206\367\015\001\001\005\005\000\003\202\002\001\000\037\050\112

\065\220\041\143\150\012\057\170\257\243\036\202\046\227\243\077  
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\174\357\224\362\361\211\365\267\337\122\002\041\151\322\352\226  
\064\345\240\317\227\270\234\125\016\020\205\243\024\136\054\005  
\370\265\072\166\363\371\172\270\336\266\014\047\151\362\313\224  
\221\013\035\271\325\216\157\231\057\315\362\031\126\071\072\110  
\126\360\001\377\202\165\266\262\375\321\324\365\362\143\127\114  
\115\241\176\314\020\272\004\151\357\364\024\374\263\227\037\105  
\356\157\112\050\177\321\306\047\274\307\243\251\153\173\355\202  
\023\157\253\336\017\373\161\353\134\021\032\251\054\320\060\237  
\374\066\067\126\357\225\351\272\267\023\266\256\237\002\141\255  
\236\354\153\004\157\066\237\017\231\367\302\311\310\114\050\271  
\050\324\041\327\236\124\325\300\316\364\216\344\125\224\173\217  
\044\306\070\374\253\172\244\126\167\075\250\105\357\144\222\244  
\320\112\176\273\163\213\364\015\122\163\270\072\110\136\103\200  
\323\251\160\167\142\377\307\050\034\163\036\103\346\047\044\133  
\111\271\346\066\244\216\375\305\055\057\172\245\171\022\172\327  
\041\262\045\155\310\017\242\303\141\113\345\110\342\127\272\237  
\362\212\041\335\333\144\360\332\031\337\316\300\233\200\071\302  
\167\167\143\025\123\162\204\372\244\217\007\067\206\041\175\120  
\372\075\152\067\333\221\016\067\263\375\316\013\312\173\141\320  
\234\164\234\175\070\150\155\351\173\035\326\361\052\264\357\073  
\140\122\167\005\346\002\302\137\214\133\274\360\175\267\163\307  
\221\153\262\052\263\143\243\064\325\253\255\045\161\107\377\032  
\076\172\266\215\225\166\303\356\246\315\003\011\154\356\105\147  
\230\317\231\110\166\301\316\212\164\232\150\122\001\064\042\310  
\355\342\024\013\204\275\156\020\214\261\162\233\276\350\010\327  
\127\325\177\352\264\001\075\116\344\342\350\147\347\214\176\351  
\347\102\021\357\225\106\310\221\326\276\047\027\200\031\064\230  
\347\306\337\036\374\041\137\236\206\075\274\176\360\234\275\162  
\236\364\107\202\133\161\147\363\372\334\124\114\250\134\330\131  
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "VAS Latvijas Pasts SSI(RCA)"

# Issuer: CN=VAS Latvijas Pasts SSI(RCA),OU=Sertifikācijas pakalpojumi,O=VAS Latvijas Pasts -  
Vien.reg.Nr.40003052790,C=LV

# Serial Number:63:06:86:a7:c5:37:65:a5:43:90:a8:6a:58:cc:d4:32

# Subject: CN=VAS Latvijas Pasts SSI(RCA),OU=Sertifikācijas pakalpojumi,O=VAS Latvijas Pasts -  
Vien.reg.Nr.40003052790,C=LV

# Not Valid Before: Wed Sep 13 09:22:10 2006

# Not Valid After: Fri Sep 13 09:27:57 2024

# Fingerprint (MD5): fd:49:be:5b:18:5a:25:ec:f9:c3:54:85:10:40:e8:d4

```

Fingerprint
(SHA1): 08:64:18:e9:06:ce:e8:9c:23:53:b6:e2:7f:bd:9e:74:39:f7:63:16
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VAS Latvijas Pastis SSI(RCA)"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\010\144\030\351\006\316\350\234\043\123\266\342\177\275\236\164
\071\367\143\026
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\375\111\276\133\030\132\045\354\371\303\124\205\020\100\350\324
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\114\126
\061\065\060\063\006\003\125\004\012\023\054\126\101\123\040\114
\141\164\166\151\152\141\163\040\120\141\163\164\163\040\055\040
\126\151\145\156\056\162\145\147\056\116\162\056\064\060\060\060
\063\060\065\062\067\071\060\061\043\060\041\006\003\125\004\013
\023\032\123\145\162\164\151\146\151\153\141\143\151\152\141\163
\040\160\141\153\141\154\160\157\152\165\155\151\061\044\060\042
\006\003\125\004\003\023\033\126\101\123\040\114\141\164\166\151
\152\141\163\040\120\141\163\164\163\040\123\123\111\050\122\103
\101\051
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\143\006\206\247\305\067\145\245\103\220\250\152\130\314
\324\062
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "ANCERT Certificados CGN"
Issuer: CN=ANCERT Certificados CGN,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF
B83395988,C=ES
Serial Number:44:74:ec:c8:6c:72:1e:58:dd:b8:2c:7e:f4:fc:95
Subject: CN=ANCERT Certificados CGN,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF
B83395988,C=ES
Not Valid Before: Wed Feb 11 17:27:12 2004
Not Valid After: Sun Feb 11 17:27:12 2024
Fingerprint (MD5): 1c:4b:e2:c6:2d:b9:ac:31:14:f4:40:07:69:cb:1f:40
Fingerprint (SHA1): 11:c5:b5:f7:55:52:b0:11:66:9c:2e:97:17:de:6d:9b:ff:5f:a8:10
CKA_CLASS

```

```
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados CGN"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103
\111\106\040\102\070\063\063\071\065\071\070\070\061\040\060\036
\006\003\125\004\003\023\027\101\116\103\105\122\124\040\103\145
\162\164\151\146\151\143\141\144\157\163\040\103\107\116
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061
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\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103
\111\106\040\102\070\063\063\071\065\071\070\070\061\040\060\036
\006\003\125\004\003\023\027\101\116\103\105\122\124\040\103\145
\162\164\151\146\151\143\141\144\157\163\040\103\107\116
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MULTILINE_OCTAL
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\225
END
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\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164\151
\146\151\143\141\143\151\157\156\040\123\056\114\056\040\125\156
\151\160\145\162\163\157\156\141\154\040\055\040\103\111\106\040
\102\070\063\063\071\065\071\070\070\061\040\060\036\006\003\125
\004\003\023\027\101\116\103\105\122\124\040\103\145\162\164\151
\146\151\143\141\144\157\163\040\103\107\116\060\036\027\015\060
\064\060\062\061\061\061\067\062\067\061\062\132\027\015\062\064
\060\062\061\061\061\067\062\067\061\062\132\060\174\061\013\060
\011\006\003\125\004\006\023\002\105\123\061\113\060\111\006\003
\125\004\012\023\102\101\147\145\156\143\151\141\040\116\157\164
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\141\162\151\141\154\040\144\145\040\103\145\162\164\151\146\151  
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\063\063\071\065\071\070\070\061\040\060\036\006\003\125\004\003  
\023\027\101\116\103\105\122\124\040\103\145\162\164\151\146\151  
\143\141\144\157\163\040\103\107\116\060\202\001\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017  
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\360\021\242\271\212\123\002\046\165\022\211\341\373\210\116\131  
\172\000\321\202\330\026\256\345\266\274\225\045\140\100\167\045  
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\012\245\115\154\115\253\237\050\110\204\341\203\165\270\030\160  
\125\123\333\320\337\051\220\257\071\306\027\225\301\224\305\136  
\331\145\137\135\377\156\026\225\230\041\237\136\115\360\315\061  
\071\041\003\027\015\221\037\241\125\231\101\354\125\311\273\075  
\231\134\233\305\177\321\034\136\352\123\002\003\001\000\001\243  
\202\001\247\060\202\001\243\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\202\001\040\006\003\125\035  
\040\004\202\001\027\060\202\001\023\060\202\001\017\006\011\053  
\006\001\004\001\201\223\150\004\060\202\001\000\060\045\006\010  
\053\006\001\005\005\007\002\001\026\031\150\164\164\160\072\057  
\057\167\167\167\056\141\156\143\145\162\164\056\143\157\155\057  
\143\160\163\060\201\326\006\010\053\006\001\005\005\007\002\002  
\060\201\311\060\015\026\006\101\116\103\105\122\124\060\003\002  
\001\001\032\201\267\101\147\145\156\143\151\141\040\116\157\164  
\141\162\151\141\154\040\144\145\040\103\145\162\164\151\146\151  
\143\141\143\151\157\156\056\040\114\141\040\144\145\143\154\141  
\162\141\143\151\157\156\040\144\145\040\160\162\141\143\164\151  
\143\141\163\040\144\145\040\143\145\162\164\151\146\151\141\143  
\151\157\156\040\161\165\145\040\162\151\147\145\040\145\154\040  
\146\165\156\143\151\157\156\141\155\151\145\156\164\157\040\144  
\145\040\154\141\040\160\162\145\163\145\156\164\145\040\141\165  
\164\157\162\151\144\141\144\040\163\145\040\145\156\143\165\145  
\156\164\162\141\040\144\151\163\160\157\156\151\142\154\145\040  
\145\156\040\150\164\164\160\072\057\057\167\167\167\056\141\156  
\143\145\162\164\056\143\157\155\057\143\160\163\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\206\060\034\006\003  
\125\035\021\004\025\060\023\201\021\141\156\143\145\162\164\100  
\141\156\143\145\162\164\056\143\157\155\060\037\006\003\125\035  
\043\004\030\060\026\200\024\354\127\237\310\166\042\157\314\072



```
\256\133\360\055\241\142\130\321\215\002\314\060\035\006\003\125
\035\016\004\026\004\024\354\127\237\310\166\042\157\314\072\256
\133\360\055\241\142\130\321\215\002\314\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\213\075
\337\334\066\054\177\047\234\374\265\130\123\161\012\022\135\020
\144\121\161\265\112\126\364\136\104\147\036\357\035\262\361\244
\121\074\147\154\054\145\226\172\241\022\243\257\013\010\067\016
\231\326\156\050\207\013\142\253\116\170\116\162\201\233\337\021
\117\211\140\310\121\246\033\006\011\161\163\174\067\267\034\070
\067\232\371\207\341\357\241\356\177\327\300\352\071\024\372\174
\157\013\371\206\312\346\305\167\151\240\237\215\051\243\167\156
\305\314\332\366\335\006\172\323\151\146\076\140\073\343\062\337
\256\360\033\236\052\235\314\204\337\032\020\107\355\245\126\226
\102\067\265\055\162\015\101\022\223\272\062\210\104\310\256\011
\304\275\200\355\375\140\017\162\262\266\144\366\143\040\062\160
\167\207\056\063\056\237\065\310\137\250\222\126\267\377\044\072
\054\135\362\046\005\150\031\362\121\147\317\337\122\011\351\202
\004\172\153\202\247\177\345\322\251\164\153\030\046\310\272\324
\325\036\245\113\073\046\301\235\042\341\373\022\275\325\142\106
\325\327\135\322\335\303\374\141\015\060\005\117\005\213
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ANCERT Certificados CGN"

# Issuer: CN=ANCERT Certificados CGN,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF  
B83395988,C=ES

# Serial Number:44:74:ec:c8:6c:72:1e:58:dd:b8:2c:7e:f4:fc:95

# Subject: CN=ANCERT Certificados CGN,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF  
B83395988,C=ES

# Not Valid Before: Wed Feb 11 17:27:12 2004

# Not Valid After: Sun Feb 11 17:27:12 2024

# Fingerprint (MD5): 1c:4b:e2:c6:2d:b9:ac:31:14:f4:40:07:69:cb:1f:40

# Fingerprint (SHA1): 11:c5:b5:f7:55:52:b0:11:66:9c:2e:97:17:de:6d:9b:ff:5f:a8:10

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ANCERT Certificados CGN"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\021\305\265\367\125\122\260\021\146\234\056\227\027\336\155\233
\377\137\250\020
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\034\113\342\306\055\271\254\061\024\364\100\007\151\313\037\100

END

CKA\_ISSUER

MULTILINE\_OCTAL

\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061  
\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143\151  
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145  
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056  
\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103  
\111\106\040\102\070\063\063\071\065\071\070\070\061\040\060\036  
\006\003\125\004\003\023\027\101\116\103\105\122\124\040\103\145  
\162\164\151\146\151\143\141\144\157\163\040\103\107\116

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\017\104\164\354\310\154\162\036\130\335\270\054\176\364\374  
\225

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "ANCERT Certificados Notariales"

# Issuer:

CN=ANCERT Certificados Notariales,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF  
B83395988,C=ES

# Serial Number:f4:cf:89:ea:dd:a4:c6:3e:91:ad:48:0e:2d:22:36:84

# Subject: CN=ANCERT Certificados Notariales,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF  
B83395988,C=ES

# Not Valid Before: Wed Feb 11 15:58:30 2004

# Not Valid After: Sun Feb 11 15:58:26 2024

# Fingerprint (MD5): 45:f7:50:11:4e:c5:ad:bd:53:68:86:63:ec:7b:6a:e1

# Fingerprint (SHA1): c0:9a:b0:c8:ad:71:14:71:4e:d5:e2:1a:5a:27:6a:dc:d5:e7:ef:cb

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ANCERT Certificados Notariales"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\203\061\013\060\011\006\003\125\004\006\023\002\105\123  
\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143  
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103  
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114  
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040  
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\047\060  
\045\006\003\125\004\003\023\036\101\116\103\105\122\124\040\103

```
\145\162\164\151\146\151\143\141\144\157\163\040\116\157\164\141
\162\151\141\154\145\163
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\047\060
\045\006\003\125\004\003\023\036\101\116\103\105\122\124\040\103
\145\162\164\151\146\151\143\141\144\157\163\040\116\157\164\141
\162\151\141\154\145\163
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\364\317\211\352\335\244\306\076\221\255\110\016\055
\042\066\204
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\074\060\202\004\044\240\003\002\001\002\002\021\000
\364\317\211\352\335\244\306\076\221\255\110\016\055\042\066\204
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\201\203\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103
\111\106\040\102\070\063\063\071\065\071\070\070\061\047\060\045
\006\003\125\004\003\023\036\101\116\103\105\122\124\040\103\145
\162\164\151\146\151\143\141\144\157\163\040\116\157\164\141\162
\151\141\154\145\163\060\036\027\015\060\064\060\062\061\061\061
\065\065\070\063\060\132\027\015\062\064\060\062\061\061\061\065
\065\070\062\066\132\060\201\203\061\013\060\011\006\003\125\004
\006\023\002\105\123\061\113\060\111\006\003\125\004\012\023\102
\101\147\145\156\143\151\141\040\116\157\164\141\162\151\141\154
\040\144\145\040\103\145\162\164\151\146\151\143\141\143\151\157
\156\040\123\056\114\056\040\125\156\151\160\145\162\163\157\156
\141\154\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\047\060\045\006\003\125\004\003\023\036\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\116\157\164\141\162\151\141\154\145\163\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\360\221\017\320
\147\055\051\262\143\115\037\065\171\366\145\153\271\363\363\265
\130\223\047\144\117\247\325\133\202\005\162\233\177\035\256\010
```

\322\214\320\321\311\140\260\231\031\065\326\031\306\000\071\151  
\175\042\357\164\042\203\264\176\352\020\213\076\063\034\341\335  
\144\066\051\363\122\112\156\101\303\276\121\014\037\143\270\277  
\215\251\077\061\061\073\273\361\066\104\074\047\145\024\171\165  
\346\020\244\074\130\033\313\123\142\022\365\207\132\106\242\171  
\243\140\343\026\250\336\204\246\372\345\314\304\020\062\366\102  
\332\107\115\030\075\346\172\017\053\016\143\377\147\175\103\325  
\164\026\220\064\264\017\316\046\163\041\301\112\332\144\344\117  
\343\043\265\331\366\253\267\112\177\226\341\313\107\375\006\103  
\321\224\064\151\012\376\075\350\146\252\046\014\325\143\071\006  
\160\223\255\174\263\344\107\301\073\107\216\151\227\014\221\240  
\114\007\217\311\200\114\256\160\223\150\217\241\303\042\302\361  
\165\233\050\175\222\222\125\072\250\131\031\354\022\061\034\357  
\235\027\334\271\100\011\133\364\055\023\046\163\002\003\001\000  
\001\243\202\001\247\060\202\001\243\060\034\006\003\125\035\021  
\004\025\060\023\201\021\141\156\143\145\162\164\100\141\156\143  
\145\162\164\056\143\157\155\060\037\006\003\125\035\043\004\030  
\060\026\200\024\204\367\372\162\136\210\144\146\035\050\214\260  
\167\275\014\152\237\114\115\142\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\202\001\040\006\003\125  
\035\040\004\202\001\027\060\202\001\023\060\202\001\017\006\011  
\053\006\001\004\001\201\223\150\001\060\202\001\000\060\045\006  
\010\053\006\001\005\005\007\002\001\026\031\150\164\164\160\072  
\057\057\167\167\167\056\141\156\143\145\162\164\056\143\157\155  
\057\143\160\163\060\201\326\006\010\053\006\001\005\005\007\002  
\002\060\201\311\060\015\026\006\101\116\103\105\122\124\060\003  
\002\001\001\032\201\267\101\147\145\156\143\151\141\040\116\157  
\164\141\162\151\141\154\040\144\145\040\103\145\162\164\151\146  
\151\143\141\143\151\157\156\056\040\114\141\040\144\145\143\154  
\141\162\141\143\151\157\156\040\144\145\040\160\162\141\143\164  
\151\143\141\163\040\144\145\040\143\145\162\164\151\146\151\141  
\143\151\157\156\040\161\165\145\040\162\151\147\145\040\145\154  
\040\146\165\156\143\151\157\156\141\155\151\145\156\164\157\040  
\144\145\040\154\141\040\160\162\145\163\145\156\164\145\040\141  
\165\164\157\162\151\144\141\144\040\163\145\040\145\156\143\165  
\145\156\164\162\141\040\144\151\163\160\157\156\151\142\154\145  
\040\145\156\040\150\164\164\160\072\057\057\167\167\167\056\141  
\156\143\145\162\164\056\143\157\155\057\143\160\163\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\035\006  
\003\125\035\016\004\026\004\024\204\367\372\162\136\210\144\146  
\035\050\214\260\167\275\014\152\237\114\115\142\060\015\006\011  
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000  
\057\370\345\330\063\245\302\224\156\136\300\361\356\241\114\012  
\255\206\017\300\063\335\236\322\331\233\356\305\053\205\051\166  
\254\245\022\123\223\035\252\007\354\351\071\144\013\150\360\165  
\044\351\321\206\214\234\123\152\353\025\241\011\267\031\007\271  
\235\217\002\262\033\111\160\302\143\164\335\013\252\376\007\306  
\067\126\306\203\376\300\117\034\314\070\252\375\356\125\230\211

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\134\302\123\255\040\207\272\026\144\122\141\354\301\237\273\324
\142\321\052\310\135\360\053\370\332\022\316\043\313\261\314\301
\322\012\275\374\300\200\116\125\111\372\211\330\144\243\112\312
\356\213\327\345\355\222\373\140\342\342\052\317\055\050\076\246
\377\200\234\145\314\022\236\245\034\164\131\220\245\207\177\147
\025\200\020\300\241\321\250\060\354\241\002\221\212\132\323\043
\027\223\132\107\041\171\352\063\172\017\177\070\065\232\312\126
\270\277\144\272\247\260\265\121\035\026\236\216\211\175\070\072
\313\204\115\007\230\330\345\341\214\005\152\245\067\014\326\171
\051\076\361\102\304\266\367\352\031\240\141\340\002\116\277\022
END
```

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ANCERT Certificados Notariales"

# Issuer: CN=ANCERT Certificados Notariales,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF B83395988,C=ES

# Serial Number:f4:cf:89:ea:dd:a4:c6:3e:91:ad:48:0e:2d:22:36:84

# Subject: CN=ANCERT Certificados Notariales,O=Agencia

Notarial de Certificacion S.L. Unipersonal - CIF B83395988,C=ES

# Not Valid Before: Wed Feb 11 15:58:30 2004

# Not Valid After: Sun Feb 11 15:58:26 2024

# Fingerprint (MD5): 45:f7:50:11:4e:c5:ad:bd:53:68:86:63:ec:7b:6a:e1

# Fingerprint (SHA1): c0:9a:b0:c8:ad:71:14:71:4e:d5:e2:1a:5a:27:6a:dc:d5:e7:ef:cb

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ANCERT Certificados Notariales"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\300\232\260\310\255\161\024\161\116\325\342\032\132\047\152\334
\325\347\357\313
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\105\367\120\021\116\305\255\275\123\150\206\143\354\173\152\341
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\047\060
\045\006\003\125\004\003\023\036\101\116\103\105\122\124\040\103
\145\162\164\151\146\151\143\141\144\157\163\040\116\157\164\141
```

\162\151\141\154\145\163

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\021\000\364\317\211\352\335\244\306\076\221\255\110\016\055

\042\066\204

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "ANCERT Corporaciones de Derecho Publico"

# Issuer: CN=ANCERT Corporaciones de Derecho Publico,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF B83395988,C=ES

# Serial Number:3f:b2:e5:f2:d1:7c:8b:18:64:56:62:a9:39:81:7f:a7

# Subject: CN=ANCERT Corporaciones de Derecho Publico,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF B83395988,C=ES

# Not Valid Before: Wed Feb 11 17:22:45 2004

# Not Valid After: Sun Feb 11 17:22:45 2024

# Fingerprint (MD5): 20:6b:d6:8b:4a:8f:48:ab:e4:88:09:0d:e5:65:1a:50

# Fingerprint (SHA1): 0c:fd:83:db:ae:44:b9:a0:c8:f6:76:f3:b5:70:65:0b:94:b6:9d:bf

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ANCERT Corporaciones de Derecho Publico"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\214\061\013\060\011\006\003\125\004\006\023\002\105\123

\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143

\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103

\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114

\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040

\103\111\106\040\102\070\063\063\071\065\071\070\070\061\060\060

\056\006\003\125\004\003\023\047\101\116\103\105\122\124\040\103

\157\162\160\157\162\141\143\151\157\156\145\163\040\144\145\040

\104\145\162\145\143\150\157\040\120\165\142\154\151\143\157

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\214\061\013\060\011\006\003\125\004\006\023\002\105\123

\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143

\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103

\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114

\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040

\103\111\106\040\102\070\063\063\071\065\071\070\070\061\060\060  
\056\006\003\125\004\003\023\047\101\116\103\105\122\124\040\103  
\157\162\160\157\162\141\143\151\157\156\145\163\040\144\145\040  
\104\145\162\145\143\150\157\040\120\165\142\154\151\143\157

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\077\262\345\362\321\174\213\030\144\126\142\251\071\201  
\177\247

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\115\060\202\004\065\240\003\002\001\002\002\020\077  
\262\345\362\321\174\213\030\144\126\142\251\071\201\177\247\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201  
\214\061\013\060\011\006\003\125\004\006\023\002\105\123\061\113  
\060\111\006\003\125\004\012\023\102\101\147\145\156\143\151\141  
\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162  
\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056\040  
\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103\111  
\106\040\102\070\063\063\071\065\071\070\070\061\060\060\056\006  
\003\125\004\003\023\047\101\116\103\105\122\124\040\103\157\162  
\160\157\162\141\143\151\157\156\145\163\040\144\145\040\104\145  
\162\145\143\150\157\040\120\165\142\154\151\143\157\060\036\027  
\015\060\064\060\062\061\061\061\067\062\062\064\065\132\027\015  
\062\064\060\062\061\061\061\067\062\062\064\065\132\060\201\214  
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\113\060  
\111\006\003\125\004\012\023\102\101\147\145\156\143\151\141\040  
\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164  
\151\146\151\143\141\143\151\157\156\040\123\056\114\056\040\125  
\156\151\160\145\162\163\157\156\141\154\040\055\040\103\111\106  
\040\102\070\063\063\071\065\071\070\070\061\060\060\056\006\003  
\125\004\003\023\047\101\116\103\105\122\124\040\103\157\162\160  
\157\162\141\143\151\157\156\145\163\040\144\145\040\104\145\162  
\145\143\150\157\040\120\165\142\154\151\143\157\060\202\001\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\001\017\000\060\202\001\012\002\202\001\001\000\242\041\225  
\207\334\212\353\326\172\220\250\150\065\375\027\374\164\072\124  
\020\222\065\223\102\165\056\330\076\313\251\224\241\276\152\067  
\077\122\272\244\173\332\204\231\026\171\116\000\150\324\037\023  
\351\106\073\074\112\235\203\072\330\041\357\302\362\100\105\341  
\017\140\105\004\355\374\212\030\056\371\075\344\244\021\062\040  
\216\072\267\356\226\100\025\032\231\351\041\235\162\254\315\037  
\211\256\252\331\241\100\260\250\147\276\374\172\016\107\261\136  
\274\370\060\152\216\067\237\005\102\354\054\303\246\033\213\253  
\304\120\075\372\344\163\365\041\260\270\125\137\207\340\242\107  
\070\057\100\137\117\154\253\224\044\126\343\114\217\176\220\351  
\047\202\050\233\230\272\232\326\265\233\127\157\153\025\034\371  
\273\160\051\175\074\367\023\250\321\161\361\260\376\210\105\161  
\251\245\164\145\313\303\371\365\003\017\020\303\206\060\000\156

\301\300\046\242\210\376\041\307\062\075\273\306\173\033\267\233  
\212\263\372\261\174\161\331\001\247\102\220\252\057\230\220\204  
\252\336\306\255\354\074\121\112\005\035\001\121\233\002\003\001  
\000\001\243\202\001\247\060\202\001\243\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\202\001\040\006  
\003\125\035\040\004\202\001\027\060\202\001\023\060\202\001\017  
\006\011\053\006\001\004\001\201\223\150\003\060\202\001\000\060  
\045\006\010\053\006\001\005\005\007\002\001\026\031\150\164\164  
\160\072\057\057\167\167\167\056\141\156\143\145\162\164\056\143  
\157\155\057\143\160\163\060\201\326\006\010\053\006\001\005\005  
\007\002\002\060\201\311\060\015\026\006\101\116\103\105\122\124  
\060\003\002\001\001\032\201\267\101\147\145\156\143\151\141\040  
\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164  
\151\146\151\143\141\143\151\157\156\056\040\114\141\040\144\145  
\143\154\141\162\141\143\151\157\156\040\144\145\040\160\162\141  
\143\164\151\143\141\163\040\144\145\040\143\145\162\164\151\146  
\151\141\143\151\157\156\040\161\165\145\040\162\151\147\145\040  
\145\154\040\146\165\156\143\151\157\156\141\155\151\145\156\164  
\157\040\144\145\040\154\141\040\160\162\145\163\145\156\164\145  
\040\141\165\164\157\162\151\144\141\144\040\163\145\040\145\156  
\143\165\145\156\164\162\141\040\144\151\163\160\157\156\151\142  
\154\145\040\145\156\040\150\164\164\160\072\057\057\167\167\167  
\056\141\156\143\145\162\164\056\143\157\155\057\143\160\163\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060  
\034\006\003\125\035\021\004\025\060\023\201\021\141\156\143\145  
\162\164\100\141\156\143\145\162\164\056\143\157\155\060\037\006  
\003\125\035\043\004\030\060\026\200\024\214\114\036\067\014\261  
\237\322\254\104\013\072\276\002\317\364\215\055\146\225\060\035  
\006\003\125\035\016\004\026\004\024\214\114\036\067\014\261\237  
\322\254\104\013\072\276\002\317\364\215\055\146\225\060\015\006  
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001  
\000\107\164\300\224\221\342\245\373\230\122\104\223\154\304\300  
\035\340\171\333\151\144\055\141\256\244\167\221\065\265\267\312  
\227\252\300\261\206\365\033\150\153\252\130\262\174\077\347\003  
\047\370\101\161\274\246\322\040\251\200\225\242\107\255\155\106  
\164\255\204\233\330\157\251\365\271\057\155\233\300\335\231\207  
\355\131\262\165\201\245\211\205\052\314\320\205\201\115\363\257  
\167\336\214\301\050\232\102\254\005\207\014\064\234\161\207\375  
\354\001\024\037\276\303\056\360\337\372\044\246\135\037\074\361  
\242\013\121\210\001\256\022\207\244\265\135\161\262\337\357\015  
\174\040\343\177\023\013\115\246\300\167\314\077\326\017\161\307  
\161\114\056\036\372\031\006\145\311\255\126\154\167\215\106\077  
\275\060\203\036\340\056\125\270\170\043\164\074\130\012\143\072  
\115\201\173\157\065\160\256\266\045\331\366\044\376\043\306\332  
\032\210\257\250\024\223\163\340\300\133\260\061\151\032\366\051  
\137\126\267\032\012\302\371\013\352\002\301\063\021\142\152\174  
\103\350\352\032\253\220\000\205\340\105\017\175\216\272\120\325  
\306



```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "ANCERT Corporaciones de Derecho Publico"
Issuer: CN=ANCERT Corporaciones de Derecho Publico,O=Agencia Notarial de Certificacion S.L. Unipersonal -
CIF B83395988,C=ES
Serial Number:3f:b2:e5:f2:d1:7c:8b:18:64:56:62:a9:39:81:7f:a7
Subject: CN=ANCERT Corporaciones de Derecho Publico,O=Agencia Notarial de Certificacion S.L. Unipersonal
- CIF B83395988,C=ES
Not Valid
Before: Wed Feb 11 17:22:45 2004
Not Valid After: Sun Feb 11 17:22:45 2024
Fingerprint (MD5): 20:6b:d6:8b:4a:8f:48:ab:e4:88:09:0d:e5:65:1a:50
Fingerprint (SHA1): 0c:fd:83:db:ae:44:b9:a0:c8:f6:76:f3:b5:70:65:0b:94:b6:9d:bf
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Corporaciones de Derecho Publico"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\014\375\203\333\256\104\271\240\310\366\166\363\265\160\145\013
\224\266\235\277
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\040\153\326\213\112\217\110\253\344\210\011\015\345\145\032\120
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\214\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\060\060
\056\006\003\125\004\003\023\047\101\116\103\105\122\124\040\103
\157\162\160\157\162\141\143\151\157\156\145\163\040\144\145\040
\104\145\162\145\143\150\157\040\120\165\142\154\151\143\157
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\077\262\345\362\321\174\213\030\144\126\142\251\071\201
\177\247
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Certificate "GLOBALTRUST"  
# Issuer: 1.2.840.113549.1.9.1=info@globaltrust.info,CN=GLOBALTRUST,OU=GLOBALTRUST Certification  
Service,O=ARGE DATEN - Austrian Society for Data Protection,ST=Austria,L=Vienna,C=AT  
# Serial Number: 0 (0x0)  
# Subject: 1.2.840.113549.1.9.1=info@globaltrust.info,CN=GLOBALTRUST,OU=GLOBALTRUST Certification  
Service,O=ARGE DATEN - Austrian Society  
for Data Protection,ST=Austria,L=Vienna,C=AT  
# Not Valid Before: Mon Aug 07 14:12:35 2006  
# Not Valid After: Thu Sep 18 14:12:35 2036  
# Fingerprint (MD5): df:0d:bc:7c:c8:36:b7:76:99:a1:ab:f0:d2:0f:89:6a  
# Fingerprint (SHA1): 34:2c:d9:d3:06:2d:a4:8c:34:69:65:29:7f:08:1e:bc:2e:f6:8f:dc

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "GLOBALTRUST"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509  
CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\324\061\013\060\011\006\003\125\004\006\023\002\101\124  
\061\017\060\015\006\003\125\004\007\023\006\126\151\145\156\156  
\141\061\020\060\016\006\003\125\004\010\023\007\101\165\163\164  
\162\151\141\061\072\060\070\006\003\125\004\012\023\061\101\122  
\107\105\040\104\101\124\105\116\040\055\040\101\165\163\164\162  
\151\141\156\040\123\157\143\151\145\164\171\040\146\157\162\040  
\104\141\164\141\040\120\162\157\164\145\143\164\151\157\156\061  
\052\060\050\006\003\125\004\013\023\041\107\114\117\102\101\114  
\124\122\125\123\124\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\123\145\162\166\151\143\145\061\024\060\022\006  
\003\125\004\003\023\013\107\114\117\102\101\114\124\122\125\123  
\124\061\044\060\042\006\011\052\206\110\206\367\015\001\011\001  
\026\025\151\156\146\157\100\147\154\157\142\141\154\164\162\165  
\163\164\056\151\156\146\157

END

CKA\_ID  
UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL  
\060\201\324\061\013\060\011\006\003\125\004\006\023\002\101\124  
\061\017\060\015\006\003\125\004\007\023\006\126\151\145\156\156  
\141\061\020\060\016\006\003\125\004\010\023\007\101\165\163\164  
\162\151\141\061\072\060\070\006\003\125\004\012\023\061\101\122  
\107\105\040\104\101\124\105\116\040\055\040\101\165\163\164\162  
\151\141\156\040\123\157\143\151\145\164\171\040\146\157\162\040  
\104\141\164\141\040\120\162\157\164\145\143\164\151\157\156\061  
\052\060\050\006\003\125\004\013\023\041\107\114\117\102\101\114

\124\122\125\123\124\040\103\145\162\164\151\146\151\143\141\164  
\151\157\156\040\123\145\162\166\151\143\145\061\024\060\022\006  
\003\125\004\003\023\013\107\114\117\102\101\114\124\122\125\123  
\124\061\044\060\042\006\011\052\206\110\206\367\015\001\011\001  
\026\025\151\156\146\157\100\147\154\157\142\141\154\164\162\165  
\163\164\056\151\156\146\157

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\007\376\060\202\005\346\240\003\002\001\002\002\001\000  
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\201\324\061\013\060\011\006\003\125\004\006\023\002\101\124\061  
\017\060\015\006\003\125\004\007\023\006\126\151\145\156\156\141  
\061\020\060\016\006\003\125\004\010\023\007\101\165\163\164\162  
\151\141\061\072\060\070\006\003\125\004\012\023\061\101\122\107  
\105\040\104\101\124\105\116\040\055\040\101\165\163\164\162\151  
\141\156\040\123\157\143\151\145\164\171\040\146\157\162\040\104  
\141\164\141\040\120\162\157\164\145\143\164\151\157\156\061\052  
\060\050\006\003\125\004\013\023\041\107\114\117\102\101\114\124  
\122\125\123\124\040\103\145\162\164\151\146\151\143\141\164\151  
\157\156\040\123\145\162\166\151\143\145\061\024\060\022\006\003  
\125\004\003\023\013\107\114\117\102\101\114\124\122\125\123\124  
\061\044\060\042\006\011\052\206\110\206\367\015\001\011\001\026  
\025\151\156\146\157\100\147\154\157\142\141\154\164\162\165\163  
\164\056\151\156\146\157\060\036\027\015\060\066\060\070\060\067  
\061\064\061\062\063\065\132\027\015\063\066\060\071\061\070\061  
\064\061\062\063\065\132\060\201\324\061\013\060\011\006\003\125  
\004\006\023\002\101\124\061\017\060\015\006\003\125\004\007\023  
\006\126\151\145\156\156\141\061\020\060\016\006\003\125\004\010  
\023\007\101\165\163\164\162\151\141\061\072\060\070\006\003\125  
\004\012\023\061\101\122\107\105\040\104\101\124\105\116\040\055  
\040\101\165\163\164\162\151\141\156\040\123\157\143\151\145\164  
\171\040\146\157\162\040\104\141\164\141\040\120\162\157\164\145  
\143\164\151\157\156\061\052\060\050\006\003\125\004\013\023\041  
\107\114\117\102\101\114\124\122\125\123\124\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143  
\145\061\024\060\022\006\003\125\004\003\023\013\107\114\117\102  
\101\114\124\122\125\123\124\061\044\060\042\006\011\052\206\110  
\206\367\015\001\011\001\026\025\151\156\146\157\100\147\154\157  
\142\141\154\164\162\165\163\164\056\151\156\146\157\060\202\002  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\322\022  
\107\354\137\230\350\015\206\025\111\304\335\354\236\361\154\315  
\121\266\373\225\117\213\304\220\075\123\063\261\323\023\305\110  
\342\245\277\365\364\003\204\017\234\170\161\366\222\227\361\133

\131\165\030\077\047\013\121\057\134\150\307\241\353\000\363\366  
\225\075\151\303\176\302\254\304\012\066\162\172\133\246\320\367  
\001\173\050\307\052\307\062\140\356\131\270\327\013\047\335\263  
\105\005\053\173\144\247\163\134\350\223\002\227\150\354\374\204  
\333\236\324\325\201\107\306\234\300\254\227\313\031\352\207\245  
\012\243\270\165\044\347\120\047\015\253\026\371\126\135\261\201  
\001\026\175\363\351\341\044\363\010\041\271\272\254\135\236\307  
\110\171\177\152\312\337\071\167\004\155\033\156\072\315\177\316  
\134\110\254\022\074\131\362\152\317\200\110\341\366\000\147\170  
\040\340\375\265\144\173\027\227\263\345\047\335\105\153\233\141  
\231\006\276\362\347\236\244\155\213\073\153\014\201\356\264\157  
\241\276\032\022\101\113\236\255\016\371\106\264\132\321\003\000  
\224\026\300\300\363\254\373\174\274\226\300\051\330\371\063\026  
\211\243\016\035\225\331\003\324\041\014\335\126\010\111\145\310  
\215\253\041\037\124\273\231\274\361\104\133\173\000\030\375\052  
\031\130\322\005\311\331\051\066\045\376\167\356\153\131\124\117  
\010\024\242\231\011\105\127\255\007\336\042\374\207\034\240\357  
\240\171\335\012\175\300\177\065\350\014\146\115\343\265\152\026  
\131\161\133\363\220\260\122\136\221\002\307\250\271\302\004\157  
\236\117\264\000\055\354\010\354\256\100\156\360\051\047\042\071  
\266\315\240\206\020\272\013\065\354\173\132\015\266\171\303\372  
\307\255\301\373\353\355\053\204\015\352\336\371\353\232\131\063  
\154\301\053\022\214\270\076\305\066\043\070\032\326\167\223\220  
\326\167\165\152\130\031\027\241\025\216\156\166\016\243\163\341  
\134\225\111\333\301\017\224\024\305\325\142\033\231\253\070\325  
\147\156\322\251\031\341\132\072\207\152\110\077\221\226\343\306  
\305\047\153\127\164\061\230\366\076\161\161\355\176\336\260\115  
\054\363\356\217\333\173\150\327\020\104\051\255\354\253\120\131  
\122\232\154\152\162\024\115\026\024\121\367\327\176\037\002\003  
\001\000\001\243\202\001\327\060\202\001\323\060\035\006\003\125  
\035\016\004\026\004\024\300\001\325\340\170\037\057\164\072\343  
\353\300\041\122\246\004\356\046\313\244\060\202\001\001\006\003  
\125\035\043\004\201\371\060\201\366\200\024\300\001\325\340\170  
\037\057\164\072\343\353\300\041\122\246\004\356\046\313\244\241  
\201\332\244\201\327\060\201\324\061\013\060\011\006\003\125\004  
\006\023\002\101\124\061\017\060\015\006\003\125\004\007\023\006  
\126\151\145\156\156\141\061\020\060\016\006\003\125\004\010\023  
\007\101\165\163\164\162\151\141\061\072\060\070\006\003\125\004  
\012\023\061\101\122\107\105\040\104\101\124\105\116\040\055\040  
\101\165\163\164\162\151\141\156\040\123\157\143\151\145\164\171  
\040\146\157\162\040\104\141\164\141\040\120\162\157\164\145\143  
\164\151\157\156\061\052\060\050\006\003\125\004\013\023\041\107  
\114\117\102\101\114\124\122\125\123\124\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145  
\061\024\060\022\006\003\125\004\003\023\013\107\114\117\102\101  
\114\124\122\125\123\124\061\044\060\042\006\011\052\206\110\206  
\367\015\001\011\001\026\025\151\156\146\157\100\147\154\157\142  
\141\154\164\162\165\163\164\056\151\156\146\157\202\001\000\060

\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\013\006\003\125\035\017\004\004\003\002\001\306\060\021\006  
\003\125\035\040\004\012\060\010\060\006\006\004\125\035\040\000  
\060\075\006\003\125\035\021\004\066\060\064\201\025\151\156\146  
\157\100\147\154\157\142\141\154\164\162\165\163\164\056\151\156  
\146\157\206\033\150\164\164\160\072\057\057\167\167\167\056\147  
\154\157\142\141\154\164\162\165\163\164\056\151\156\146\157\060  
\075\006\003\125\035\022\004\066\060\064\201\025\151\156\146\157  
\100\147\154\157\142\141\154\164\162\165\163\164\056\151\156\146  
\157\206\033\150\164\164\160\072\057\057\167\167\167\056\147\154  
\157\142\141\154\164\162\165\163\164\056\151\156\146\157\060\015  
\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202\002  
\001\000\025\073\210\203\136\016\336\076\360\076\135\334\055\241  
\112\372\050\245\326\007\245\044\110\316\236\171\350\171\232\134  
\044\216\130\162\024\101\205\307\105\356\074\050\151\070\111\256  
\042\215\273\214\005\155\256\145\273\207\271\176\166\073\050\143  
\152\326\157\063\060\210\176\125\005\272\271\025\003\230\035\142  
\322\316\300\017\156\034\232\064\356\344\257\037\142\321\354\264  
\171\317\317\151\222\212\130\375\301\307\166\013\134\315\122\064  
\110\153\345\013\177\311\062\022\337\230\012\026\331\063\126\026  
\217\337\103\077\327\275\077\305\036\305\255\041\254\207\054\232  
\344\034\037\205\003\254\213\307\267\063\142\111\301\370\252\053  
\116\135\207\076\166\122\256\131\176\061\341\174\272\122\213\130  
\220\327\200\106\013\064\066\336\357\021\311\134\042\106\302\074  
\247\177\142\004\157\337\076\110\216\352\013\076\010\254\030\032  
\122\326\361\366\324\142\057\003\271\232\326\074\123\177\125\046  
\306\065\053\041\164\260\211\220\124\344\001\210\134\234\205\052  
\232\145\136\113\127\362\200\034\354\147\064\232\106\334\002\166  
\376\162\067\162\011\261\360\043\217\130\263\002\175\356\170\016  
\271\075\163\022\055\125\237\027\143\257\256\330\256\163\266\307  
\120\152\205\301\333\175\373\224\131\160\306\303\007\154\126\305  
\260\007\374\116\175\223\035\271\047\300\260\225\325\347\174\005  
\274\367\017\012\263\364\156\025\127\111\033\265\024\000\244\060  
\053\132\364\126\130\277\166\064\242\075\376\001\046\360\335\270  
\155\360\244\347\274\040\366\121\010\366\343\067\211\127\066\366  
\367\057\376\315\270\144\275\352\327\246\320\377\170\357\176\341  
\034\036\124\176\017\064\031\201\020\163\322\343\170\006\027\266  
\322\121\373\065\170\166\332\167\203\067\101\076\055\106\250\176  
\206\336\126\364\312\220\236\264\255\260\036\105\030\074\064\210  
\002\207\350\360\066\221\353\362\347\265\322\004\271\056\270\135  
\215\035\232\056\013\026\031\315\166\244\253\373\321\342\243\242  
\334\204\175\173\352\120\352\365\262\004\073\211\122\072\262\303  
\031\117\271\046\261\274\274\054\262\341\201\246\263\141\265\364  
\105\140\057\054\165\305\310\055\210\113\046\273\160\356\073\177  
\001\055

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

```

CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "GLOBALTRUST"
Issuer: 1.2.840.113549.1.9.1=info@globaltrust.info,CN=GLOBALTRUST,OU=GLOBALTRUST
Certification Service,O=ARGE DATEN - Austrian Society for Data Protection,ST=Austria,L=Vienna,C=AT
Serial Number: 0 (0x0)
Subject: 1.2.840.113549.1.9.1=info@globaltrust.info,CN=GLOBALTRUST,OU=GLOBALTRUST Certification
Service,O=ARGE DATEN - Austrian Society for Data Protection,ST=Austria,L=Vienna,C=AT
Not Valid Before: Mon Aug 07 14:12:35 2006
Not Valid After: Thu Sep 18 14:12:35 2036
Fingerprint (MD5): df:0d:bc:7c:c8:36:b7:76:99:a1:ab:f0:d2:0f:89:6a
Fingerprint (SHA1): 34:2c:d9:d3:06:2d:a4:8c:34:69:65:29:7f:08:1e:bc:2e:f6:8f:dc
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\064\054\331\323\006\055\244\214\064\151\145\051\177\010\036\274
\056\366\217\334
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\337\015\274\174\310\066\267\166\231\241\253\360\322\017\211\152
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\324\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\017\060\015\006\003\125\004\007\023\006\126\151\145\156\156
\141\061\020\060\016\006\003\125\004\010\023\007\101\165\163\164
\162\151\141\061\072\060\070\006\003\125\004\012\023\061\101\122
\107\105\040\104\101\124\105\116\040\055\040\101\165\163\164\162
\151\141\156\040\123\157\143\151\145\164\171\040\146\157\162\040
\104\141\164\141\040\120\162\157\164\145\143\164\151\157\156\061
\052\060\050\006\003\125\004\013\023\041\107\114\117\102\101\114
\124\122\125\123\124\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\123\145\162\166\151\143\145\061\024\060\022\006
\003\125\004\003\023\013\107\114\117\102\101\114\124\122\125\123
\124\061\044\060\042\006\011\052\206\110\206\367\015\001\011\001
\026\025\151\156\146\157\100\147\154\157\142\141\154\164\162\165
\163\164\056\151\156\146\157
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```

```
CKA_TRUST_EMAIL_PROTECTION CK_TRUST
CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "Certipost E-Trust TOP Root CA"
Issuer: CN=Certipost E-Trust TOP Root CA,O=Certipost s.a./n.v.,C=BE
Serial Number:04:00:00:00:00:01:05:52:64:c1:95
Subject: CN=Certipost E-Trust TOP Root CA,O=Certipost s.a./n.v.,C=BE
Not Valid Before: Tue Jul 26 10:00:00 2005
Not Valid After: Sat Jul 26 10:00:00 2025
Fingerprint (MD5): b8:d3:12:03:4e:8c:0c:5a:47:c9:b6:c5:9e:5b:97:fd
Fingerprint (SHA1): 05:60:a2:c7:38:ff:98:d1:17:2a:94:fe:45:fb:8a:47:d6:65:37:1e
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certipost E-Trust TOP Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\046\060
\044\006\003\125\004\003\023\035\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\124\117\120\040\122\157
\157\164\040\103\101
```

```
END
```

```
CKA_ID
UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\046\060
\044\006\003\125\004\003\023\035\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\124\117\120\040\122\157
\157\164\040\103\101
```

```
END
```

```
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\005\122\144\301\225
```

```
END
```

```
CKA_VALUE MULTILINE_OCTAL
\060\202\003\314\060\202\002\264\240\003\002\001\002\002\013\004
\000\000\000\000\001\005\122\144\301\225\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\123\061\013\060\011\006
\003\125\004\006\023\002\102\105\061\034\060\032\006\003\125\004
\012\023\023\103\145\162\164\151\160\157\163\164\040\163\056\141
\056\057\156\056\166\056\061\046\060\044\006\003\125\004\003\023
```

\035\103\145\162\164\151\160\157\163\164\040\105\055\124\162\165  
\163\164\040\124\117\120\040\122\157\157\164\040\103\101\060\036  
\027\015\060\065\060\067\062\066\061\060\060\060\060\060\132\027  
\015\062\065\060\067\062\066\061\060\060\060\060\060\132\060\123  
\061\013\060\011\006\003\125\004\006\023\002\102\105\061\034\060  
\032\006\003\125\004\012\023\023\103\145\162\164\151\160\157\163  
\164\040\163\056\141\056\057\156\056\166\056\061\046\060\044\006  
\003\125\004\003\023\035\103\145\162\164\151\160\157\163\164\040  
\105\055\124\162\165\163\164\040\124\117\120\040\122\157\157\164  
\040\103\101\060\202\001\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002  
\202\001\001\000\245\324\113\100\326\373\361\065\030\073\242\260  
\103\344\311\125\241\300\007\273\010\276\072\031\265\043\303\036  
\235\263\010\112\364\103\113\351\301\031\140\220\337\204\327\130  
\306\072\335\012\054\225\054\275\227\177\376\242\165\332\006\343  
\253\233\154\321\270\317\104\206\301\122\140\267\334\076\073\260  
\362\351\304\121\074\112\271\203\271\116\141\152\003\233\034\122  
\200\072\120\264\040\262\333\323\262\306\124\177\313\140\233\310  
\044\236\257\011\307\145\015\050\366\332\232\042\302\063\156\362  
\363\045\324\244\371\226\365\157\252\074\153\334\101\060\345\346  
\157\312\110\037\060\170\035\171\175\247\321\277\256\305\136\103  
\371\306\057\203\166\233\064\112\244\050\130\053\250\210\205\104  
\152\053\362\126\102\166\231\220\063\252\356\371\041\317\362\075  
\371\167\204\313\335\051\204\304\324\212\052\244\071\134\076\371  
\034\045\150\115\365\347\233\135\261\032\064\136\312\002\163\371  
\010\304\014\155\136\335\022\052\345\173\305\066\170\122\235\062  
\301\305\050\245\040\250\345\230\015\271\157\317\271\200\236\345  
\276\271\233\375\002\003\001\000\001\243\201\240\060\201\235\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\035\006\003\125\035\016\004\026\004\024\113\336\276\005\061  
\056\363\065\310\330\312\247\126\305\224\015\264\132\145\305\060  
\110\006\003\125\035\040\004\101\060\077\060\075\006\011\003\220  
\016\007\001\000\001\002\000\060\060\060\056\006\010\053\006\001  
\005\005\007\002\001\026\042\150\164\164\160\072\057\057\167\167  
\167\056\145\055\164\162\165\163\164\056\142\145\057\103\120\123  
\057\121\116\143\145\162\164\163\040\060\021\006\011\140\206\110  
\001\206\370\102\001\001\004\004\003\002\000\007\060\015\006\011  
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000  
\211\143\314\242\316\370\124\152\174\131\064\170\253\001\264\226  
\055\052\041\156\100\055\137\320\226\042\231\203\005\034\345\044  
\315\342\365\065\004\277\000\226\007\354\262\244\072\152\053\043  
\076\311\017\312\023\035\270\044\226\011\046\330\074\052\201\316  
\341\201\310\311\163\076\365\273\017\010\036\220\340\260\222\271  
\322\072\227\120\340\006\216\344\202\060\074\140\040\267\244\356  
\253\211\006\341\374\045\273\221\324\371\267\137\150\143\250\240  
\150\206\153\247\354\222\313\042\372\120\133\023\130\047\256\053  
\103\013\266\027\306\060\162\004\063\104\046\112\104\007\037\163



```
\240\203\101\051\340\222\006\274\325\001\352\376\274\257\161\353
\040\037\012\135\015\240\051\136\316\344\101\121\125\226\303\037
\264\061\245\243\363\123\352\377\302\234\206\162\317\066\114\126
\132\006\062\176\136\253\112\241\316\247\353\237\244\214\052\271
\044\213\270\265\363\006\115\246\312\175\231\373\366\125\352\256
\110\171\356\046\131\323\037\014\123\025\367\142\121\371\204\015
\226\154\136\261\010\346\131\010\053\046\051\012\301\203\100\163
END
```

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Certipost E-Trust TOP Root CA"

# Issuer: CN=Certipost E-Trust TOP

Root CA,O=Certipost s.a./n.v.,C=BE

# Serial Number:04:00:00:00:00:01:05:52:64:c1:95

# Subject: CN=Certipost E-Trust TOP Root CA,O=Certipost s.a./n.v.,C=BE

# Not Valid Before: Tue Jul 26 10:00:00 2005

# Not Valid After: Sat Jul 26 10:00:00 2025

# Fingerprint (MD5): b8:d3:12:03:4e:8c:0c:5a:47:c9:b6:c5:9e:5b:97:fd

# Fingerprint (SHA1): 05:60:a2:c7:38:ff:98:d1:17:2a:94:fe:45:fb:8a:47:d6:65:37:1e

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certipost E-Trust TOP Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\005\140\242\307\070\377\230\321\027\052\224\376\105\373\212\107
\326\145\067\036
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\270\323\022\003\116\214\014\132\107\311\266\305\236\133\227\375
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\046\060
\044\006\003\125\004\003\023\035\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\124\117\120\040\122\157
\157\164\040\103\101
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\013\004\000\000\000\000\001\005\122\144\301\225
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

```
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "Certipost E-Trust Primary Qualified CA"
Issuer: CN=Certipost E-Trust Primary Qualified CA,O=Certipost s.a./n.v.,C=BE
Serial Number:04:00:00:00:00:01:05:52:64:c4:25
Subject: CN=Certipost E-Trust Primary Qualified CA,O=Certipost s.a./n.v.,C=BE
Not Valid Before: Tue Jul 26 10:00:00 2005
Not Valid After: Sun Jul 26 10:00:00 2020
Fingerprint (MD5): 10:0e:ad:f3:5c:84:1d:8e:03:5f:2d:c9:39:37:f5:52
Fingerprint (SHA1): 74:2c:df:15:94:04:9c:bf:17:a2:04:6c:c6:39:bb:38:88:e0:2e:33
```

```
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certipost E-Trust Primary Qualified CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\057\060
\055\006\003\125\004\003\023\046\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\121\165\141\154\151\146\151\145\144\040\103\101
END
```

```
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\057\060
\055\006\003\125\004\003\023\046\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\121\165\141\154\151\146\151\145\144\040\103\101
END
```

```
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\005\122\144\304\045
END
```

```
CKA_VALUE MULTILINE_OCTAL
\060\202\003\336\060\202\002\306\240\003\002\001\002\002\013\004
\000\000\000\000\001\005\122\144\304\045\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\134\061\013\060\011\006
\003\125\004\006\023\002\102\105\061\034\060\032\006\003\125\004
\012\023\023\103\145\162\164\151\160\157\163\164\040\163\056\141
\056\057\156\056\166\056\061\057\060\055\006\003\125\004\003\023
```

\046\103\145\162\164\151\160\157\163\164\040\105\055\124\162\165  
\163\164\040\120\162\151\155\141\162\171\040\121\165\141\154\151  
\146\151\145\144\040\103\101\060\036\027\015\060\065\060\067\062  
\066\061\060\060\060\060\060\132\027\015\062\060\060\067\062\066  
\061\060\060\060\060\060\132\060\134\061\013\060\011\006\003\125  
\004\006\023\002\102\105\061\034\060\032\006\003\125\004\012\023  
\023\103\145\162\164\151\160\157\163\164\040\163\056\141\056\057  
\156\056\166\056\061\057\060\055\006\003\125\004\003\023\046\103  
\145\162\164\151\160\157\163\164\040\105\055\124\162\165\163\164  
\040\120\162\151\155\141\162\171\040\121\165\141\154\151\146\151  
\145\144\040\103\101\060\202\001\042\060\015\006\011\052\206\110  
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001  
\012\002\202\001\001\000\256\040\322\170\333\232\240\162\234\004  
\122\045\054\155\122\330\327\047\211\063\240\341\262\325\373\060  
\165\153\055\177\034\147\216\016\347\037\022\337\027\171\030\273  
\264\033\157\370\075\165\033\236\147\067\360\361\372\017\165\355  
\206\235\003\004\241\050\160\055\074\262\153\240\163\121\343\065  
\251\164\245\010\076\224\205\047\066\052\252\162\144\374\167\356  
\166\224\034\162\353\277\062\307\167\003\152\045\202\011\005\257  
\137\140\074\177\254\033\274\222\350\074\164\131\316\361\174\124  
\055\070\256\226\360\254\157\241\063\014\041\132\001\272\043\040  
\133\240\206\002\325\123\334\111\037\250\062\263\257\073\106\073  
\266\357\237\071\263\070\013\347\172\212\366\050\371\247\157\120  
\051\310\171\130\213\111\322\245\330\205\176\126\361\151\025\170  
\104\021\065\327\245\124\076\253\146\045\322\333\343\030\361\056  
\053\342\161\043\011\067\144\103\102\164\062\226\167\336\227\242  
\351\226\206\234\045\104\011\324\001\235\121\176\063\267\011\104  
\345\200\227\015\144\133\167\030\227\245\113\251\236\020\235\207  
\372\126\247\317\012\175\002\003\001\000\001\243\201\240\060\201  
\235\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\035\006\003\125\035\016\004\026\004\024\360\170\371  
\007\167\020\273\334\036\241\256\171\373\060\020\333\306\064\370  
\027\060\110\006\003\125\035\040\004\101\060\077\060\075\006\011  
\003\220\016\007\001\000\001\002\000\060\060\060\056\006\010\053  
\006\001\005\005\007\002\001\026\042\150\164\164\160\072\057\057  
\167\167\167\056\145\055\164\162\165\163\164\056\142\145\057\103  
\120\123\057\121\116\143\145\162\164\163\040\060\021\006\011\140  
\206\110\001\206\370\102\001\001\004\004\003\002\000\007\060\015  
\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001  
\001\000\154\341\330\137\164\130\351\160\111\326\312\015\054\130  
\332\312\144\266\121\117\303\006\144\001\351\212\163\035\236\317  
\106\170\277\073\205\206\342\075\112\030\224\052\201\167\157\202  
\370\157\364\356\042\374\235\030\041\162\140\273\030\200\202\225  
\373\371\367\225\044\201\146\301\265\303\265\322\266\166\213\073  
\201\134\270\241\016\053\001\024\213\200\011\100\356\370\140\114  
\031\344\027\315\047\001\263\143\022\005\244\010\311\264\277\236  
\120\116\265\336\017\222\063\146\165\320\075\347\043\174\352\045

```
\161\174\376\076\056\066\171\241\345\051\120\043\065\005\225\170
\273\237\171\144\334\127\110\047\054\342\134\063\315\302\273\176
\150\167\247\057\243\111\027\162\341\000\204\153\175\172\257\071
\013\054\325\330\127\144\062\154\204\012\152\166\072\323\254\315
\235\261\347\067\334\354\014\057\305\127\140\337\210\365\103\261
\001\144\046\264\047\202\020\262\243\120\357\227\346\177\277\221
\207\263\333\220\251\052\342\172\064\154\163\111\364\350\215\056
\153\212\335\241\212\177\143\320\277\130\036\257\314\077\222\120
\055\321
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Certipost E-Trust Primary Qualified CA"

# Issuer: CN=Certipost E-Trust Primary Qualified CA,O=Certipost s.a./n.v.,C=BE

# Serial Number:04:00:00:00:01:05:52:64:c4:25

# Subject: CN=Certipost E-Trust Primary Qualified CA,O=Certipost s.a./n.v.,C=BE

# Not Valid Before: Tue Jul 26 10:00:00 2005

# Not Valid After: Sun Jul 26 10:00:00 2020

# Fingerprint (MD5): 10:0e:ad:f3:5c:84:1d:8e:03:5f:2d:c9:39:37:f5:52

# Fingerprint (SHA1): 74:2c:df:15:94:04:9c:bf:17:a2:04:6c:c6:39:bb:38:88:e0:2e:33

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certipost E-Trust Primary Qualified CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\164\054\337\025\224\004\234\277\027\242\004\154\306\071\273\070
\210\340\056\063
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\020\016\255\363\134\204\035\216\003\137\055\311\071\067\365\122
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\134\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\057\060
\055\006\003\125\004\003\023\046\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\121\165\141\154\151\146\151\145\144\040\103\101
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\013\004\000\000\000\000\001\005\122\144\304\045
```

END

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "Certipost E-Trust Primary Normalised CA"
Issuer: CN=Certipost E-Trust Primary Normalised CA,O=Certipost s.a./n.v.,C=BE
Serial Number:04:00:00:00:00:01:05:52:64:c7:61
Subject: CN=Certipost E-Trust Primary Normalised CA,O=Certipost s.a./n.v.,C=BE
Not Valid Before: Tue Jul 26 10:00:00 2005
Not Valid After: Sun Jul 26 10:00:00 2020
Fingerprint (MD5): 21:ef:b8:50:40:39:3f:75:6f:27:fe:e3:ea:58:70:eb
Fingerprint (SHA1): a5:9c:9b:10:ec:73:57:51:5a:bb:66:0c:4d:94:f7:3b:9e:6e:92:72
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certipost E-Trust Primary Normalised CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\135\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\060\060
\056\006\003\125\004\003\023\047\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\116\157\162\155\141\154\151\163\145\144\040\103\101
```

```
END
```

```
CKA_ID
UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\060\060
\056\006\003\125\004\003\023\047\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\116\157\162\155\141\154\151\163\145\144\040\103\101
```

```
END
```

```
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\005\122\144\307\141
```

```
END
```

```
CKA_VALUE MULTILINE_OCTAL
\060\202\003\340\060\202\002\310\240\003\002\001\002\002\013\004
\000\000\000\000\001\005\122\144\307\141\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\135\061\013\060\011\006
\003\125\004\006\023\002\102\105\061\034\060\032\006\003\125\004
\012\023\023\103\145\162\164\151\160\157\163\164\040\163\056\141
```

\056\057\156\056\166\056\061\060\060\056\006\003\125\004\003\023  
\047\103\145\162\164\151\160\157\163\164\040\105\055\124\162\165  
\163\164\040\120\162\151\155\141\162\171\040\116\157\162\155\141  
\154\151\163\145\144\040\103\101\060\036\027\015\060\065\060\067  
\062\066\061\060\060\060\060\060\132\027\015\062\060\060\067\062  
\066\061\060\060\060\060\060\132\060\135\061\013\060\011\006\003  
\125\004\006\023\002\102\105\061\034\060\032\006\003\125\004\012  
\023\023\103\145\162\164\151\160\157\163\164\040\163\056\141\056  
\057\156\056\166\056\061\060\060\056\006\003\125\004\003\023\047  
\103\145\162\164\151\160\157\163\164\040\105\055\124\162\165\163  
\164\040\120\162\151\155\141\162\171\040\116\157\162\155\141\154  
\151\163\145\144\040\103\101\060\202\001\042\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060  
\202\001\012\002\202\001\001\000\325\263\252\122\204\172\027\223  
\042\017\270\004\030\312\311\362\202\052\254\025\013\247\120\161  
\266\114\045\153\367\377\001\252\127\132\167\116\136\023\024\015  
\125\362\036\361\205\315\205\327\202\034\014\332\011\053\275\375  
\274\236\376\155\211\115\242\002\044\346\121\352\067\177\061\106  
\132\173\232\166\263\056\240\135\137\344\370\231\012\007\276\356  
\222\046\022\311\173\347\135\154\320\203\107\016\300\214\247\321  
\171\127\300\013\031\234\233\236\103\305\116\221\045\316\210\053  
\155\171\331\171\212\326\146\116\042\303\032\105\116\357\310\260  
\142\046\116\046\124\120\237\014\157\263\153\314\174\237\177\336  
\017\015\265\217\303\153\324\341\302\373\273\126\120\252\214\075  
\217\000\213\074\374\110\027\152\322\132\363\165\155\145\201\275  
\106\135\237\242\142\123\256\316\363\251\344\221\053\132\046\303  
\171\146\321\246\123\146\065\034\006\161\261\356\231\016\304\373  
\130\022\254\042\106\055\342\042\222\333\341\074\277\273\376\206  
\347\223\064\163\317\170\151\323\313\336\371\014\262\150\332\311  
\212\012\140\124\304\363\126\143\002\003\001\000\001\243\201\240  
\060\201\235\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\110\006\003\125\035\040\004\101\060\077\060  
\075\006\011\003\220\016\007\001\000\001\002\000\060\060\060\056  
\006\010\053\006\001\005\005\007\002\001\026\042\150\164\164\160  
\072\057\057\167\167\167\056\145\055\164\162\165\163\164\056\142  
\145\057\103\120\123\057\121\116\143\145\162\164\163\040\060\035  
\006\003\125\035\016\004\026\004\024\021\362\013\226\322\063\070  
\201\127\130\023\375\100\244\021\157\116\231\372\147\060\021\006  
\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\065\153\117\336\235\363\003\266\035\310\274\215  
\347\136\152\236\251\351\355\242\053\227\352\257\321\341\106\323  
\002\111\175\304\122\205\353\272\366\323\277\071\142\030\235\223  
\111\275\170\003\277\323\136\025\335\357\047\034\341\273\105\001  
\042\201\000\115\072\340\205\312\132\062\003\314\040\217\257\357  
\301\333\250\372\363\334\327\262\261\017\003\201\011\051\340\161  
\174\213\372\177\313\066\156\033\350\024\316\360\113\046\241\062

```
\051\117\314\264\365\207\110\014\023\374\307\235\257\253\324\223
\365\052\115\177\110\202\130\076\027\377\303\200\052\253\077\127
\125\270\071\054\146\020\144\046\155\214\153\326\335\240\203\032
\132\126\021\226\106\275\256\160\050\326\070\127\133\221\325\077
\115\351\254\263\303\044\112\226\145\134\064\320\036\324\277\010
\245\227\135\367\106\333\166\360\315\076\165\143\000\053\257\255
\256\206\336\137\246\231\124\015\205\043\245\374\272\355\033\122
\372\111\030\167\205\133\252\162\233\047\010\065\105\067\047\333
\227\311\372\213\075\310\320\235\336\132\357\135\243\026\266\230
\171\312\174\313
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Certipost E-Trust Primary Normalised CA"

# Issuer: CN=Certipost E-Trust Primary Normalised CA,O=Certipost s.a./n.v.,C=BE

# Serial Number:04:00:00:00:00:01:05:52:64:c7:61

# Subject: CN=Certipost E-Trust Primary Normalised CA,O=Certipost s.a./n.v.,C=BE

# Not Valid Before: Tue Jul 26 10:00:00 2005

# Not Valid After: Sun Jul 26 10:00:00 2020

# Fingerprint (MD5): 21:ef:b8:50:40:39:3f:75:6f:27:fe:e3:ea:58:70:eb

# Fingerprint (SHA1): a5:9c:9b:10:ec:73:57:51:5a:bb:66:0c:4d:94:f7:3b:9e:6e:92:72

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Certipost E-Trust Primary Normalised CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\245\234\233\020\354\163\127\121\132\273\146\014\115\224\367\073
\236\156\222\162
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\041\357\270\120\100\071\077\165\157\047\376\343\352\130\160\353
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\135\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\060\060
\056\006\003\125\004\003\023\047\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\116\157\162\155\141\154\151\163\145\144\040\103\101
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\013\004\000\000\000\000\001\005\122\144\307\141
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "Cybertrust Global Root"
Issuer: CN=Cybertrust Global Root,O=Cybertrust\, Inc
Serial Number:04:00:00:00:00:01:0f:85:aa:2d:48
Subject: CN=Cybertrust Global Root,O=Cybertrust\, Inc
Not Valid Before: Fri Dec
 15 08:00:00 2006
Not Valid After: Wed Dec 15 08:00:00 2021
Fingerprint (MD5): 72:e4:4a:87:e3:69:40:80:77:ea:bc:e3:f4:ff:f0:e1
Fingerprint (SHA1): 5f:43:e5:b1:bf:f8:78:8c:ac:1c:c7:ca:4a:9a:c6:22:2b:cc:34:c6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Cybertrust Global Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\073\061\030\060\026\006\003\125\004\012\023\017\103\171\142
\145\162\164\162\165\163\164\054\040\111\156\143\061\037\060\035
\006\003\125\004\003\023\026\103\171\142\145\162\164\162\165\163
\164\040\107\154\157\142\141\154\040\122\157\157\164
```

END

```
CKA_ID UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\030\060\026\006\003\125\004\012\023\017\103\171\142
\145\162\164\162\165\163\164\054\040\111\156\143\061\037\060\035
\006\003\125\004\003\023\026\103\171\142\145\162\164\162\165\163
\164\040\107\154\157\142\141\154\040\122\157\157\164
```

END

```
CKA_SERIAL_NUMBER
```

```
MULTILINE_OCTAL
```

```
\002\013\004\000\000\000\000\001\017\205\252\055\110
```

END

```
CKA_VALUE MULTILINE_OCTAL
```

```
\060\202\003\241\060\202\002\211\240\003\002\001\002\002\013\004
\000\000\000\000\001\017\205\252\055\110\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\073\061\030\060\026\006
\003\125\004\012\023\017\103\171\142\145\162\164\162\165\163\164
\054\040\111\156\143\061\037\060\035\006\003\125\004\003\023\026
\103\171\142\145\162\164\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164\060\036\027\015\060\066\061\062\061\065
```



\060\070\060\060\060\060\132\027\015\062\061\061\062\061\065\060  
\070\060\060\060\060\132\060\073\061\030\060\026\006\003\125\004  
\012\023\017\103\171\142\145\162\164\162\165\163\164\054\040\111  
\156\143\061\037\060\035\006\003\125\004\003\023\026\103\171\142  
\145\162\164\162\165\163\164\040\107\154\157\142\141\154\040\122  
\157\157\164\060\202\001\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002  
\202\001\001\000\370\310\274\275\024\120\146\023\377\360\323\171  
\354\043\362\267\032\307\216\205\361\022\163\246\031\252\020\333  
\234\242\145\164\132\167\076\121\175\126\366\334\043\266\324\355  
\137\130\261\067\115\325\111\016\156\365\152\207\326\322\214\322  
\047\306\342\377\066\237\230\145\240\023\116\306\052\144\233\325  
\220\022\317\024\006\364\073\343\324\050\276\350\016\370\253\116  
\110\224\155\216\225\061\020\134\355\242\055\275\325\072\155\262  
\034\273\140\300\106\113\001\365\111\256\176\106\212\320\164\215  
\241\014\002\316\356\374\347\217\270\153\146\363\177\104\000\277  
\146\045\024\053\335\020\060\035\007\226\077\115\366\153\270\217  
\267\173\014\245\070\353\336\107\333\325\135\071\374\210\247\363  
\327\052\164\361\350\132\242\073\237\120\272\246\214\105\065\302  
\120\145\225\334\143\202\357\335\277\167\115\234\142\311\143\163  
\026\320\051\017\111\251\110\360\263\252\267\154\305\247\060\071  
\100\135\256\304\342\135\046\123\360\316\034\043\010\141\250\224  
\031\272\004\142\100\354\037\070\160\167\022\006\161\247\060\030  
\135\045\047\245\002\003\001\000\001\243\201\245\060\201\242\060  
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\035\006\003\125\035\016\004\026\004\024\266\010\173\015\172  
\314\254\040\114\206\126\062\136\317\253\156\205\055\160\127\060  
\077\006\003\125\035\037\004\070\060\066\060\064\240\062\240\060  
\206\056\150\164\164\160\072\057\057\167\167\167\062\056\160\165  
\142\154\151\143\055\164\162\165\163\164\056\143\157\155\057\143  
\162\154\057\143\164\057\143\164\162\157\157\164\056\143\162\154  
\060\037\006\003\125\035\043\004\030\060\026\200\024\266\010\173  
\015\172\314\254\040\114\206\126\062\136\317\253\156\205\055\160  
\127\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000  
\003\202\001\001\000\126\357\012\043\240\124\116\225\227\311\370  
\211\332\105\301\324\243\000\045\364\037\023\253\267\243\205\130  
\151\302\060\255\330\025\212\055\343\311\315\201\132\370\163\043  
\132\247\174\005\363\375\042\073\016\321\006\304\333\066\114\163  
\004\216\345\260\042\344\305\363\056\245\331\043\343\270\116\112  
\040\247\156\002\044\237\042\140\147\173\213\035\162\011\305\061  
\134\351\171\237\200\107\075\255\241\013\007\024\075\107\377\003  
\151\032\014\013\104\347\143\045\247\177\262\311\270\166\204\355  
\043\366\175\007\253\105\176\323\337\263\277\351\212\266\315\250  
\242\147\053\122\325\267\145\360\071\114\143\240\221\171\223\122  
\017\124\335\203\273\237\321\217\247\123\163\303\313\377\060\354  
\174\004\270\330\104\037\223\137\161\011\042\267\156\076\352\034  
\003\116\235\032\040\141\373\201\067\354\136\374\012\105\253\327

```
\347\027\125\320\240\352\140\233\246\366\343\214\133\051\302\006
\140\024\235\055\227\114\251\223\025\235\141\304\001\137\110\326
\130\275\126\061\022\116\021\310\041\340\263\021\221\145\333\264
\246\210\070\316\125
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL

CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Cybertrust Global Root"

# Issuer: CN=Cybertrust Global Root,O=Cybertrust\, Inc

# Serial Number:04:00:00:00:00:01:0f:85:aa:2d:48

# Subject: CN=Cybertrust Global Root,O=Cybertrust\, Inc

# Not Valid Before: Fri Dec 15 08:00:00 2006

# Not Valid After: Wed Dec 15 08:00:00 2021

# Fingerprint (MD5): 72:e4:4a:87:e3:69:40:80:77:ea:bc:e3:f4:ff:f0:e1

# Fingerprint (SHA1): 5f:43:e5:b1:bf:f8:78:8c:ac:1c:c7:ca:4a:9a:c6:22:2b:cc:34:c6

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Cybertrust Global Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\137\103\345\261\277\370\170\214\254\034\307\312\112\232\306\042
\053\314\064\306
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\162\344\112\207\343\151\100\200\167\352\274\343\364\377\360\341
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\073\061\030\060\026\006\003\125\004\012\023\017\103\171\142
\145\162\164\162\165\163\164\054\040\111\156\143\061\037\060\035
\006\003\125\004\003\023\026\103\171\142\145\162\164\162\165\163
\164\040\107\154\157\142\141\154\040\122\157\157\164
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\013\004\000\000\000\000\001\017\205\252\055\110
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

```

Certificate "GlobalSign"
Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R2
Serial Number:04:00:00:00:00:01:0f:86:26:e6:0d
Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R2
Not Valid Before: Fri Dec 15 08:00:00 2006
Not Valid After: Wed Dec 15 08:00:00 2021
Fingerprint (MD5): 94:14:77:7e:3e:5e:fd:8f:30:bd:41:b0:cf:e7:d0:30
Fingerprint (SHA1): 75:e0:ab:b6:13:85:12:27:1c:04:f8:5f:dd:de:38:e4:b7:24:2e:fe
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\062\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\062\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\017\206\046\346\015
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\003\272\060\202\002\242\240\003\002\001\002\002\013\004
\000\000\000\000\001\017\206\046\346\015\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\114\061\040\060\036\006
\003\125\004\013\023\027\107\154\157\142\141\154\123\151\147\156
\040\122\157\157\164\040\103\101\040\055\040\122\062\061\023\060
\021\006\003\125\004\012\023\012\107\154\157\142\141\154\123\151
\147\156\061\023\060\021\006\003\125\004\003\023\012\107\154\157
\142\141\154\123\151\147\156\060\036\027\015\060\066\061\062\061
\065\060\070\060\060\060\060\132\027\015\062\061\061\062\061\065
\060\070\060\060\060\060\132\060\114\061\040\060\036\006\003\125
\004\013\023\027\107\154\157\142\141\154\123\151\147\156\040\122
\157\157\164\040\103\101\040\055\040\122\062\061\023\060\021\006
\003\125\004\012\023\012\107\154\157\142\141\154\123\151\147\156

```

\061\023\060\021\006\003\125\004\003\023\012\107\154\157\142\141  
\154\123\151\147\156\060\202\001\042\060\015\006\011\052\206\110  
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001  
\012\002\202\001\001\000\246\317\044\016\276\056\157\050\231\105  
\102\304\253\076\041\124\233\013\323\177\204\160\372\022\263\313  
\277\207\137\306\177\206\323\262\060\134\326\375\255\361\173\334  
\345\370\140\226\011\222\020\365\320\123\336\373\173\176\163\210  
\254\122\210\173\112\246\312\111\246\136\250\247\214\132\021\274  
\172\202\353\276\214\351\263\254\226\045\007\227\112\231\052\007  
\057\264\036\167\277\212\017\265\002\174\033\226\270\305\271\072  
\054\274\326\022\271\353\131\175\342\320\006\206\137\136\111\152  
\265\071\136\210\064\354\274\170\014\010\230\204\154\250\315\113  
\264\240\175\014\171\115\360\270\055\313\041\312\325\154\133\175  
\341\240\051\204\241\371\323\224\111\313\044\142\221\040\274\335  
\013\325\331\314\371\352\047\012\053\163\221\306\235\033\254\310  
\313\350\340\240\364\057\220\213\115\373\260\066\033\366\031\172  
\205\340\155\362\141\023\210\134\237\340\223\012\121\227\212\132  
\316\257\253\325\367\252\011\252\140\275\334\331\137\337\162\251  
\140\023\136\000\001\311\112\372\077\244\352\007\003\041\002\216  
\202\312\003\302\233\217\002\003\001\000\001\243\201\234\060\201  
\231\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\035\006\003\125\035\016\004\026\004\024\233\342\007  
\127\147\034\036\300\152\006\336\131\264\232\055\337\334\031\206  
\056\060\066\006\003\125\035\037\004\057\060\055\060\053\240\051  
\240\047\206\045\150\164\164\160\072\057\057\143\162\154\056\147  
\154\157\142\141\154\163\151\147\156\056\156\145\164\057\162\157  
\157\164\055\162\062\056\143\162\154\060\037\006\003\125\035\043  
\004\030\060\026\200\024\233\342\007\127\147\034\036\300\152\006  
\336\131\264\232\055\337\334\031\206\056\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\231\201  
\123\207\034\150\227\206\221\354\340\112\270\104\013\253\201\254  
\047\117\326\301\270\034\103\170\263\014\232\374\352\054\074\156  
\141\033\115\113\051\365\237\005\035\046\301\270\351\203\000\142  
\105\266\251\010\223\271\251\063\113\030\232\302\370\207\210\116  
\333\335\161\064\032\301\124\332\106\077\340\323\052\253\155\124  
\042\365\072\142\315\040\157\272\051\211\327\335\221\356\323\134  
\242\076\241\133\101\365\337\345\144\103\055\351\325\071\253\322  
\242\337\267\213\320\300\200\031\034\105\300\055\214\350\370\055  
\244\164\126\111\305\005\265\117\025\336\156\104\170\071\207\250  
\176\273\363\171\030\221\273\364\157\235\301\360\214\065\214\135  
\001\373\303\155\271\357\104\155\171\106\061\176\012\376\251\202  
\301\377\357\253\156\040\304\120\311\137\235\115\233\027\214\014  
\345\001\311\240\101\152\163\123\372\245\120\264\156\045\017\373  
\114\030\364\375\122\331\216\151\261\350\021\017\336\210\330\373  
\035\111\367\252\336\225\317\040\170\302\140\022\333\045\100\214  
\152\374\176\102\070\100\144\022\367\236\201\341\223\056

END

CKA\_NSS\_Mozilla\_CA\_POLICY  
CK\_BBOOL CK\_FALSE  
CKA\_NSS\_SERVER\_DISTRICT\_AFTER  
CK\_BBOOL CK\_FALSE  
CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Trust for "GlobalSign"  
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R2  
# Serial Number:04:00:00:00:00:01:0f:86:26:e6:0d  
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R2  
# Not Valid Before: Fri Dec 15 08:00:00 2006  
# Not Valid After: Wed Dec 15 08:00:00 2021  
# Fingerprint (MD5): 94:14:77:7e:3e:5e:fd:8f:30:bd:41:b0:cf:e7:d0:30  
# Fingerprint (SHA1): 75:e0:ab:b6:13:85:12:27:1c:04:f8:5f:dd:de:38:e4:b7:24:2e:fe

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "GlobalSign"  
CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL  
\165\340\253\266\023\205\022\047\034\004\370\137\335\336\070\344  
\267\044\056\376

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL  
\224\024\167\176\076\136\375\217\060\275\101\260\317\347\320\060

END

CKA\_ISSUER MULTILINE\_OCTAL  
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157  
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040  
\055\040\122\062\061\023\060\021\006\003\125\004\012\023\012\107  
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125  
\004\003\023\012\107\154\157\142\141\154\123\151\147\156

END

CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\013\004\000\000\000\000\001\017\206\046\346\015

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Certificate "IGC/A"  
# Issuer:  
1.2.840.113549.1.9.1=igca@sgdn.pm.gouv.fr,CN=IGC/A,OU=DCSSI,O=PM/SGDN,L=Paris,ST=France,C=FR  
# Serial Number:39:11:45:10:94

# Subject:

1.2.840.113549.1.9.1=igca@sgdn.pm.gouv.fr,CN=IGC/A,OU=DCSSI,O=PM/SGDN,L=Paris,ST=France,C=FR

# Not Valid Before: Fri Dec 13 14:29:23 2002

# Not Valid After: Sat Oct 17 14:29:22

2020

# Fingerprint (MD5): 0c:7f:dd:6a:f4:2a:b9:c8:9b:bd:20:7e:a9:db:5c:37

# Fingerprint (SHA1): 60:d6:89:74:b5:c2:65:9e:8a:0f:c1:88:7c:88:d2:46:69:1b:18:2c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "IGC/A"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\205\061\013\060\011\006\003\125\004\006\023\002\106\122  
\061\017\060\015\006\003\125\004\010\023\006\106\162\141\156\143  
\145\061\016\060\014\006\003\125\004\007\023\005\120\141\162\151  
\163\061\020\060\016\006\003\125\004\012\023\007\120\115\057\123  
\107\104\116\061\016\060\014\006\003\125\004\013\023\005\104\103  
\123\123\111\061\016\060\014\006\003\125\004\003\023\005\111\107  
\103\057\101\061\043\060\041\006\011\052\206\110\206\367\015\001  
\011\001\026\024\151\147\143\141\100\163\147\144\156\056\160\155  
\056\147\157\165\166\056\146\162

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\205\061\013\060\011\006\003\125\004\006\023\002\106\122  
\061\017\060\015\006\003\125\004\010\023\006\106\162\141\156\143  
\145\061\016\060\014\006\003\125\004\007\023\005\120\141\162\151  
\163\061\020\060\016\006\003\125\004\012\023\007\120\115\057\123  
\107\104\116\061\016\060\014\006\003\125\004\013\023\005\104\103  
\123\123\111\061\016\060\014\006\003\125\004\003\023\005\111\107  
\103\057\101\061\043\060\041\006\011\052\206\110\206\367\015\001  
\011\001\026\024\151\147\143\141\100\163\147\144\156\056\160\155  
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\005\071\021\105\020\224

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\002\060\202\002\352\240\003\002\001\002\002\005\071  
\021\105\020\224\060\015\006\011\052\206\110\206\367\015\001\001  
\005\005\000\060\201\205\061\013\060\011\006\003\125\004\006\023  
\002\106\122\061\017\060\015\006\003\125\004\010\023\006\106\162  
\141\156\143\145\061\016\060\014\006\003\125\004\007\023\005\120  
\141\162\151\163\061\020\060\016\006\003\125\004\012\023\007\120  
\115\057\123\107\104\116\061\016\060\014\006\003\125\004\013\023

\005\104\103\123\123\111\061\016\060\014\006\003\125\004\003\023  
\005\111\107\103\057\101\061\043\060\041\006\011\052\206\110\206  
\367\015\001\011\001\026\024\151\147\143\141\100\163\147\144\156  
\056\160\155\056\147\157\165\166\056\146\162\060\036\027\015\060  
\062\061\062\061\063\061\064\062\071\062\063\132\027\015\062\060  
\061\060\061\067\061\064\062\071\062\062\132\060\201\205\061\013  
\060\011\006\003\125\004\006\023\002\106\122\061\017\060\015\006  
\003\125\004\010\023\006\106\162\141\156\143\145\061\016\060\014  
\006\003\125\004\007\023\005\120\141\162\151\163\061\020\060\016  
\006\003\125\004\012\023\007\120\115\057\123\107\104\116\061\016  
\060\014\006\003\125\004\013\023\005\104\103\123\123\111\061\016  
\060\014\006\003\125\004\003\023\005\111\107\103\057\101\061\043  
\060\041\006\011\052\206\110\206\367\015\001\011\001\026\024\151  
\147\143\141\100\163\147\144\156\056\160\155\056\147\157\165\166  
\056\146\162\060\202\001\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002  
\202\001\001\000\262\037\321\320\142\305\063\073\300\004\206\210  
\263\334\370\210\367\375\337\103\337\172\215\232\111\134\366\116  
\252\314\034\271\241\353\047\211\362\106\351\073\112\161\325\035  
\216\055\317\346\255\253\143\120\307\124\013\156\022\311\220\066  
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\265\062\210\160\312\160\300\226\112\216\344\125\315\035\047\224  
\277\316\162\052\354\134\371\163\040\376\275\367\056\211\147\270  
\273\107\163\022\367\321\065\151\072\362\012\271\256\377\106\102  
\106\242\277\241\205\032\371\277\344\377\111\205\367\243\160\206  
\062\034\135\237\140\367\251\255\245\377\317\321\064\371\175\133  
\027\306\334\326\016\050\153\302\335\361\365\063\150\235\116\374  
\207\174\066\022\326\243\200\350\103\015\125\141\224\352\144\067  
\107\352\167\312\320\262\130\005\303\135\176\261\250\106\220\061  
\126\316\160\052\226\262\060\270\167\346\171\300\275\051\073\375  
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\101\322\135\255\022\152\212\233\107\373\311\335\106\100\341\235  
\074\063\320\265\002\003\001\000\001\243\167\060\165\060\017\006  
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\006\003\125\035\017\004\004\003\002\001\106\060\025\006\003\125  
\035\040\004\016\060\014\060\012\006\010\052\201\172\001\171\001  
\001\001\060\035\006\003\125\035\016\004\026\004\024\243\005\057  
\030\140\120\302\211\012\335\053\041\117\377\216\116\250\060\061  
\066\060\037\006\003\125\035\043\004\030\060\026\200\024\243\005  
\057\030\140\120\302\211\012\335\053\041\117\377\216\116\250\060  
\061\066\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\003\202\001\001\000\005\334\046\330\372\167\025\104\150\374  
\057\146\072\164\340\135\344\051\377\006\007\023\204\112\253\317  
\155\240\037\121\224\370\111\313\164\066\024\274\025\335\333\211  
\057\335\217\240\135\174\365\022\353\237\236\070\244\107\314\263  
\226\331\276\234\045\253\003\176\063\017\225\201\015\375\026\340  
\210\276\067\360\154\135\320\061\233\062\053\135\027\145\223\230  
\140\274\156\217\261\250\074\036\331\034\363\251\046\102\371\144

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\035\302\347\222\366\364\036\132\252\031\122\135\257\350\242\367
\140\240\366\215\360\211\365\156\340\012\005\001\225\311\213\040
\012\272\132\374\232\054\074\275\303\267\311\135\170\045\005\077
\126\024\233\014\332\373\072\110\376\227\151\136\312\020\206\367
\116\226\004\010\115\354\260\276\135\334\073\216\117\301\375\232
\066\064\232\114\124\176\027\003\110\225\010\021\034\007\157\205
\010\176\135\115\304\235\333\373\256\316\262\321\263\270\203\154
\035\262\263\171\361\330\160\231\176\360\023\002\316\136\335\121
\323\337\066\201\241\033\170\057\161\263\361\131\114\106\030\050
\253\205\322\140\126\132
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing

Only Certificate

# Trust for "IGC/A"

# Issuer:

1.2.840.113549.1.9.1=igca@sgdn.pm.gouv.fr,CN=IGC/A,OU=DCSSI,O=PM/SGDN,L=Paris,ST=France,C=FR

# Serial Number:39:11:45:10:94

# Subject:

1.2.840.113549.1.9.1=igca@sgdn.pm.gouv.fr,CN=IGC/A,OU=DCSSI,O=PM/SGDN,L=Paris,ST=France,C=FR

# Not Valid Before: Fri Dec 13 14:29:23 2002

# Not Valid After: Sat Oct 17 14:29:22 2020

# Fingerprint (MD5): 0c:7f:dd:6a:f4:2a:b9:c8:9b:bd:20:7e:a9:db:5c:37

# Fingerprint (SHA1): 60:d6:89:74:b5:c2:65:9e:8a:0f:c1:88:7c:88:d2:46:69:1b:18:2c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "IGC/A"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\140\326\211\164\265\302\145\236\212\017\301\210\174\210\322\106
\151\033\030\054
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END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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\014\177\335\152\364\052\271\310\233\275\040\176\251\333\134\067
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END

CKA\_ISSUER MULTILINE\_OCTAL

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\060\201\205\061\013\060\011\006\003\125\004\006\023\002\106\122
\061\017\060\015\006\003\125\004\010\023\006\106\162\141\156\143
\145\061\016\060\014\006\003\125\004\007\023\005\120\141\162\151
\163\061\020\060\016\006\003\125\004\012\023\007\120\115\057\123
\107\104\116\061\016\060\014\006\003\125\004\013\023\005\104\103
\123\123\111\061\016\060\014\006\003\125\004\003\023\005\111\107
\103\057\101\061\043\060\041\006\011\052\206\110\206\367\015\001
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\011\001\026\024\151\147\143\141\100\163\147\144\156\056\160\155  
\056\147\157\165\166\056\146\162

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\005\071\021\105\020\224

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "SwissSign Platinum CA - G2"

# Issuer: CN=SwissSign Platinum CA - G2,O=SwissSign AG,C=CH

# Serial Number:4e:b2:00:67:0c:03:5d:4f

# Subject: CN=SwissSign Platinum CA - G2,O=SwissSign

AG,C=CH

# Not Valid Before: Wed Oct 25 08:36:00 2006

# Not Valid After: Sat Oct 25 08:36:00 2036

# Fingerprint (MD5): c9:98:27:77:28:1e:3d:0e:15:3c:84:00:b8:85:03:e6

# Fingerprint (SHA1): 56:e0:fa:c0:3b:8f:18:23:55:18:e5:d3:11:ca:e8:c2:43:31:ab:66

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SwissSign Platinum CA - G2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\111\061\013\060\011\006\003\125\004\006\023\002\103\110\061

\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123

\151\147\156\040\101\107\061\043\060\041\006\003\125\004\003\023

\032\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151

\156\165\155\040\103\101\040\055\040\107\062

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\111\061\013\060\011\006\003\125\004\006\023\002\103\110\061

\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123

\151\147\156\040\101\107\061\043\060\041\006\003\125\004\003\023

\032\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151

\156\165\155\040\103\101\040\055\040\107\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\010\116\262\000\147\014\003\135\117

END

CKA\_VALUE MULTILINE\_OCTAL

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\015\001\001\005\005\000\060\111\061\013\060\011\006\003\125\004  
\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014  
\123\167\151\163\163\123\151\147\156\040\101\107\061\043\060\041  
\006\003\125\004\003\023\032\123\167\151\163\163\123\151\147\156  
\040\120\154\141\164\151\156\165\155\040\103\101\040\055\040\107  
\062\060\036\027\015\060\066\061\060\062\065\060\070\063\066\060  
\060\132\027\015\063\066\061\060\062\065\060\070\063\066\060\060  
\132\060\111\061\013\060\011\006\003\125\004\006\023\002\103\110  
\061\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163  
\123\151\147\156\040\101\107\061\043\060\041\006\003\125\004\003  
\023\032\123\167\151\163\163\123\151\147\156\040\120\154\141\164  
\151\156\165\155\040\103\101\040\055\040\107\062\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\312\337\242  
\002\342\332\370\374\007\026\261\336\140\252\336\226\134\144\037  
\307\057\176\317\147\372\104\102\326\166\143\225\256\353\257\162  
\040\212\105\107\206\142\170\206\326\040\071\046\364\256\243\375  
\043\347\245\234\265\042\041\031\267\067\223\042\300\120\234\202  
\173\324\325\004\104\134\313\264\302\237\222\276\044\330\173\147  
\042\342\151\137\345\005\170\324\207\331\161\160\063\045\123\264  
\207\073\051\220\050\066\232\125\104\060\150\244\203\227\177\015  
\036\234\166\377\025\235\140\227\000\215\212\205\003\354\200\276  
\352\054\156\020\121\222\314\176\325\243\063\330\326\111\336\130  
\052\257\366\026\353\113\173\220\062\227\271\272\235\130\361\370  
\127\111\004\036\242\135\006\160\335\161\333\371\335\213\232\033  
\214\317\075\243\115\316\313\174\366\273\234\240\372\011\316\043  
\142\262\351\015\037\342\162\050\217\237\254\150\040\175\157\073  
\250\205\061\011\177\013\307\350\145\351\343\170\016\011\147\060  
\213\064\202\373\135\340\314\235\201\155\142\356\010\036\004\054  
\116\233\354\376\251\117\137\375\151\170\357\011\037\241\264\277  
\372\363\357\220\036\114\005\213\036\352\172\221\172\303\327\345  
\373\060\274\154\033\020\130\230\367\032\137\320\051\062\003\023  
\106\115\141\152\205\114\122\164\057\006\037\173\021\342\204\227  
\306\231\363\155\177\327\147\203\176\023\150\330\161\050\132\330  
\316\335\350\020\024\232\376\155\043\207\156\216\132\160\074\325  
\215\011\000\247\252\274\260\061\067\155\310\204\024\036\133\275  
\105\143\040\153\113\164\214\275\333\072\016\301\317\132\026\217  
\245\230\362\166\211\262\023\022\073\013\167\167\254\273\345\074  
\051\112\222\162\312\141\032\053\136\114\342\203\164\167\372\065  
\110\172\205\115\215\232\123\304\337\170\312\227\221\110\053\105  
\053\001\367\034\032\242\355\030\272\012\275\203\372\157\274\215  
\127\223\073\324\324\246\316\036\361\240\261\316\253\375\053\050  
\232\117\033\327\303\162\333\244\304\277\135\114\365\335\173\226  
\151\356\150\200\346\347\230\272\066\267\376\156\355\053\275\040  
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\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001  
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\321\336\225\252\351\337\234\314\060\037\006\003\125\035\043\004  
\030\060\026\200\024\120\257\314\007\207\025\107\157\070\305\264  
\145\321\336\225\252\351\337\234\314\060\106\006\003\125\035\040  
\004\077\060\075\060\073\006\011\140\205\164\001\131\001\001\001  
\001\060\056\060\054\006\010\053\006\001\005\005\007\002\001\026  
\040\150\164\164\160\072\057\057\162\145\160\157\163\151\164\157  
\162\171\056\163\167\151\163\163\163\151\147\156\056\143\157\155  
\057\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000  
\003\202\002\001\000\010\205\246\365\026\014\374\104\032\301\143  
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\165\116\011\161\171\345\155\226\312\113\245\210\140\320\060\164  
\270\312\010\334\264\060\236\100\007\026\153\145\225\167\001\256  
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\057\373\300\145\166\215\133\001\271\175\336\202\075\144\270\276  
\024\164\243\012\124\323\054\225\030\027\065\365\121\153\077\217  
\242\226\141\071\170\153\113\345\246\240\370\123\337\121\020\223  
\142\347\200\057\342\321\340\274\216\066\106\167\063\354\270\373  
\216\232\054\211\115\061\021\017\046\236\004\273\267\004\215\013  
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\056\243\073\374\051\135\213\301\113\311\342\212\023\035\261\277  
\273\102\035\122\335\116\330\024\136\020\306\061\007\357\161\047  
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\061\246\340\061\266\224\346\104\111\164\305\026\345\367\037\003  
\141\050\305\310\313\022\240\102\113\371\153\210\010\215\264\062  
\030\363\165\237\304\177\000\117\005\225\234\243\027\002\303\263  
\123\233\252\040\071\051\053\146\372\235\257\136\263\222\322\265  
\246\341\032\371\055\101\151\201\024\264\264\265\355\211\075\316  
\373\251\235\065\102\104\261\034\024\163\201\317\052\001\065\232  
\061\325\055\217\155\204\337\200\115\127\343\077\305\204\165\332  
\211\306\060\273\353\217\313\042\010\240\256\252\361\003\154\072  
\113\115\011\245\016\162\306\126\153\041\102\116\043\045\024\150  
\256\166\012\174\014\007\160\144\371\232\057\366\005\071\046\306  
\014\217\031\177\103\136\156\364\133\025\057\333\141\135\346\147  
\057\077\010\224\371\140\264\230\061\332\164\361\204\223\161\115  
\137\373\140\130\321\373\304\301\155\211\242\273\040\037\235\161  
\221\313\062\233\023\075\076\175\222\122\065\254\222\224\242\323  
\030\302\174\307\352\257\166\005\026\335\147\047\302\176\034\007  
\042\041\363\100\012\033\064\007\104\023\302\204\152\216\337\031  
\132\277\177\353\035\342\032\070\321\134\257\107\222\153\200\265  
\060\245\311\215\330\253\061\201\037\337\302\146\067\323\223\251  
\205\206\171\145\322

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE  
CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE  
CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Trust for "SwissSign Platinum CA - G2"  
# Issuer: CN=SwissSign Platinum CA - G2,O=SwissSign AG,C=CH  
# Serial Number:4e:b2:00:67:0c:03:5d:4f  
# Subject: CN=SwissSign Platinum CA - G2,O=SwissSign AG,C=CH  
# Not Valid Before: Wed Oct 25 08:36:00 2006  
# Not Valid After: Sat Oct 25 08:36:00 2036  
# Fingerprint (MD5): c9:98:27:77:28:1e:3d:0e:15:3c:84:00:b8:85:03:e6  
# Fingerprint (SHA1): 56:e0:fa:c0:3b:8f:18:23:55:18:e5:d3:11:ca:e8:c2:43:31:ab:66

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE  
CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "SwissSign Platinum CA - G2"  
CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL  
\126\340\372\300\073\217\030\043\125\030\345\323\021\312\350\302  
\103\061\253\146

END  
CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL  
\311\230\047\167\050\036\075\016\025\074\204\000\270\205\003\346  
END

CKA\_ISSUER MULTILINE\_OCTAL  
\060\111\061\013\060\011\006\003\125\004\006\023\002\103\110\061  
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123  
\151\147\156\040\101\107\061\043\060\041\006\003\125\004\003\023  
\032\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151  
\156\165\155\040\103\101\040\055\040\107\062

END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\010\116\262\000\147\014\003\135\117  
END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Certificate "S-TRUST  
Authentication and Encryption Root CA 2005:PN"  
# Issuer: CN=S-TRUST Authentication and Encryption Root CA 2005:PN,O=Deutscher Sparkassen Verlag  
GmbH,L=Stuttgart,ST=Baden-Wuerttemberg (BW),C=DE  
# Serial Number:37:19:18:e6:53:54:7c:1a:b5:b8:cb:59:5a:db:35:b7  
# Subject: CN=S-TRUST Authentication and Encryption Root CA 2005:PN,O=Deutscher Sparkassen Verlag

```
GmbH,L=Stuttgart,ST=Baden-Wuerttemberg (BW),C=DE
Not Valid Before: Wed Jun 22 00:00:00 2005
Not Valid After: Fri Jun 21 23:59:59 2030
Fingerprint (MD5): 04:4b:fd:c9:6c:da:2a:32:85:7c:59:84:61:46:8a:64
Fingerprint (SHA1): be:b5:a9:95:74:6b:9e:df:73:8b:56:e6:df:43:7a:77:be:10:6b:81
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "S-TRUST Authentication and Encryption Root CA 2005:PN"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\040\060\036\006\003\125\004\010\023\027\102\141\144\145\156
\055\127\165\145\162\164\164\145\155\142\145\162\147\040\050\102
\127\051\061\022\060\020\006\003\125\004\007\023\011\123\164\165
\164\164\147\141\162\164\061\051\060\047\006\003\125\004\012\023
\040\104\145\165\164\163\143\150\145\162\040\123\160\141\162\153
\141\163\163\145\156\040\126\145\162\154\141\147\040\107\155\142
\110\061\076\060\074\006\003\125\004\003\023\065\123\055\124\122
\125\123\124\040\101\165\164\150\145\156\164\151\143\141\164\151
\157\156\040\141\156\144\040\105\156\143\162\171\160\164\151\157
\156\040\122\157\157\164\040\103\101\040\062\060\060\065\072\120
\116
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\040\060\036\006\003\125\004\010\023\027\102\141\144\145\156
\055\127\165\145\162\164\164\145\155\142\145\162\147\040\050\102
\127\051\061\022\060\020\006\003\125\004\007\023\011\123\164\165
\164\164\147\141\162\164\061\051\060\047\006\003\125\004\012\023
\040\104\145\165\164\163\143\150\145\162\040\123\160\141\162\153
\141\163\163\145\156\040\126\145\162\154\141\147\040\107\155\142
\110\061\076\060\074\006\003\125\004\003\023\065\123\055\124\122
\125\123\124\040\101\165\164\150\145\156\164\151\143\141\164\151
\157\156\040\141\156\144\040\105\156\143\162\171\160\164\151\157
\156\040\122\157\157\164\040\103\101\040\062\060\060\065\072\120
\116
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\067\031\030\346\123\124\174\032\265\270\313\131\132\333
\065\267
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\173\060\202\003\143\240\003\002\001\002\002\020\067
```

\031\030\346\123\124\174\032\265\270\313\131\132\333\065\267\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201  
\256\061\013\060\011\006\003\125\004\006\023\002\104\105\061\040  
\060\036\006\003\125\004\010\023\027\102\141\144\145\156\055\127  
\165\145\162\164\164\145\155\142\145\162\147\040\050\102\127\051  
\061\022\060\020\006\003\125\004\007\023\011\123\164\165\164\164  
\147\141\162\164\061\051\060\047\006\003\125\004\012\023\040\104  
\145\165\164\163\143\150\145\162\040\123\160\141\162\153\141\163  
\163\145\156\040\126\145\162\154\141\147\040\107\155\142\110\061  
\076\060\074\006\003\125\004\003\023\065\123\055\124\122\125\123  
\124\040\101\165\164\150\145\156\164\151\143\141\164\151\157\156  
\040\141\156\144\040\105\156\143\162\171\160\164\151\157\156\040  
\122\157\157\164\040\103\101\040\062\060\060\065\072\120\116\060  
\036\027\015\060\065\060\066\062\062\060\060\060\060\060\132  
\027\015\063\060\060\066\062\061\062\063\065\071\065\071\132\060  
\201\256\061\013\060\011\006\003\125\004\006\023\002\104\105\061  
\040\060\036\006\003\125\004\010\023\027\102\141\144\145\156\055  
\127\165\145\162\164\164\145\155\142\145\162\147\040\050\102\127  
\051\061\022\060\020\006\003\125\004\007\023\011\123\164\165\164  
\164\147\141\162\164\061\051\060\047\006\003\125\004\012\023\040  
\104\145\165\164\163\143\150\145\162\040\123\160\141\162\153\141  
\163\163\145\156\040\126\145\162\154\141\147\040\107\155\142\110  
\061\076\060\074\006\003\125\004\003\023\065\123\055\124\122\125  
\123\124\040\101\165\164\150\145\156\164\151\143\141\164\151\157  
\156\040\141\156\144\040\105\156\143\162\171\160\164\151\157\156  
\040\122\157\157\164\040\103\101\040\062\060\060\065\072\120\116  
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001  
\000\331\265\112\301\323\063\352\323\106\263\321\342\114\322\365  
\266\203\320\157\325\030\351\223\257\047\216\023\315\265\045\066  
\120\064\022\144\051\241\125\341\072\140\223\236\050\311\343\363  
\233\341\004\260\043\277\225\212\216\133\033\101\177\132\303\350  
\115\114\325\044\026\076\207\110\324\047\256\346\367\123\035\273  
\014\000\357\076\141\161\255\277\072\172\130\037\224\075\134\201  
\325\325\157\337\270\233\322\365\345\313\203\162\222\302\123\262  
\202\002\353\255\255\137\026\055\222\123\166\361\211\266\054\365  
\301\057\340\247\112\157\240\060\152\062\353\232\164\003\150\170  
\023\235\312\057\233\013\035\276\317\165\015\046\227\233\307\365  
\136\012\237\170\337\263\274\354\232\272\357\125\217\033\232\246  
\007\143\051\027\131\142\011\052\171\007\167\245\340\321\027\151  
\351\133\335\366\220\253\342\230\012\000\321\045\155\236\327\205  
\207\057\222\361\321\166\203\117\013\072\131\067\050\057\063\247  
\027\120\326\040\013\012\364\046\371\237\070\347\055\244\270\233  
\211\215\255\255\311\152\175\211\027\273\366\177\200\203\172\346  
\355\002\003\001\000\001\243\201\222\060\201\217\060\022\006\003  
\125\035\023\001\001\377\004\010\060\006\001\001\377\002\001\000  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\051\006\003\125\035\021\004\042\060\040\244\036\060\034\061

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\032\060\030\006\003\125\004\003\023\021\123\124\122\157\156\154
\151\156\145\061\055\062\060\064\070\055\065\060\035\006\003\125
\035\016\004\026\004\024\017\312\036\134\171\340\242\363\051\266
\322\205\263\013\112\265\145\354\153\122\060\037\006\003\125\035
\043\004\030\060\026\200\024\017\312\036\134\171\340\242\363\051
\266\322\205\263\013\112\265\145\354\153\122\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\257
\001\360\355\031\074\050\350\115\134\273\245\143\034\210\063\003
\247\000\207\244\037\040\253\326\034\343\006\037\227\176\124\275
\267\321\262\311\325\332\200\354\027\327\212\365\173\302\000\366
\351\021\157\204\240\132\045\061\342\211\371\244\000\077\061\150
\056\325\075\350\156\346\325\035\074\077\262\275\237\167\353\235
\323\214\272\300\327\266\115\354\123\234\017\004\156\352\065\147
\127\343\012\145\173\220\072\341\117\076\303\000\222\172\273\005
\211\163\214\313\246\115\300\373\366\002\326\260\007\243\003\302
\047\100\237\014\344\205\202\055\257\232\102\035\320\307\215\370
\100\356\235\006\127\034\331\242\330\200\024\376\341\143\055\062
\207\325\224\122\226\072\106\306\161\226\075\367\230\016\262\221
\252\217\332\364\116\044\000\071\125\350\255\027\271\323\064\053
\112\251\100\314\027\052\125\145\101\164\102\176\365\300\257\310
\223\255\362\030\133\075\211\014\333\107\071\044\370\340\114\362
\037\260\075\012\312\005\116\211\041\032\343\052\231\254\374\177
\241\361\017\033\037\075\236\004\203\335\226\331\035\072\224
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "S-TRUST Authentication and Encryption Root CA 2005:PN"

# Issuer: CN=S-TRUST Authentication and Encryption Root CA 2005:PN,O=Deutscher Sparkassen Verlag GmbH,L=Stuttgart,ST=Baden-Wuerttemberg (BW),C=DE

# Serial Number:37:19:18:e6:53:54:7c:1a:b5:b8:cb:59:5a:db:35:b7

# Subject: CN=S-TRUST Authentication and Encryption Root CA 2005:PN,O=Deutscher Sparkassen Verlag GmbH,L=Stuttgart,ST=Baden-Wuerttemberg (BW),C=DE

# Not Valid Before: Wed Jun 22 00:00:00 2005

# Not Valid After: Fri Jun 21 23:59:59 2030

# Fingerprint (MD5): 04:4b:fd:c9:6c:da:2a:32:85:7c:59:84:61:46:8a:64

#

Fingerprint (SHA1): be:b5:a9:95:74:6b:9e:df:73:8b:56:e6:df:43:7a:77:be:10:6b:81

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "S-TRUST Authentication and Encryption Root CA 2005:PN"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\276\265\251\225\164\153\236\337\163\213\126\346\337\103\172\167
```

```

\276\020\153\201
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\004\113\375\311\154\332\052\062\205\174\131\204\141\106\212\144
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\040\060\036\006\003\125\004\010\023\027\102\141\144\145\156
\055\127\165\145\162\164\164\145\155\142\145\162\147\040\050\102
\127\051\061\022\060\020\006\003\125\004\007\023\011\123\164\165
\164\164\147\141\162\164\061\051\060\047\006\003\125\004\012\023
\040\104\145\165\164\163\143\150\145\162\040\123\160\141\162\153
\141\163\163\145\156\040\126\145\162\154\141\147\040\107\155\142
\110\061\076\060\074\006\003\125\004\003\023\065\123\055\124\122
\125\123\124\040\101\165\164\150\145\156\164\151\143\141\164\151
\157\156\040\141\156\144\040\105\156\143\162\171\160\164\151\157
\156\040\122\157\157\164\040\103\101\040\062\060\060\065\072\120
\116
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\067\031\030\346\123\124\174\032\265\270\313\131\132\333
\065\267
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "GeoTrust Primary Certification Authority"
Issuer: CN=GeoTrust Primary Certification Authority,O=GeoTrust Inc.,C=US
Serial Number:18:ac:b5:6a:fd:69:b6:15:3a:63:6c:af:da:fa:c4:a1
Subject: CN=GeoTrust Primary Certification Authority,O=GeoTrust Inc.,C=US
Not Valid Before: Mon Nov 27 00:00:00 2006
Not Valid After: Wed Jul 16 23:59:59 2036
#
Fingerprint (MD5): 02:26:c3:01:5e:08:30:37:43:a9:d0:7d:cf:37:e6:bf
Fingerprint (SHA1): 32:3c:11:8e:1b:f7:b8:b6:52:54:e2:e2:10:0d:d6:02:90:37:f0:96
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Primary Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165

```



\163\164\040\111\156\143\056\061\061\060\057\006\003\125\004\003  
\023\050\107\145\157\124\162\165\163\164\040\120\162\151\155\141  
\162\171\040\103\145\162\164\151\146\151\143\141\164\151\157\156  
\040\101\165\164\150\157\162\151\164\171

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\130\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165  
\163\164\040\111\156\143\056\061\061\060\057\006\003\125\004\003  
\023\050\107\145\157\124\162\165\163\164\040\120\162\151\155\141  
\162\171\040\103\145\162\164\151\146\151\143\141\164\151\157\156  
\040\101\165\164\150\157\162\151\164\171

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\030\254\265\152\375\151\266\025\072\143\154\257\332\372  
\304\241

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\174\060\202\002\144\240\003\002\001\002\002\020\030  
\254\265\152\375\151\266\025\072\143\154\257\332\372\304\241\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\130  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026\060  
\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163\164  
\040\111\156\143\056\061\061\060\057\006\003\125\004\003\023\050  
\107\145\157\124\162\165\163\164\040\120\162\151\155\141\162\171  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171\060\036\027\015\060\066\061\061  
\062\067\060\060\060\060\060\060\132\027\015\063\066\060\067\061  
\066\062\063\065\071\065\071\132\060\130\061\013\060\011\006\003  
\125\004\006\023\002\125\123\061\026\060\024\006\003\125\004\012  
\023\015\107\145\157\124\162\165\163\164\040\111\156\143\056\061  
\061\060\057\006\003\125\004\003\023\050\107\145\157\124\162\165  
\163\164\040\120\162\151\155\141\162\171\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\060\202\001\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202  
\001\001\000\276\270\025\173\377\324\174\175\147\255\203\144\173  
\310\102\123\055\337\366\204\010\040\141\326\001\131\152\234\104  
\021\257\357\166\375\225\176\316\141\060\273\172\203\137\002\275  
\001\146\312\356\025\215\157\241\060\234\275\241\205\236\224\072  
\363\126\210\000\061\317\330\356\152\226\002\331\355\003\214\373  
\165\155\347\352\270\125\026\005\026\232\364\340\136\261\210\300  
\144\205\134\025\115\210\307\267\272\340\165\351\255\005\075\235  
\307\211\110\340\273\050\310\003\341\060\223\144\136\122\300\131  
\160\042\065\127\210\212\361\225\012\203\327\274\061\163\001\064  
\355\357\106\161\340\153\002\250\065\162\153\227\233\146\340\313

\034\171\137\330\032\004\150\036\107\002\346\235\140\342\066\227  
\001\337\316\065\222\337\276\147\307\155\167\131\073\217\235\326  
\220\025\224\274\102\064\020\301\071\371\261\047\076\176\326\212  
\165\305\262\257\226\323\242\336\233\344\230\276\175\341\351\201  
\255\266\157\374\327\016\332\340\064\260\015\032\167\347\343\010  
\230\357\130\372\234\204\267\066\257\302\337\254\322\364\020\006  
\160\161\065\002\003\001\000\001\243\102\060\100\060\017\006\003  
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006  
\003\125\035\016\004\026\004\024\054\325\120\101\227\025\213\360  
\217\066\141\133\112\373\153\331\231\311\063\222\060\015\006\011  
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000  
\132\160\177\054\335\267\064\117\365\206\121\251\046\276\113\270  
\252\361\161\015\334\141\307\240\352\064\036\172\167\017\004\065  
\350\047\217\154\220\277\221\026\044\106\076\112\116\316\053\026  
\325\013\122\035\374\037\147\242\002\105\061\117\316\363\372\003  
\247\171\235\123\152\331\332\143\072\370\200\327\323\231\341\245  
\341\276\324\125\161\230\065\072\276\223\352\256\255\102\262\220  
\157\340\374\041\115\065\143\063\211\111\326\233\116\312\307\347  
\116\011\000\367\332\307\357\231\142\231\167\266\225\042\136\212  
\240\253\364\270\170\230\312\070\031\231\311\162\236\170\315\113  
\254\257\031\240\163\022\055\374\302\101\272\201\221\332\026\132  
\061\267\371\264\161\200\022\110\231\162\163\132\131\123\301\143  
\122\063\355\247\311\322\071\002\160\372\340\261\102\146\051\252  
\233\121\355\060\124\042\024\137\331\253\035\301\344\224\360\370  
\365\053\367\352\312\170\106\326\270\221\375\246\015\053\032\024  
\001\076\200\360\102\240\225\007\136\155\315\314\113\244\105\215  
\253\022\350\263\336\132\345\240\174\350\017\042\035\132\351\131

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GeoTrust Primary Certification Authority"

# Issuer: CN=GeoTrust Primary Certification Authority,O=GeoTrust Inc.,C=US

# Serial Number: 18:ac:b5:6a:fd:69:b6:15:3a:63:6c:af:da:fa:c4:a1

# Subject: CN=GeoTrust Primary Certification Authority,O=GeoTrust Inc.,C=US

# Not Valid Before: Mon Nov 27 00:00:00 2006

# Not Valid After: Wed Jul 16 23:59:59 2036

# Fingerprint (MD5): 02:26:c3:01:5e:08:30:37:43:a9:d0:7d:cf:37:e6:bf

# Fingerprint (SHA1): 32:3c:11:8e:1b:f7:b8:b6:52:54:e2:e2:10:0d:d6:02:90:37:f0:96

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GeoTrust Primary Certification Authority"

```
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\062\074\021\216\033\367\270\266\122\124\342\342\020\015\326\002
\220\067\360\226
END
```

```
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\002\046\303\001\136\010\060\067\103\251\320\175\317\067\346\277
END
```

```
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\061\060\057\006\003\125\004\003
\023\050\107\145\157\124\162\165\163\164\040\120\162\151\155\141
\162\171\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
```

```
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\030\254\265\152\375\151\266\025\072\143\154\257\332\372
\304\241
END
```

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "thawte Primary Root CA"
Issuer: CN=thawte Primary Root CA,OU=(c) 2006 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
Serial Number:34:4e:d5:57:20:d5:ed:ec:49:f4:2f:ce:37:db:2b:6d
Subject: CN=thawte Primary Root CA,OU=(c) 2006 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
Not Valid Before: Fri Nov 17 00:00:00 2006
Not Valid After: Wed Jul 16 23:59:59 2036
Fingerprint (MD5): 8c:ca:dc:0b:22:ce:f5:be:72:ac:41:1a:11:a8:d8:12
Fingerprint (SHA1): 91:c6:d6:ee:3e:8a:c8:63:84:e5:48:c2:99:29:5c:75:6c:81:7b:81
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "thawte Primary Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\251\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
```

\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040  
\062\060\060\066\040\164\150\141\167\164\145\054\040\111\156\143  
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172  
\145\144\040\165\163\145\040\157\156\154\171\061\037\060\035\006  
\003\125\004\003\023\026\164\150\141\167\164\145\040\120\162\151  
\155\141\162\171\040\122\157\157\164\040\103\101

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\251\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164  
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013  
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040  
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157  
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040  
\062\060\060\066\040\164\150\141\167\164\145\054\040\111\156\143  
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172  
\145\144\040\165\163\145\040\157\156\154\171\061\037\060\035\006  
\003\125\004\003\023\026\164\150\141\167\164\145\040\120\162\151  
\155\141\162\171\040\122\157\157\164\040\103\101

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\064\116\325\127\040\325\355\354\111\364\057\316\067\333  
\053\155

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\040\060\202\003\010\240\003\002\001\002\002\020\064  
\116\325\127\040\325\355\354\111\364\057\316\067\333\053\155\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201  
\251\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025  
\060\023\006\003\125\004\012\023\014\164\150\141\167\164\145\054  
\040\111\156\143\056\061\050\060\046\006\003\125\004\013\023\037  
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145  
\162\166\151\143\145\163\040\104\151\166\151\163\151\157\156\061  
\070\060\066\006\003\125\004\013\023\057\050\143\051\040\062\060  
\060\066\040\164\150\141\167\164\145\054\040\111\156\143\056\040  
\055\040\106\157\162\040\141\165\164\150\157\162\151\172\145\144  
\040\165\163\145\040\157\156\154\171\061\037\060\035\006\003\125  
\004\003\023\026\164\150\141\167\164\145\040\120\162\151\155\141  
\162\171\040\122\157\157\164\040\103\101\060\036\027\015\060\066  
\061\061\061\067\060\060\060\060\060\060\132\027\015\063\066\060  
\067\061\066\062\063\065\071\065\071\132\060\201\251\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006\003  
\125\004\012\023\014\164\150\141\167\164\145\054\040\111\156\143  
\056\061\050\060\046\006\003\125\004\013\023\037\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143

\145\163\040\104\151\166\151\163\151\157\156\061\070\060\066\006  
\003\125\004\013\023\057\050\143\051\040\062\060\060\066\040\164  
\150\141\167\164\145\054\040\111\156\143\056\040\055\040\106\157  
\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145  
\040\157\156\154\171\061\037\060\035\006\003\125\004\003\023\026  
\164\150\141\167\164\145\040\120\162\151\155\141\162\171\040\122  
\157\157\164\040\103\101\060\202\001\042\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202  
\001\012\002\202\001\001\000\254\240\360\373\200\131\324\234\307  
\244\317\235\241\131\163\011\020\105\014\015\054\156\150\361\154  
\133\110\150\111\131\067\374\013\063\031\302\167\177\314\020\055  
\225\064\034\346\353\115\011\247\034\322\270\311\227\066\002\267  
\211\324\044\137\006\300\314\104\224\224\215\002\142\157\353\132  
\335\021\215\050\232\134\204\220\020\172\015\275\164\146\057\152  
\070\240\342\325\124\104\353\035\007\237\007\272\157\356\351\375  
\116\013\051\365\076\204\240\001\361\234\253\370\034\176\211\244  
\350\241\330\161\145\015\243\121\173\356\274\322\042\140\015\271  
\133\235\337\272\374\121\133\013\257\230\262\351\056\351\004\350  
\142\207\336\053\310\327\116\301\114\144\036\335\317\207\130\272  
\112\117\312\150\007\035\034\235\112\306\325\057\221\314\174\161  
\162\034\305\300\147\353\062\375\311\222\134\224\332\205\300\233  
\277\123\175\053\011\364\214\235\221\037\227\152\122\313\336\011  
\066\244\167\330\173\207\120\104\325\076\156\051\151\373\071\111  
\046\036\011\245\200\173\100\055\353\350\047\205\311\376\141\375  
\176\346\174\227\035\325\235\002\003\001\000\001\243\102\060\100  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\035\006\003\125\035\016\004\026\004\024\173\133\105\317  
\257\316\313\172\375\061\222\032\152\266\363\106\353\127\110\120  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\171\021\300\113\263\221\266\374\360\351\147\324  
\015\156\105\276\125\350\223\322\316\003\077\355\332\045\260\035  
\127\313\036\072\166\240\114\354\120\166\350\144\162\014\244\251  
\361\270\213\326\326\207\204\273\062\345\101\021\300\167\331\263  
\140\235\353\033\325\321\156\104\104\251\246\001\354\125\142\035  
\167\270\134\216\110\111\174\234\073\127\021\254\255\163\067\216  
\057\170\134\220\150\107\331\140\140\346\374\007\075\042\040\027  
\304\367\026\351\304\330\162\371\310\163\174\337\026\057\025\251  
\076\375\152\047\266\241\353\132\272\230\037\325\343\115\144\012  
\235\023\310\141\272\365\071\034\207\272\270\275\173\042\177\366  
\376\254\100\171\345\254\020\157\075\217\033\171\166\213\304\067  
\263\041\030\204\345\066\000\353\143\040\231\271\351\376\063\004  
\273\101\310\301\002\371\104\143\040\236\201\316\102\323\326\077  
\054\166\323\143\234\131\335\217\246\341\016\240\056\101\367\056  
\225\107\317\274\375\063\363\366\013\141\176\176\221\053\201\107  
\302\047\060\356\247\020\135\067\217\134\071\053\344\004\360\173  
\215\126\214\150

END

```

CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "thawte Primary Root CA"
Issuer: CN=thawte Primary Root CA,OU=(c) 2006 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
#
Serial Number:34:4e:d5:57:20:d5:ed:ec:49:f4:2f:ce:37:db:2b:6d
Subject: CN=thawte Primary Root CA,OU=(c) 2006 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
Not Valid Before: Fri Nov 17 00:00:00 2006
Not Valid After: Wed Jul 16 23:59:59 2036
Fingerprint (MD5): 8c:ca:dc:0b:22:ce:f5:be:72:ac:41:1a:11:a8:d8:12
Fingerprint (SHA1): 91:c6:d6:ee:3e:8a:c8:63:84:e5:48:c2:99:29:5c:75:6c:81:7b:81
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "thawte Primary Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\221\306\326\356\076\212\310\143\204\345\110\302\231\051\134\165
\154\201\173\201
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\214\312\334\013\042\316\365\276\162\254\101\032\021\250\330\022
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\251\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040
\062\060\060\066\040\164\150\141\167\164\145\054\040\111\156\143
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172
\145\144\040\165\163\145\040\157\156\154\171\061\037\060\035\006
\003\125\004\003\023\026\164\150\141\167\164\145\040\120\162\151
\155\141\162\171\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\064\116\325\127\040\325\355\354\111\364\057\316\067\333
\053\155
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```

```
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
```

```
Certificate "VeriSign Class 3 Public Primary
```

```
 Certification Authority - G5"
```

```
Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G5,OU=(c) 2006 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
```

```
Serial Number:18:da:d1:9e:26:7d:e8:bb:4a:21:58:cd:cc:6b:3b:4a
```

```
Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G5,OU=(c) 2006 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
```

```
Not Valid Before: Wed Nov 08 00:00:00 2006
```

```
Not Valid After: Wed Jul 16 23:59:59 2036
```

```
Fingerprint (MD5): cb:17:e4:31:67:3e:e2:09:fe:45:57:93:f3:0a:fa:1c
```

```
Fingerprint (SHA1): 4e:b6:d5:78:49:9b:1c:cf:5f:58:1e:ad:56:be:3d:9b:67:44:a5:e5
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

```
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

```
CKA_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G5"
```

```
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

```
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\066\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\065
```

```
END
```

```
CKA_ID
```

```
 UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
```

```
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\066\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
```

\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023  
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040  
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171\040\055\040\107\065

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\030\332\321\236\046\175\350\273\112\041\130\315\314\153  
\073\112

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\323\060\202\003\273\240\003\002\001\002\002\020\030  
\332\321\236\046\175\350\273\112\041\130\315\314\153\073\112\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201  
\312\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027  
\060\025\006\003\125\004\012\023\016\126\145\162\151\123\151\147  
\156\054\040\111\156\143\056\061\037\060\035\006\003\125\004\013  
\023\026\126\145\162\151\123\151\147\156\040\124\162\165\163\164  
\040\116\145\164\167\157\162\153\061\072\060\070\006\003\125\004  
\013\023\061\050\143\051\040\062\060\060\066\040\126\145\162\151  
\123\151\147\156\054\040\111\156\143\056\040\055\040\106\157\162  
\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040  
\157\156\154\171\061\105\060\103\006\003\125\004\003\023\074\126  
\145\162\151\123\151\147\156\040\103\154\141\163\163\040\063\040  
\120\165\142\154\151\143\040\120\162\151\155\141\162\171\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\040\055\040\107\065\060\036\027\015\060  
\066\061\061\060\070\060\060\060\060\060\132\027\015\063\066  
\060\067\061\066\062\063\065\071\065\071\132\060\201\312\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006  
\003\125\004\012\023\016\126\145\162\151\123\151\147\156\054\040  
\111\156\143\056\061\037\060\035\006\003\125\004\013\023\026\126  
\145\162\151\123\151\147\156\040\124\162\165\163\164\040\116\145  
\164\167\157\162\153\061\072\060\070\006\003\125\004\013\023\061  
\050\143\051\040\062\060\060\066\040\126\145\162\151\123\151\147  
\156\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165  
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154  
\171\061\105\060\103\006\003\125\004\003\023\074\126\145\162\151  
\123\151\147\156\040\103\154\141\163\163\040\063\040\120\165\142  
\154\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\040\055\040\107\065\060\202\001\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000  
\060\202\001\012\002\202\001\001\000\257\044\010\010\051\172\065  
\236\140\014\252\347\113\073\116\334\174\274\074\105\034\273\053  
\340\376\051\002\371\127\010\243\144\205\025\047\365\361\255\310  
\061\211\135\042\350\052\252\246\102\263\217\370\271\125\267\261



\267\113\263\376\217\176\007\127\354\357\103\333\146\142\025\141  
\317\140\015\244\330\336\370\340\303\142\010\075\124\023\353\111  
\312\131\124\205\046\345\053\217\033\237\353\365\241\221\302\063  
\111\330\103\143\152\122\113\322\217\350\160\121\115\321\211\151  
\173\307\160\366\263\334\022\164\333\173\135\113\126\323\226\277  
\025\167\241\260\364\242\045\362\257\034\222\147\030\345\364\006  
\004\357\220\271\344\000\344\335\072\265\031\377\002\272\364\074  
\356\340\213\353\067\213\354\364\327\254\362\366\360\075\257\335  
\165\221\063\031\035\034\100\313\164\044\031\041\223\331\024\376  
\254\052\122\307\217\325\004\111\344\215\143\107\210\074\151\203  
\313\376\107\275\053\176\117\305\225\256\016\235\324\321\103\300  
\147\163\343\024\010\176\345\077\237\163\270\063\012\317\135\077  
\064\207\226\212\356\123\350\045\025\002\003\001\000\001\243\201  
\262\060\201\257\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\006\060\155\006\010\053\006\001\005\005\007\001  
\014\004\141\060\137\241\135\240\133\060\131\060\127\060\125\026  
\011\151\155\141\147\145\057\147\151\146\060\041\060\037\060\007  
\006\005\053\016\003\002\032\004\024\217\345\323\032\206\254\215  
\216\153\303\317\200\152\324\110\030\054\173\031\056\060\045\026  
\043\150\164\164\160\072\057\057\154\157\147\157\056\166\145\162  
\151\163\151\147\156\056\143\157\155\057\166\163\154\157\147\157  
\056\147\151\146\060\035\006\003\125\035\016\004\026\004\024\177  
\323\145\247\302\335\354\273\360\060\011\363\103\071\372\002\257  
\063\061\063\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\003\202\001\001\000\223\044\112\060\137\142\317\330\032  
\230\057\075\352\334\231\055\275\167\366\245\171\042\070\354\304  
\247\240\170\022\255\142\016\105\160\144\305\347\227\146\055\230  
\011\176\137\257\326\314\050\145\362\001\252\010\032\107\336\371  
\371\174\222\132\010\151\040\015\331\076\155\156\074\015\156\330  
\346\006\221\100\030\271\370\301\355\337\333\101\252\340\226\040  
\311\315\144\025\070\201\311\224\356\242\204\051\013\023\157\216  
\333\014\335\045\002\333\244\213\031\104\322\101\172\005\151\112  
\130\117\140\312\176\202\152\013\002\252\045\027\071\265\333\177  
\347\204\145\052\225\212\275\206\336\136\201\026\203\055\020\314  
\336\375\250\202\052\155\050\037\015\013\304\345\347\032\046\031  
\341\364\021\157\020\265\225\374\347\102\005\062\333\316\235\121  
\136\050\266\236\205\323\133\357\245\175\105\100\162\216\267\016  
\153\016\006\373\063\065\110\161\270\235\047\213\304\145\137\015  
\206\166\234\104\172\366\225\134\366\135\062\010\063\244\124\266  
\030\077\150\134\362\102\112\205\070\124\203\137\321\350\054\362  
\254\021\326\250\355\143\152

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL

CK\_FALSE

```
Microsoft Code Signing Only Certificate
Trust for "VeriSign Class 3 Public Primary Certification Authority - G5"
Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G5,OU=(c) 2006 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
Serial Number:18:da:d1:9e:26:7d:e8:bb:4a:21:58:cd:cc:6b:3b:4a
Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G5,OU=(c) 2006 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
Not Valid Before: Wed Nov 08 00:00:00 2006
Not Valid After: Wed Jul 16 23:59:59 2036
Fingerprint (MD5): cb:17:e4:31:67:3e:e2:09:fe:45:57:93:f3:0a:fa:1c
Fingerprint (SHA1): 4e:b6:d5:78:49:9b:1c:cf:5f:58:1e:ad:56:be:3d:9b:67:44:a5:e5
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G5"
CKA_CERT_SHA1_HASH
MULTILINE_OCTAL
\116\266\325\170\111\233\034\317\137\130\036\255\126\276\075\233
\147\104\245\345
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\313\027\344\061\147\076\342\011\376\105\127\223\363\012\372\034
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\066\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\030\332\321\236\046\175\350\273\112\041\130\315\314\153
\073\112
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Certificate "Swisscom Root CA 1"  
# Issuer: CN=Swisscom Root CA 1,OU=Digital Certificate Services,O=Swisscom,C=ch  
# Serial Number:5c:0b:85:5c:0b:e7:59:41:df:57:cc:3f:7f:9d:a8:36  
# Subject: CN=Swisscom Root CA 1,OU=Digital Certificate Services,O=Swisscom,C=ch  
# Not Valid Before: Thu Aug 18 12:06:20 2005  
# Not Valid After: Mon Aug 18 22:06:20 2025  
# Fingerprint (MD5): f8:38:7c:77:88:df:2c:16:68:2e:c2:e2:52:4b:b8:f9  
# Fingerprint (SHA1): 5f:3a:fc:0a:8b:64:f6:86:67:34:74:df:7e:a9:a2:fe:f9:fa:7a:51

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN  
CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "Swisscom Root CA 1"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL  
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061  
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143  
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147  
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145  
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125  
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157  
\164\040\103\101\040\061

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL  
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061  
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143  
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147  
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145  
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125  
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157  
\164\040\103\101\040\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL  
\002\020\134\013\205\134\013\347\131\101\337\127\314\077\177\235  
\250\066

END

CKA\_VALUE MULTILINE\_OCTAL  
\060\202\005\331\060\202\003\301\240\003\002\001\002\002\020\134  
\013\205\134\013\347\131\101\337\127\314\077\177\235\250\066\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\144  
\061\013\060\011\006\003\125\004\006\023\002\143\150\061\021\060

\017\006\003\125\004\012\023\010\123\167\151\163\163\143\157\155  
\061\045\060\043\006\003\125\004\013\023\034\104\151\147\151\164  
\141\154\040\103\145\162\164\151\146\151\143\141\164\145\040\123  
\145\162\166\151\143\145\163\061\033\060\031\006\003\125\004\003  
\023\022\123\167\151\163\163\143\157\155\040\122\157\157\164\040  
\103\101\040\061\060\036\027\015\060\065\060\070\061\070\061\062  
\060\066\062\060\132\027\015\062\065\060\070\061\070\062\062\060  
\066\062\060\132\060\144\061\013\060\011\006\003\125\004\006\023  
\002\143\150\061\021\060\017\006\003\125\004\012\023\010\123\167  
\151\163\163\143\157\155\061\045\060\043\006\003\125\004\013\023  
\034\104\151\147\151\164\141\154\040\103\145\162\164\151\146\151  
\143\141\164\145\040\123\145\162\166\151\143\145\163\061\033\060  
\031\006\003\125\004\003\023\022\123\167\151\163\163\143\157\155  
\040\122\157\157\164\040\103\101\040\061\060\202\002\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002  
\017\000\060\202\002\012\002\202\002\001\000\320\271\260\250\014  
\331\273\077\041\370\033\325\063\223\200\026\145\040\165\262\075  
\233\140\155\106\310\214\061\157\027\303\372\232\154\126\355\074  
\305\221\127\303\315\253\226\111\220\052\031\113\036\243\155\127  
\335\361\053\142\050\165\105\136\252\326\133\372\013\045\330\241  
\026\371\034\304\056\346\225\052\147\314\320\051\156\074\205\064  
\070\141\111\261\000\237\326\072\161\137\115\155\316\137\271\251  
\344\211\177\152\122\372\312\233\362\334\251\371\235\231\107\077  
\116\051\137\264\246\215\135\173\013\231\021\003\003\376\347\333  
\333\243\377\035\245\315\220\036\001\037\065\260\177\000\333\220  
\157\306\176\173\321\356\172\172\247\252\014\127\157\244\155\305  
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\345\323\027\174\146\120\162\135\324\032\130\301\331\317\330\211  
\002\157\247\111\264\066\135\320\244\336\007\054\266\165\267\050  
\221\326\227\276\050\365\230\036\352\133\046\311\275\260\227\163  
\332\256\221\046\353\150\301\371\071\025\326\147\113\012\155\117  
\313\317\260\344\102\161\214\123\171\347\356\341\333\035\240\156  
\035\214\032\167\065\134\026\036\053\123\037\064\213\321\154\374  
\362\147\007\172\365\255\355\326\232\253\241\261\113\341\314\067  
\137\375\177\315\115\256\270\037\234\103\371\052\130\125\103\105  
\274\226\315\160\016\374\311\343\146\272\116\215\073\201\313\025  
\144\173\271\224\350\135\063\122\205\161\056\117\216\242\006\021  
\121\311\343\313\241\156\061\010\144\014\302\322\074\365\066\350  
\327\320\016\170\043\040\221\311\044\052\145\051\133\042\367\041  
\316\203\136\244\363\336\113\323\150\217\106\165\134\203\011\156  
\051\153\304\160\214\365\235\327\040\057\377\106\322\053\070\302  
\057\165\034\075\176\332\245\357\036\140\205\151\102\323\314\370  
\143\376\036\103\071\205\246\266\143\101\020\263\163\036\274\323  
\372\312\175\026\107\342\247\325\320\243\212\012\010\226\142\126  
\156\064\333\331\002\271\060\165\343\004\322\347\217\302\260\021  
\100\012\254\325\161\002\142\213\061\276\335\306\043\130\061\102  
\103\055\164\371\306\236\246\212\017\351\376\277\203\346\103\127  
\044\272\357\106\064\252\327\022\001\070\355\002\003\001\000\001

\243\201\206\060\201\203\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\206\060\035\006\003\125\035\041\004\026\060  
\024\060\022\006\007\140\205\164\001\123\000\001\006\007\140\205  
\164\001\123\000\001\060\022\006\003\125\035\023\001\001\377\004  
\010\060\006\001\001\377\002\001\007\060\037\006\003\125\035\043  
\004\030\060\026\200\024\003\045\057\336\157\202\001\072\134\054  
\334\053\241\151\265\147\324\214\323\375\060\035\006\003\125\035  
\016\004\026\004\024\003\045\057\336\157\202\001\072\134\054\334  
\053\241\151\265\147\324\214\323\375\060\015\006\011\052\206\110  
\206\367\015\001\001\005\005\000\003\202\002\001\000\065\020\313  
\354\246\004\015\015\017\315\300\333\253\250\362\210\227\014\337  
\223\057\115\174\100\126\061\172\353\244\017\140\315\172\363\276  
\303\047\216\003\076\244\335\022\357\176\036\164\006\074\077\061  
\362\034\173\221\061\041\264\360\320\154\227\324\351\227\262\044  
\126\036\126\303\065\275\210\005\017\133\020\032\144\341\307\202  
\060\371\062\255\236\120\054\347\170\005\320\061\261\132\230\212  
\165\116\220\134\152\024\052\340\122\107\202\140\346\036\332\201  
\261\373\024\013\132\361\237\322\225\272\076\320\033\326\025\035  
\243\276\206\325\333\017\300\111\144\273\056\120\031\113\322\044  
\370\335\036\007\126\320\070\240\225\160\040\166\214\327\335\036  
\336\237\161\304\043\357\203\023\134\243\044\025\115\051\100\074  
\152\304\251\330\267\246\104\245\015\364\340\235\167\036\100\160  
\046\374\332\331\066\344\171\344\265\077\274\233\145\276\273\021  
\226\317\333\306\050\071\072\010\316\107\133\123\132\305\231\376  
\135\251\335\357\114\324\306\245\255\002\346\214\007\022\036\157  
\003\321\157\240\243\363\051\275\022\307\120\242\260\177\210\251  
\231\167\232\261\300\245\071\056\134\174\151\342\054\260\352\067  
\152\244\341\132\341\365\120\345\203\357\245\273\052\210\347\214  
\333\375\155\136\227\031\250\176\146\165\153\161\352\277\261\307  
\157\240\364\216\244\354\064\121\133\214\046\003\160\241\167\325  
\001\022\127\000\065\333\043\336\016\212\050\231\375\261\020\157  
\113\377\070\055\140\116\054\234\353\147\265\255\111\356\113\037  
\254\257\373\015\220\132\146\140\160\135\252\315\170\324\044\356  
\310\101\240\223\001\222\234\152\236\374\271\044\305\263\025\202  
\176\276\256\225\053\353\261\300\332\343\001\140\013\136\151\254  
\204\126\141\276\161\027\376\035\023\017\376\306\207\105\351\376  
\062\240\032\015\023\244\224\125\161\245\026\213\272\312\211\260  
\262\307\374\217\330\124\265\223\142\235\316\317\131\373\075\030  
\316\052\313\065\025\202\135\377\124\042\133\161\122\373\267\311  
\376\140\233\000\101\144\360\252\052\354\266\102\103\316\211\146  
\201\310\213\237\071\124\003\045\323\026\065\216\204\320\137\372  
\060\032\365\232\154\364\016\123\371\072\133\321\034

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```

Microsoft Code Signing Only Certificate
Trust for "Swisscom Root CA 1"
Issuer: CN=Swisscom Root CA 1,OU=Digital Certificate Services,O=Swisscom,C=ch
Serial Number:5c:0b:85:5c:0b:e7:59:41:df:57:cc:3f:7f:9d:a8:36
Subject: CN=Swisscom Root CA 1,OU=Digital Certificate Services,O=Swisscom,C=ch
Not Valid Before: Thu Aug 18 12:06:20 2005
Not Valid After: Mon Aug 18 22:06:20 2025
Fingerprint (MD5): f8:38:7c:77:88:df:2c:16:68:2e:c2:e2:52:4b:b8:f9
Fingerprint (SHA1): 5f:3a:fc:0a:8b:64:f6:86:67:34:74:df:7e:a9:a2:fe:f9:fa:7a:51
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swisscom Root CA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\137\072\374\012\213\144\366\206\147\064\164\337\176\251\242\376
\371\372\172\121
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\370\070\174\167\210\337\054\026\150\056\302\342\122\113\270\371
END
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\134\013\205\134\013\347\131\101\337\127\314\077\177\235
\250\066
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "Microsec e-Szigno Root CA"
Issuer: CN=Microsec e-Szigno Root CA,OU=e-Szigno CA,O=Microsec Ltd.,L=Budapest,C=HU
Serial Number:cc:b8:e7:bf:4e:29:1a:fd:a2:dc:66:a5:1c:2c:0f:11
Subject: CN=Microsec e-Szigno Root CA,OU=e-Szigno CA,O=Microsec Ltd.,L=Budapest,C=HU
Not Valid Before: Wed Apr 06 12:28:44 2005
Not Valid After: Thu Apr 06 12:28:44 2017

```

```
Fingerprint (MD5): f0:96:b6:2f:c5:10:d5:67:8e:83:25:32:e8:5e:2e:e5
Fingerprint (SHA1): 23:88:c9:d3:71:cc:9e:96:3d:ff:7d:3c:a7:ce:fc:d6:25:ec:19:0d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsec e-Szigno Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\162\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\023\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\024\060\022\006\003
\125\004\013\023\013\145\055\123\172\151\147\156\157\040\103\101
\061\042\060\040\006\003\125\004\003\023\031\115\151\143\162\157
\163\145\143\040\145\055\123\172\151\147\156\157\040\122\157\157
\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\162\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\023\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\024\060\022\006\003
\125\004\013\023\013\145\055\123\172\151\147\156\157\040\103\101
\061\042\060\040\006\003\125\004\003\023\031\115\151\143\162\157
\163\145\143\040\145\055\123\172\151\147\156\157\040\122\157\157
\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\314\270\347\277\116\051\032\375\242\334\146\245\034
\054\017\021
END
CKA_VALUE MULTILINE_OCTAL
\060\202\007\250\060\202\006\220\240\003\002\001\002\002\021\000
\314\270\347\277\116\051\032\375\242\334\146\245\034\054\017\021
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\162\061\013\060\011\006\003\125\004\006\023\002\110\125\061\021
\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145\163
\164\061\026\060\024\006\003\125\004\012\023\015\115\151\143\162
\157\163\145\143\040\114\164\144\056\061\024\060\022\006\003\125
\004\013\023\013\145\055\123\172\151\147\156\157\040\103\101\061
\042\060\040\006\003\125\004\003\023\031\115\151\143\162\157\163
\145\143\040\145\055\123\172\151\147\156\157\040\122\157\157\164
\040\103\101\060\036\027\015\060\065\060\064\060\066\061\062\062
\070\064\064\132\027\015\061\067\060\064\060\066\061\062\062\070
```

\064\064\132\060\162\061\013\060\011\006\003\125\004\006\023\002  
\110\125\061\021\060\017\006\003\125\004\007\023\010\102\165\144  
\141\160\145\163\164\061\026\060\024\006\003\125\004\012\023\015  
\115\151\143\162\157\163\145\143\040\114\164\144\056\061\024\060  
\022\006\003\125\004\013\023\013\145\055\123\172\151\147\156\157  
\040\103\101\061\042\060\040\006\003\125\004\003\023\031\115\151  
\143\162\157\163\145\143\040\145\055\123\172\151\147\156\157\040  
\122\157\157\164\040\103\101\060\202\001\042\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060  
\202\001\012\002\202\001\001\000\355\310\000\325\201\173\315\070  
\000\107\314\333\204\301\041\151\054\164\220\014\041\331\123\207  
\355\076\103\104\123\257\253\370\200\233\074\170\215\324\215\256  
\270\357\323\021\334\201\346\317\073\226\214\326\157\025\306\167  
\176\241\057\340\137\222\266\047\327\166\232\035\103\074\352\331  
\354\057\356\071\363\152\147\113\213\202\317\042\370\145\125\376  
\054\313\057\175\110\172\075\165\371\252\240\047\273\170\302\006  
\312\121\302\176\146\113\257\315\242\247\115\002\202\077\202\254  
\205\306\341\017\220\107\231\224\012\161\162\223\052\311\246\300  
\276\074\126\114\163\222\047\361\153\265\365\375\374\060\005\140  
\222\306\353\226\176\001\221\302\151\261\036\035\173\123\105\270  
\334\101\037\311\213\161\326\124\024\343\213\124\170\077\276\364  
\142\073\133\365\243\354\325\222\164\342\164\060\357\001\333\341  
\324\253\231\233\052\153\370\275\246\034\206\043\102\137\354\111  
\336\232\213\133\364\162\072\100\305\111\076\245\276\216\252\161  
\353\154\372\365\032\344\152\375\173\175\125\100\357\130\156\346  
\331\325\274\044\253\301\357\267\002\003\001\000\001\243\202\004  
\067\060\202\004\063\060\147\006\010\053\006\001\005\005\007\001  
\001\004\133\060\131\060\050\006\010\053\006\001\005\005\007\060  
\001\206\034\150\164\164\160\163\072\057\057\162\143\141\056\145  
\055\163\172\151\147\156\157\056\150\165\057\157\143\163\160\060  
\055\006\010\053\006\001\005\005\007\060\002\206\041\150\164\164  
\160\072\057\057\167\167\167\056\145\055\163\172\151\147\156\157  
\056\150\165\057\122\157\157\164\103\101\056\143\162\164\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\202\001\163\006\003\125\035\040\004\202\001\152\060\202\001\146  
\060\202\001\142\006\014\053\006\001\004\001\201\250\030\002\001  
\001\001\060\202\001\120\060\050\006\010\053\006\001\005\005\007  
\002\001\026\034\150\164\164\160\072\057\057\167\167\167\056\145  
\055\163\172\151\147\156\157\056\150\165\057\123\132\123\132\057  
\060\202\001\042\006\010\053\006\001\005\005\007\002\002\060\202  
\001\024\036\202\001\020\000\101\000\040\000\164\000\141\000\156  
\000\372\000\163\000\355\000\164\000\166\000\341\000\156\000\171  
\000\040\000\351\000\162\000\164\000\145\000\154\000\155\000\145  
\000\172\000\351\000\163\000\351\000\150\000\145\000\172\000\040  
\000\351\000\163\000\040\000\145\000\154\000\146\000\157\000\147  
\000\141\000\144\000\341\000\163\000\341\000\150\000\157\000\172  
\000\040\000\141\000\040\000\123\000\172\000\157\000\154\000\147  
\000\341\000\154\000\164\000\141\000\164\000\363\000\040\000\123



\000\172\000\157\000\154\000\147\000\341\000\154\000\164\000\141  
\000\164\000\341\000\163\000\151\000\040\000\123\000\172\000\141  
\000\142\000\341\000\154\000\171\000\172\000\141\000\164\000\141  
\000\040\000\163\000\172\000\145\000\162\000\151\000\156\000\164  
\000\040\000\153\000\145\000\154\000\154\000\040\000\145\000\154  
\000\152\000\341\000\162\000\156\000\151\000\072\000\040\000\150  
\000\164\000\164\000\160\000\072\000\057\000\057\000\167\000\167  
\000\167\000\056\000\145\000\055\000\163\000\172\000\151\000\147  
\000\156\000\157\000\056\000\150\000\165\000\057\000\123\000\132  
\000\123\000\132\000\057\060\201\310\006\003\125\035\037\004\201  
\300\060\201\275\060\201\272\240\201\267\240\201\264\206\041\150  
\164\164\160\072\057\057\167\167\167\056\145\055\163\172\151\147  
\156\157\056\150\165\057\122\157\157\164\103\101\056\143\162\154  
\206\201\216\154\144\141\160\072\057\057\154\144\141\160\056\145  
\055\163\172\151\147\156\157\056\150\165\057\103\116\075\115\151  
\143\162\157\163\145\143\045\062\060\145\055\123\172\151\147\156  
\157\045\062\060\122\157\157\164\045\062\060\103\101\054\117\125  
\075\145\055\123\172\151\147\156\157\045\062\060\103\101\054\117  
\075\115\151\143\162\157\163\145\143\045\062\060\114\164\144\056  
\054\114\075\102\165\144\141\160\145\163\164\054\103\075\110\125  
\077\143\145\162\164\151\146\151\143\141\164\145\122\145\166\157  
\143\141\164\151\157\156\114\151\163\164\073\142\151\156\141\162  
\171\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\201\226\006\003\125\035\021\004\201\216\060\201\213\201  
\020\151\156\146\157\100\145\055\163\172\151\147\156\157\056\150  
\165\244\167\060\165\061\043\060\041\006\003\125\004\003\014\032  
\115\151\143\162\157\163\145\143\040\145\055\123\172\151\147\156  
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\125\004\013\014\015\145\055\123\172\151\147\156\303\263\040\110  
\123\132\061\026\060\024\006\003\125\004\012\023\015\115\151\143  
\162\157\163\145\143\040\113\146\164\056\061\021\060\017\006\003  
\125\004\007\023\010\102\165\144\141\160\145\163\164\061\013\060  
\011\006\003\125\004\006\023\002\110\125\060\201\254\006\003\125  
\035\043\004\201\244\060\201\241\200\024\307\240\111\165\026\141  
\204\333\061\113\204\322\361\067\100\220\357\116\334\367\241\166  
\244\164\060\162\061\013\060\011\006\003\125\004\006\023\002\110  
\125\061\021\060\017\006\003\125\004\007\023\010\102\165\144\141  
\160\145\163\164\061\026\060\024\006\003\125\004\012\023\015\115  
\151\143\162\157\163\145\143\040\114\164\144\056\061\024\060\022  
\006\003\125\004\013\023\013\145\055\123\172\151\147\156\157\040  
\103\101\061\042\060\040\006\003\125\004\003\023\031\115\151\143  
\162\157\163\145\143\040\145\055\123\172\151\147\156\157\040\122  
\157\157\164\040\103\101\202\021\000\314\270\347\277\116\051\032  
\375\242\334\146\245\034\054\017\021\060\035\006\003\125\035\016  
\004\026\004\024\307\240\111\165\026\141\204\333\061\113\204\322  
\361\067\100\220\357\116\334\367\060\015\006\011\052\206\110\206  
\367\015\001\001\005\005\000\003\202\001\001\000\323\023\234\146  
\143\131\056\312\134\160\014\374\203\274\125\261\364\216\007\154

```
\146\047\316\301\073\040\251\034\273\106\124\160\356\132\314\240
\167\352\150\104\047\353\362\051\335\167\251\325\373\343\324\247
\004\304\225\270\013\341\104\150\140\007\103\060\061\102\141\345
\356\331\345\044\325\033\337\341\112\033\252\237\307\137\370\172
\021\352\023\223\000\312\212\130\261\356\355\016\115\264\327\250
\066\046\174\340\072\301\325\127\202\361\165\266\375\211\137\332
\363\250\070\237\065\006\010\316\042\225\276\315\325\374\276\133
\336\171\153\334\172\251\145\146\276\261\045\132\137\355\176\323
\254\106\155\114\364\062\207\264\040\004\340\154\170\260\167\321
\205\106\113\246\022\267\165\350\112\311\126\154\327\222\253\235
\365\111\070\322\117\123\343\125\220\021\333\230\226\306\111\362
\076\364\237\033\340\367\210\334\045\142\231\104\330\163\277\077
\060\363\014\067\076\324\302\050\200\163\261\001\267\235\132\226
\024\001\113\251\021\235\051\152\056\320\135\201\300\317\262\040
\103\307\003\340\067\116\135\012\334\131\040\045
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Microsec e-Szigno Root CA"

# Issuer: CN=Microsec e-Szigno Root CA,OU=e-Szigno CA,O=Microsec Ltd.,L=Budapest,C=HU

# Serial Number:cc:b8:e7:bf:4e:29:1a:fd:a2:dc:66:a5:1c:2c:0f:11

# Subject: CN=Microsec e-Szigno Root CA,OU=e-Szigno CA,O=Microsec Ltd.,L=Budapest,C=HU

# Not Valid Before: Wed Apr 06 12:28:44 2005

# Not Valid After: Thu Apr 06 12:28:44 2017

# Fingerprint (MD5): f0:96:b6:2f:c5:10:d5:67:8e:83:25:32:e8:5e:2e:e5

# Fingerprint (SHA1): 23:88:c9:d3:71:cc:9e:96:3d:ff:7d:3c:a7:ce:fc:d6:25:ec:19:0d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Microsec e-Szigno Root CA"

CKA\_CERT\_SHA1\_HASH

MULTILINE\_OCTAL

```
\043\210\311\323\161\314\236\226\075\377\175\074\247\316\374\326
\045\354\031\015
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\360\226\266\057\305\020\325\147\216\203\045\062\350\136\056\345
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\162\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\023\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\024\060\022\006\003
```

```
\125\004\013\023\013\145\055\123\172\151\147\156\157\040\103\101
\061\042\060\040\006\003\125\004\003\023\031\115\151\143\162\157
\163\145\143\040\145\055\123\172\151\147\156\157\040\122\157\157
\164\040\103\101
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\021\000\314\270\347\277\116\051\032\375\242\334\146\245\034
\054\017\021
```

END

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE
```

# Microsoft Code Signing Only Certificate

# Certificate "LGPKI"

# Issuer: OU=Application CA G2,O=LGPKI,C=JP

# Serial Number: 49 (0x31)

# Subject: OU=Application CA G2,O=LGPKI,C=JP

# Not Valid Before: Fri Mar 31 15:00:00 2006

# Not Valid After: Thu Mar 31 14:59:59 2016

# Fingerprint (MD5): f3:d7:52:a8:75:fd:18:ec:e1:7d:35:b1:70:6e:a5:9c

# Fingerprint (SHA1): 96:83:38:f1:13:e3:6a:7b:ab:dd:08:f7:77:63:91:a6:87:36:58:2e

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "LGPKI"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\071\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\032\060\030\006\003\125\004\013\023\021\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\062
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\071\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\032\060\030\006\003\125\004\013\023\021\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\062
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\001\061
```

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\240\060\202\002\210\240\003\002\001\002\002\001\061  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\071\061\013\060\011\006\003\125\004\006\023\002\112\120\061\016  
\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061\032  
\060\030\006\003\125\004\013\023\021\101\160\160\154\151\143\141  
\164\151\157\156\040\103\101\040\107\062\060\036\027\015\060\066  
\060\063\063\061\061\065\060\060\060\060\132\027\015\061\066\060  
\063\063\061\061\064\065\071\065\071\132\060\071\061\013\060\011  
\006\003\125\004\006\023\002\112\120\061\016\060\014\006\003\125  
\004\012\023\005\114\107\120\113\111\061\032\060\030\006\003\125  
\004\013\023\021\101\160\160\154\151\143\141\164\151\157\156\040  
\103\101\040\107\062\060\202\001\042\060\015\006\011\052\206\110  
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001  
\012\002\202\001\001\000\271\065\306\020\370\333\150\333\007\304  
\100\114\260\035\036\066\334\303\101\366\317\125\025\155\010\177  
\134\306\150\125\345\347\127\361\226\121\346\341\115\170\017\156  
\100\025\160\073\145\376\021\337\347\323\326\130\065\073\341\237  
\002\374\224\122\106\056\263\236\140\233\002\236\311\202\322\366  
\343\256\011\117\204\104\266\142\233\000\121\150\270\072\255\354  
\144\321\062\113\351\224\104\203\264\016\316\041\211\153\260\066  
\300\230\306\113\234\302\076\133\140\052\011\061\053\055\253\114  
\336\261\240\375\130\126\302\203\035\040\274\304\204\011\207\173  
\250\225\227\306\045\216\203\340\076\223\015\321\307\175\163\251  
\250\374\031\000\100\056\042\270\172\063\101\365\170\375\132\161  
\347\202\331\110\210\134\354\250\205\207\055\155\200\211\147\032  
\151\276\020\300\132\216\355\210\175\076\157\054\070\153\067\316  
\107\330\242\061\060\336\176\123\145\154\213\206\123\101\040\154  
\275\110\245\176\257\000\132\126\022\130\201\321\334\211\131\371  
\265\356\370\115\232\330\104\051\213\171\247\367\042\252\352\174  
\134\264\026\210\040\015\002\003\001\000\001\243\201\262\060\201  
\257\060\035\006\003\125\035\016\004\026\004\024\177\270\135\216  
\304\030\153\306\175\314\056\351\256\316\064\347\027\135\340\241  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\114\006\003\125\035\037\004\105\060\103\060\101\240\077\240  
\075\244\073\060\071\061\013\060\011\006\003\125\004\006\023\002  
\112\120\061\016\060\014\006\003\125\004\012\023\005\114\107\120  
\113\111\061\032\060\030\006\003\125\004\013\023\021\101\160\160  
\154\151\143\141\164\151\157\156\040\103\101\040\107\062\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\037\006\003\125\035\043\004\030\060\026\200\024\177\270\135\216  
\304\030\153\306\175\314\056\351\256\316\064\347\027\135\340\241  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\074\330\163\066\100\006\110\112\124\031\365\047  
\110\071\045\245\156\102\347\266\315\033\313\071\064\267\233\354  
\117\052\276\167\344\312\204\374\035\353\233\042\100\325\364\373  
\150\207\162\374\107\135\152\016\122\112\343\265\135\110\306\042  
\226\346\063\155\155\253\366\315\327\313\044\132\214\250\105\236  
\076\141\202\175\224\325\005\360\032\065\137\161\057\056\124\265

```
\101\005\357\206\015\122\357\234\230\033\361\054\114\072\321\363
\206\323\214\076\172\057\206\105\216\203\062\046\133\277\123\312
\016\121\126\334\232\302\132\060\031\015\247\236\325\252\233\040
\071\151\170\041\364\227\155\321\016\021\114\056\323\033\132\260
\371\227\170\134\052\217\122\145\356\114\102\045\302\067\060\016
\155\053\065\224\203\006\350\257\105\073\004\146\247\060\273\371
\340\041\073\143\156\175\104\135\072\152\123\357\021\027\044\375
\124\262\132\154\163\126\041\311\154\055\227\244\102\263\047\141
\005\041\143\155\352\050\274\117\032\157\102\334\230\253\125\323
\036\033\300\222\077\233\301\346\073\027\126\342\304\230\103\045
\356\266\313\000
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "LGPKI"

# Issuer: OU=Application CA G2,O=LGPKI,C=JP

# Serial Number: 49 (0x31)

# Subject: OU=Application CA G2,O=LGPKI,C=JP

# Not Valid Before: Fri Mar 31 15:00:00 2006

# Not Valid After: Thu Mar 31 14:59:59 2016

# Fingerprint (MD5): f3:d7:52:a8:75:fd:18:ec:e1:7d:35:b1:70:6e:a5:9c

# Fingerprint (SHA1): 96:83:38:f1:13:e3:6a:7b:ab:dd:08:f7:77:63:91:a6:87:36:58:2e

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "LGPKI"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\226\203\070\361\023\343\152\173\253\335\010\367\167\143\221\246
\207\066\130\056
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\363\327\122\250\165\375\030\354\341\175\065\261\160\156\245\234
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\071\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\032\060\030\006\003\125\004\013\023\021\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\062
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\001\061
```

END

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "AC RAIZ DNIE"
Issuer: CN=AC RAIZ DNIE,OU=DNIE,O=DIRECCION GENERAL DE LA POLICIA,C=ES
Serial Number:d2:85:70:fd:ae:a7:d6:5f:11:84:15:c6:31:b5:cb
Subject: CN=AC RAIZ DNIE,OU=DNIE,O=DIRECCION GENERAL DE LA POLICIA,C=ES
Not Valid Before: Thu Feb 16 10:37:25 2006
Not Valid After: Fri Feb 08 22:59:59 2036
Fingerprint (MD5): 15:5e:f5:11:7a:a2:c1:15:0e:92:7e:66:fe:3b:84:c3
#
```

```
Fingerprint (SHA1): b3:8f:ec:ec:0b:14:8a:a6:86:c3:d0:0f:01:ec:c8:84:8e:80:85:eb
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ DNIE"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\050\060\046\006\003\125\004\012\014\037\104\111\122\105\103\103
\111\117\116\040\107\105\116\105\122\101\114\040\104\105\040\114
\101\040\120\117\114\111\103\111\101\061\015\060\013\006\003\125
\004\013\014\004\104\116\111\105\061\025\060\023\006\003\125\004
\003\014\014\101\103\040\122\101\111\132\040\104\116\111\105
END
```

```
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\050\060\046\006\003\125\004\012\014\037\104\111\122\105\103\103
\111\117\116\040\107\105\116\105\122\101\114\040\104\105\040\114
\101\040\120\117\114\111\103\111\101\061\015\060\013\006\003\125
\004\013\014\004\104\116\111\105\061\025\060\023\006\003\125\004
\003\014\014\101\103\040\122\101\111\132\040\104\116\111\105
END
```

```
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\000\322\205\160\375\256\247\326\137\021\204\025\306\061
\265\313
END
```

```
CKA_VALUE MULTILINE_OCTAL
\060\202\005\277\060\202\003\247\240\003\002\001\002\002\020\000
\322\205\160\375\256\247\326\137\021\204\025\306\061\265\313\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\135
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\050\060
```

\046\006\003\125\004\012\014\037\104\111\122\105\103\103\111\117  
\116\040\107\105\116\105\122\101\114\040\104\105\040\114\101\040  
\120\117\114\111\103\111\101\061\015\060\013\006\003\125\004\013  
\014\004\104\116\111\105\061\025\060\023\006\003\125\004\003\014  
\014\101\103\040\122\101\111\132\040\104\116\111\105\060\036\027  
\015\060\066\060\062\061\066\061\060\063\067\062\065\132\027\015  
\063\066\060\062\060\070\062\062\065\071\065\071\132\060\135\061  
\013\060\011\006\003\125\004\006\023\002\105\123\061\050\060\046  
\006\003\125\004\012\014\037\104\111\122\105\103\103\111\117\116  
\040\107\105\116\105\122\101\114\040\104\105\040\114\101\040\120  
\117\114\111\103\111\101\061\015\060\013\006\003\125\004\013\014  
\004\104\116\111\105\061\025\060\023\006\003\125\004\003\014\014  
\101\103\040\122\101\111\132\040\104\116\111\105\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\200\000\255  
\014\303\243\040\007\243\143\377\367\064\240\315\356\152\124\010  
\027\135\261\001\025\247\346\271\137\212\161\377\014\302\035\352  
\067\363\336\223\177\326\005\115\204\262\325\327\034\014\364\304  
\221\160\100\016\132\310\230\244\200\350\015\063\300\007\363\267  
\365\254\241\070\172\300\146\124\044\374\122\314\060\052\362\303  
\304\241\054\166\277\301\300\277\202\361\233\360\150\172\023\100  
\310\227\274\034\045\007\010\012\267\226\357\314\051\124\340\346  
\145\055\352\262\056\261\011\151\022\116\060\325\330\370\274\000  
\200\057\115\223\017\315\056\127\033\063\273\237\060\116\304\245  
\313\171\247\373\342\064\030\266\040\236\033\237\135\247\311\072  
\255\105\144\263\030\316\021\022\234\155\036\125\105\050\204\234  
\127\147\115\371\313\342\213\217\130\011\324\071\377\310\066\322  
\070\342\014\145\177\025\016\175\301\007\335\251\042\337\221\000  
\304\154\161\064\164\334\071\352\352\117\104\151\177\130\333\130  
\012\122\161\053\354\251\035\120\164\063\371\051\152\372\376\231  
\364\347\314\105\105\155\312\132\045\242\022\343\316\327\070\005  
\071\360\032\011\365\166\131\316\142\157\172\064\015\054\321\274  
\004\022\354\075\123\310\372\320\002\313\316\075\041\265\305\340  
\071\063\145\317\071\123\311\233\106\371\235\063\363\131\200\010  
\101\276\157\113\240\372\112\316\244\166\034\205\342\257\257\024  
\235\145\254\367\177\227\344\063\111\246\257\276\316\053\067\361  
\056\301\163\005\234\234\140\114\235\060\015\227\124\236\201\142  
\273\347\340\057\367\024\007\024\251\167\221\351\334\221\225\216  
\323\210\220\063\107\157\161\303\024\151\372\246\055\001\036\033  
\352\323\056\342\177\013\334\317\347\042\360\361\101\243\001\222  
\345\200\323\276\251\142\250\125\210\013\064\064\354\334\041\025  
\252\357\326\042\136\211\365\121\222\023\052\157\200\026\331\261  
\015\331\056\370\020\270\302\376\122\105\063\234\035\070\174\334  
\025\151\064\163\277\240\054\273\021\173\224\315\370\067\055\157  
\075\357\203\132\306\036\233\164\111\217\331\302\215\276\026\166  
\120\310\132\321\045\026\366\366\314\214\234\132\060\236\145\276  
\320\232\110\223\327\372\150\015\165\061\207\371\367\002\003\001  
\000\001\243\173\060\171\060\017\006\003\125\035\023\001\001\377

\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001  
\377\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026  
\004\024\216\105\364\237\163\305\377\057\033\005\333\001\107\140  
\033\003\212\201\267\272\060\067\006\003\125\035\040\004\060\060  
\056\060\054\006\004\125\035\040\000\060\044\060\042\006\010\053  
\006\001\005\005\007\002\001\026\026\150\164\164\160\072\057\057  
\167\167\167\056\144\156\151\145\056\145\163\057\144\160\143\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202  
\002\001\000\165\345\163\311\121\121\057\213\031\240\207\351\377  
\256\066\066\246\374\101\037\343\036\327\161\140\031\306\157\232  
\002\060\275\142\161\255\163\376\221\055\116\344\046\100\104\251  
\256\170\046\043\061\151\334\232\163\226\036\111\121\013\340\357  
\301\270\103\357\161\234\356\101\267\305\120\037\062\204\236\042  
\206\361\367\037\217\331\255\053\116\332\227\050\227\273\226\232  
\032\370\261\331\172\004\363\124\231\022\031\226\025\200\147\071  
\377\002\137\172\374\125\102\120\132\346\271\242\377\270\250\142  
\036\024\315\331\077\276\243\145\110\305\073\327\067\316\015\372  
\050\220\332\277\371\343\121\107\045\175\112\323\147\115\207\252  
\142\274\136\354\172\200\104\174\367\237\012\275\145\127\224\312  
\362\021\146\326\122\177\344\072\160\165\004\315\073\227\324\066  
\162\367\121\126\277\064\365\322\101\341\264\332\250\103\376\153  
\022\111\022\264\135\317\042\102\226\214\010\043\046\214\262\020  
\116\135\252\123\356\001\057\165\345\271\242\021\063\304\327\152  
\375\370\016\312\156\202\331\347\273\131\043\116\265\371\021\035  
\057\153\043\365\173\021\040\352\101\022\220\062\106\333\061\073  
\251\301\133\163\150\072\106\033\214\376\227\267\126\271\141\231  
\314\116\360\203\372\067\361\336\034\235\034\161\213\003\223\303  
\304\163\202\056\250\230\035\144\242\232\214\367\124\010\115\317  
\352\201\313\365\133\011\231\143\257\165\214\226\370\171\065\325  
\334\353\101\201\171\070\204\136\157\361\157\142\166\333\221\316  
\132\205\140\071\035\133\342\052\057\103\045\333\302\172\044\323  
\025\260\242\361\214\240\175\153\110\011\023\377\242\114\146\212  
\354\160\122\011\123\214\060\314\270\325\272\044\334\060\231\076  
\241\136\267\337\201\254\354\067\276\116\233\047\130\336\176\241  
\233\124\177\006\266\057\344\062\120\375\347\020\273\250\315\332  
\030\033\324\143\146\075\352\121\161\071\364\234\076\337\132\364  
\332\307\114\046\355\213\265\041\272\064\171\002\163\141\020\332  
\230\061\250\140\313\176\007\247\320\267\005\103\211\133\315\205  
\046\331\260\121\257\367\214\122\252\022\247\130\337\222\233\147  
\362\235\362\346\364\151\061\364\026\347\336\167\133\036\335\232  
\005\001\255

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate



```
Trust for "AC RAIZ DNIE"
Issuer: CN=AC RAIZ DNIE,OU=DNIE,O=DIRECCION GENERAL DE LA POLICIA,C=ES
Serial Number:d2:85:70:fd:ae:a7:d6:5f:11:84:15:c6:31:b5:cb
Subject: CN=AC RAIZ DNIE,OU=DNIE,O=DIRECCION GENERAL DE LA POLICIA,C=ES
Not Valid Before: Thu Feb 16 10:37:25 2006
Not Valid After: Fri Feb 08 22:59:59 2036
Fingerprint (MD5): 15:5e:f5:11:7a:a2:c1:15:0e:92:7e:66:fe:3b:84:c3
Fingerprint (SHA1): b3:8f:ec:ec:0b:14:8a:a6:86:c3:d0:0f:01:ec:c8:84:8e:80:85:eb
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ DNIE"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\263\217\354\354\013\024\212\246\206\303\320\017\001\354\310\204
\216\200\205\353
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\025\136\365\021\172\242\301\025\016\222\176\146\376\073\204\303
END
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\050\060\046\006\003\125\004\012\014\037\104\111\122\105\103\103
\111\117\116\040\107\105\116\105\122\101\114\040\104\105\040\114
\101\040\120\117\114\111\103\111\101\061\015\060\013\006\003\125
\004\013\014\004\104\116\111\105\061\025\060\023\006\003\125\004
\003\014\014\101\103\040\122\101\111\132\040\104\116\111\105
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\000\322\205\160\375\256\247\326\137\021\204\025\306\061
\265\313
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
```

```
Certificate "EC-ACC"
```

```
Issuer: CN=EC-ACC,OU=Jerarquia Entitats de Certificacio Catalanes,OU=Vegeu https://www.catcert.net/verarrel
(c)03,OU=Serveis Publics de Certificacio,O=Agencia Catalana de Certificacio (NIF Q-0801176-I),C=ES
```

```
Serial Number: -23701579247955709139626555126524820479 (0x-11d4c2142bde21eb579d53fb0c223bff)
```

```
Subject: CN=EC-ACC,OU=Jerarquia Entitats de Certificacio Catalanes,OU=Vegeu
```

```
https://www.catcert.net/verarrel (c)03,OU=Serveis Publics de Certificacio,O=Agencia Catalana de Certificacio (NIF
Q-0801176-I),C=ES
```

```
Not Valid Before: Tue Jan 07 23:00:00 2003
```

```
Not Valid After: Tue Jan 07 22:59:59 2031
Fingerprint (MD5): eb:f5:9d:29:0d:61:f9:42:1f:7c:c2:ba:6d:e3:15:09
Fingerprint (SHA1): 28:90:3a:63:5b:52:80:fa:e6:77:4c:0b:6d:a7:d6:ba:a6:4a:f2:e8
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "EC-ACC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\363\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\073\060\071\006\003\125\004\012\023\062\101\147\145\156\143
\151\141\040\103\141\164\141\154\141\156\141\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\040\050\116\111\106
\040\121\055\060\070\060\061\061\067\066\055\111\051\061\050\060
\046\006\003\125\004\013\023\037\123\145\162\166\145\151\163\040
\120\165\142\154\151\143\163\040\144\145\040\103\145\162\164\151
\146\151\143\141\143\151\157\061\065\060\063\006\003\125\004\013
\023\054\126\145\147\145\165\040\150\164\164\160\163\072\057\057
\167\167\167\056\143\141\164\143\145\162\164\056\156\145\164\057
\166\145\162\141\162\162\145\154\040\050\143\051\060\063\061\065
\060\063\006\003\125\004\013\023\054\112\145\162\141\162\161\165
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CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "EC-ACC"

# Issuer: CN=EC-ACC,OU=Jerarquia Entitats de Certificacio Catalanes,OU=Vegeu <https://www.catcert.net/verarrel> (c)03,OU=Serveis Publics de Certificacio,O=Agencia Catalana de Certificacio (NIF Q-0801176-I),C=ES

# Serial Number: -23701579247955709139626555126524820479 (0x-11d4c2142bde21eb579d53fb0c223bff)

# Subject: CN=EC-ACC,OU=Jerarquia Entitats de Certificacio Catalanes,OU=Vegeu

<https://www.catcert.net/verarrel> (c)03,OU=Serveis Publics de Certificacio,O=Agencia Catalana de Certificacio (NIF Q-0801176-I),C=ES

# Not Valid Before: Tue Jan 07 23:00:00 2003

# Not Valid After: Tue Jan 07 22:59:59 2031

# Fingerprint (MD5): eb:f5:9d:29:0d:61:f9:42:1f:7c:c2:ba:6d:e3:15:09

# Fingerprint (SHA1): 28:90:3a:63:5b:52:80:fa:e6:77:4c:0b:6d:a7:d6:ba:a6:4a:f2:e8

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CKA\_LABEL

UTF8 "EC-ACC"

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CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "A-Trust-nQual-03"
Issuer: CN=A-Trust-nQual-03,OU=A-Trust-nQual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
Serial Number:14:b4:f9
Subject: CN=A-Trust-nQual-03,OU=A-Trust-nQual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
Not Valid Before: Wed Jul 23 10:38:29 2014
#
Not Valid After: Wed Jul 23 08:38:29 2025
Fingerprint (MD5): a6:b2:ec:05:6b:b4:86:f0:e4:05:05:b0:d3:26:fc:fa
Fingerprint (SHA1): 4c:ae:e3:89:31:d1:9a:e7:3b:31:aa:75:ca:33:d6:21:29:0f:a7:5e
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-nQual-03"
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\160\122\244\263\340\211\050\372\372\251\016\207\372\306\365\243
\335\166\355\317\110\101\046\130\077\164\277\200\300\032\033\015
\034\111\071\154\236\213\004\320\376\124\257\233\307\261\252\146
\025\135\325\371\123\243\140\333\066\030\264\256\341\164\002\142
\364\210\246\307\303\046\237\025\260\237\301\061\204\275\032\241
\257\103\377\152\031\255\037\300\106\304\061\247\133\346\147\011
\267\017\304\052\016\040\046\330\114\203\023\237\073\227\225\270
\044\067\074\001\026\071\356\145\254\352\323\166\364\310\226\032
\141\122\351\354\346\032\010\166\134\213\270\332\236\300\255\354
\024\236\215\343\253\024\354\270\311\056\244\212\140\100\174\272
\312\010\213
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "A-Trust-nQual-03"

# Issuer: CN=A-Trust-nQual-03,OU=A-Trust-nQual-03,O=A-Trust

Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT

# Serial Number: 14:b4:f9

# Subject: CN=A-Trust-nQual-03,OU=A-Trust-nQual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr.

Datenverkehr GmbH,C=AT

# Not Valid Before: Wed Jul 23 10:38:29 2014

# Not Valid After: Wed Jul 23 08:38:29 2025

# Fingerprint (MD5): a6:b2:ec:05:6b:b4:86:f0:e4:05:05:b0:d3:26:fc:fa

# Fingerprint (SHA1): 4c:ae:e3:89:31:d1:9a:e7:3b:31:aa:75:ca:33:d6:21:29:0f:a7:5e

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "A-Trust-nQual-03"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\114\256\343\211\061\321\232\347\073\061\252\165\312\063\326\041
```

```
\051\017\247\136
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL



\246\262\354\005\153\264\206\360\344\005\005\260\323\046\374\372

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\215\061\013\060\011\006\003\125\004\006\023\002\101\124  
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165  
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145  
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155  
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145  
\162\153\145\150\162\040\107\155\142\110\061\031\060\027\006\003  
\125\004\013\014\020\101\055\124\162\165\163\164\055\156\121\165  
\141\154\055\060\063\061\031\060\027\006\003\125\004\003\014\020  
\101\055\124\162\165\163\164\055\156\121\165\141\154\055\060\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\003\024\264\371

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "KISA RootCA 1"

# Issuer: CN=KISA RootCA 1,OU=Korea Certification Authority Central,O=KISA,C=KR

# Serial Number: 4 (0x4)

# Subject: CN=KISA RootCA 1,OU=Korea Certification Authority Central,O=KISA,C=KR

# Not

Valid Before: Wed Aug 24 08:05:46 2005

# Not Valid After: Sun Aug 24 08:05:46 2025

# Fingerprint (MD5): 68:9b:17:c6:54:e0:e0:99:55:16:42:f7:5a:86:d8

# Fingerprint (SHA1): 02:72:68:29:3e:5f:5d:17:aa:a4:b3:c3:e6:36:1e:1f:92:57:5e:aa

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "KISA RootCA 1"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\144\061\013\060\011\006\003\125\004\006\023\002\113\122\061  
\015\060\013\006\003\125\004\012\014\004\113\111\123\101\061\056  
\060\054\006\003\125\004\013\014\045\113\157\162\145\141\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\040\103\145\156\164\162\141\154\061\026  
\060\024\006\003\125\004\003\014\015\113\111\123\101\040\122\157  
\157\164\103\101\040\061

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\144\061\013\060\011\006\003\125\004\006\023\002\113\122\061  
\015\060\013\006\003\125\004\012\014\004\113\111\123\101\061\056  
\060\054\006\003\125\004\013\014\045\113\157\162\145\141\040\103  
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164  
\150\157\162\151\164\171\040\103\145\156\164\162\141\154\061\026  
\060\024\006\003\125\004\003\014\015\113\111\123\101\040\122\157  
\157\164\103\101\040\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\004

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\163\060\202\002\133\240\003\002\001\002\002\001\004  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\144\061\013\060\011\006\003\125\004\006\023\002\113\122\061\015  
\060\013\006\003\125\004\012\014\004\113\111\123\101\061\056\060  
\054\006\003\125\004\013\014\045\113\157\162\145\141\040\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150  
\157\162\151\164\171\040\103\145\156\164\162\141\154\061\026\060  
\024\006\003\125\004\003\014\015\113\111\123\101\040\122\157\157  
\164\103\101\040\061\060\036\027\015\060\065\060\070\062\064\060  
\070\060\065\064\066\132\027\015\062\065\060\070\062\064\060\070  
\060\065\064\066\132\060\144\061\013\060\011\006\003\125\004\006  
\023\002\113\122\061\015\060\013\006\003\125\004\012\014\004\113  
\111\123\101\061\056\060\054\006\003\125\004\013\014\045\113\157  
\162\145\141\040\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\101\165\164\150\157\162\151\164\171\040\103\145\156\164  
\162\141\154\061\026\060\024\006\003\125\004\003\014\015\113\111  
\123\101\040\122\157\157\164\103\101\040\061\060\202\001\040\060  
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202  
\001\015\000\060\202\001\010\002\202\001\001\000\274\004\344\372  
\023\071\360\064\226\040\153\154\150\273\372\333\167\377\047\367  
\254\354\057\347\375\360\177\155\157\214\052\315\045\011\133\044  
\364\241\150\374\050\354\311\045\342\254\355\336\310\063\204\365  
\260\245\011\072\247\261\107\110\305\314\117\214\171\234\371\006  
\127\175\335\356\070\366\317\024\262\234\352\323\300\135\167\142  
\360\107\015\271\032\100\123\134\144\160\257\010\132\300\367\317  
\165\371\154\215\144\050\036\040\376\267\033\031\323\132\146\203  
\162\342\260\233\275\323\045\025\015\062\157\144\067\224\205\106  
\310\162\276\167\325\156\037\050\057\307\151\355\347\203\211\063  
\130\323\336\240\277\100\350\103\120\356\334\115\153\274\245\352  
\246\310\141\216\365\303\144\257\006\025\334\051\213\077\165\214  
\274\161\104\333\374\255\265\027\035\155\211\203\317\306\063\275  
\277\105\242\376\012\237\243\021\137\017\271\037\234\032\302\106  
\314\234\050\146\237\160\046\074\056\337\252\200\376\214\305\004  
\011\045\117\315\223\107\074\067\352\002\147\222\376\374\042\044

```
\134\254\322\054\340\134\001\063\212\301\031\333\002\001\003\243
\062\060\060\060\035\006\003\125\035\016\004\026\004\024\277\266
\047\330\003\132\166\145\114\141\001\101\126\061\345\213\173\072
\331\314\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\003\202\001\001\000\023\257\121\013\336\212\152\133\346
\232\012\310\261\220\112\116\241\002\235\314\210\322\253\146\275
\075\354\273\261\102\225\152\262\134\132\377\241\143\144\226\251
\150\025\177\045\136\212\370\244\163\301\200\212\205\012\016\122
\350\062\347\105\370\116\145\200\221\231\164\103\345\105\235\111
\052\360\224\225\335\351\341\060\322\023\156\311\116\261\167\345
\004\317\255\132\036\224\011\132\327\074\010\034\256\172\351\024
\062\301\105\255\322\046\110\162\254\250\101\332\360\041\207\071
\136\337\374\144\377\141\164\052\234\331\233\213\137\302\067\223
\330\243\067\057\073\223\153\262\033\007\247\177\011\120\357\323
\072\276\041\153\212\220\073\047\112\121\116\153\236\234\207\235
\370\170\220\061\355\021\047\306\250\131\276\374\030\013\373\216
\176\056\102\341\355\347\011\041\275\271\023\305\126\147\364\046
\246\102\103\220\104\124\264\161\233\166\344\032\022\254\032\050
\000\337\233\301\325\370\333\134\243\370\222\261\275\264\324\371
\120\331\000\002\117\333\203\320\021\117\244\102\126\141\072\176
\023\062\323\204\037\311\272
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "KISA RootCA 1"

# Issuer: CN=KISA RootCA 1,OU=Korea Certification Authority Central,O=KISA,C=KR

# Serial Number: 4 (0x4)

# Subject: CN=KISA RootCA 1,OU=Korea Certification Authority Central,O=KISA,C=KR

# Not Valid Before: Wed Aug 24 08:05:46 2005

# Not Valid After: Sun Aug 24 08:05:46 2025

# Fingerprint (MD5): 68:9b:17:c6:54:e0:e0:e0:99:55:16:42:f7:5a:86:d8

# Fingerprint (SHA1): 02:72:68:29:3e:5f:5d:17:aa:a4:b3:c3:e6:36:1e:1f:92:57:5e:aa

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "KISA RootCA 1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\002\162\150\051\076\137\135\027\252\244\263\303\346\066\036\037
\222\127\136\252
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\150\233\027\306\124\340\340\340\231\125\026\102\367\132\206\330
```

```
END
CKA_ISSUER
MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\015\060\013\006\003\125\004\012\014\004\113\111\123\101\061\056
\060\054\006\003\125\004\013\014\045\113\157\162\145\141\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\103\145\156\164\162\141\154\061\026
\060\024\006\003\125\004\003\014\015\113\111\123\101\040\122\157
\157\164\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\004
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado"
Issuer: 1.2.840.113549.1.9.1=info@netlock.hu,CN=NetLock Minositett Kozjegyzoi (Class QA)
Tanusitvanykiado,OU=Tanusitvanykiadok,O=NetLock
Halozatbiztonsagi Kft.,L=Budapest,C=HU
Serial Number: 123 (0x7b)
Subject: 1.2.840.113549.1.9.1=info@netlock.hu,CN=NetLock Minositett Kozjegyzoi (Class QA)
Tanusitvanykiado,OU=Tanusitvanykiadok,O=NetLock Halozatbiztonsagi Kft.,L=Budapest,C=HU
Not Valid Before: Sun Mar 30 01:47:11 2003
Not Valid After: Thu Dec 15 01:47:11 2022
Fingerprint (MD5): d4:80:65:68:24:f9:89:22:28:db:f5:a4:9a:17:8f:14
Fingerprint (SHA1): 01:68:97:e1:a0:b8:f2:c3:b1:34:66:5c:20:a7:27:b7:a1:58:e2:8f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\311\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160
\145\163\164\061\047\060\045\006\003\125\004\012\023\036\116\145
\164\114\157\143\153\040\110\141\154\157\172\141\164\142\151\172
\164\157\156\163\141\147\151\040\113\146\164\056\061\032\060\030
\006\003\125\004\013\023\021\124\141\156\165\163\151\164\166\141
\156\171\153\151\141\144\157\153\061\102\060\100\006\003\125\004
\003\023\071\116\145\164\114\157\143\153\040\115\151\156\157\163
\151\164\145\164\164\040\113\157\172\152\145\147\171\172\157\151
\040\050\103\154\141\163\163\040\121\101\051\040\124\141\156\165
```

\163\151\164\166\141\156\171\153\151\141\144\157\061\036\060\034  
\006\011\052\206\110\206\367\015\001\011\001\026\017\151\156\146  
\157\100\156\145\164\154\157\143\153\056\150\165

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\311\061\013\060\011\006\003\125\004\006\023\002\110\125  
\061\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160  
\145\163\164\061\047\060\045\006\003\125\004\012\023\036\116\145  
\164\114\157\143\153\040\110\141\154\157\172\141\164\142\151\172  
\164\157\156\163\141\147\151\040\113\146\164\056\061\032\060\030  
\006\003\125\004\013\023\021\124\141\156\165\163\151\164\166\141  
\156\171\153\151\141\144\157\153\061\102\060\100\006\003\125\004  
\003\023\071\116\145\164\114\157\143\153\040\115\151\156\157\163  
\151\164\145\164\164\040\113\157\172\152\145\147\171\172\157\151  
\040\050\103\154\141\163\163\040\121\101\051\040\124\141\156\165  
\163\151\164\166\141\156\171\153\151\141\144\157\061\036\060\034  
\006\011\052\206\110\206\367\015\001\011\001\026\017\151\156\146  
\157\100\156\145\164\154\157\143\153\056\150\165

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\173

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\321\060\202\005\271\240\003\002\001\002\002\001\173  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\201\311\061\013\060\011\006\003\125\004\006\023\002\110\125\061  
\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145  
\163\164\061\047\060\045\006\003\125\004\012\023\036\116\145\164  
\114\157\143\153\040\110\141\154\157\172\141\164\142\151\172\164  
\157\156\163\141\147\151\040\113\146\164\056\061\032\060\030\006  
\003\125\004\013\023\021\124\141\156\165\163\151\164\166\141\156  
\171\153\151\141\144\157\153\061\102\060\100\006\003\125\004\003  
\023\071\116\145\164\114\157\143\153\040\115\151\156\157\163\151  
\164\145\164\164\040\113\157\172\152\145\147\171\172\157\151\040  
\050\103\154\141\163\163\040\121\101\051\040\124\141\156\165\163  
\151\164\166\141\156\171\153\151\141\144\157\061\036\060\034\006  
\011\052\206\110\206\367\015\001\011\001\026\017\151\156\146\157  
\100\156\145\164\154\157\143\153\056\150\165\060\036\027\015\060  
\063\060\063\063\060\060\061\064\067\061\061\132\027\015\062\062  
\061\062\061\065\060\061\064\067\061\061\132\060\201\311\061\013  
\060\011\006\003\125\004\006\023\002\110\125\061\021\060\017\006  
\003\125\004\007\023\010\102\165\144\141\160\145\163\164\061\047  
\060\045\006\003\125\004\012\023\036\116\145\164\114\157\143\153  
\040\110\141\154\157\172\141\164\142\151\172\164\157\156\163\141  
\147\151\040\113\146\164\056\061\032\060\030\006\003\125\004\013

\023\021\124\141\156\165\163\151\164\166\141\156\171\153\151\141  
\144\157\153\061\102\060\100\006\003\125\004\003\023\071\116\145  
\164\114\157\143\153\040\115\151\156\157\163\151\164\145\164\164  
\040\113\157\172\152\145\147\171\172\157\151\040\050\103\154\141  
\163\163\040\121\101\051\040\124\141\156\165\163\151\164\166\141  
\156\171\153\151\141\144\157\061\036\060\034\006\011\052\206\110  
\206\367\015\001\011\001\026\017\151\156\146\157\100\156\145\164  
\154\157\143\153\056\150\165\060\202\001\042\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060  
\202\001\012\002\202\001\001\000\307\122\045\262\330\075\324\204  
\125\011\247\033\275\154\271\024\364\212\002\333\166\374\152\052  
\170\253\345\167\360\156\340\214\043\147\333\245\144\231\271\335  
\001\076\157\357\055\232\074\042\360\135\311\127\240\125\101\177  
\362\103\136\130\202\123\061\145\316\036\362\046\272\000\124\036  
\257\260\274\034\344\122\214\240\062\257\267\067\261\123\147\150  
\164\147\120\366\055\056\144\336\256\046\171\337\337\231\206\253  
\253\177\205\354\240\373\200\314\364\270\014\036\223\105\143\271  
\334\270\133\233\355\133\071\324\137\142\260\247\216\174\146\070  
\054\252\261\010\143\027\147\175\314\275\263\361\303\077\317\120  
\071\355\321\031\203\025\333\207\022\047\226\267\332\352\345\235  
\274\272\352\071\117\213\357\164\232\347\305\320\322\352\206\121  
\034\344\376\144\010\050\004\171\005\353\312\305\161\016\013\357  
\253\352\354\022\021\241\030\005\062\151\321\014\054\032\075\045  
\231\077\265\174\312\155\260\256\231\231\372\010\140\347\031\302  
\362\275\121\323\314\323\002\254\301\021\014\200\316\253\334\224  
\235\153\243\071\123\072\326\205\002\003\000\305\175\243\202\002  
\300\060\202\002\274\060\022\006\003\125\035\023\001\001\377\004  
\010\060\006\001\001\377\002\001\004\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\006\060\202\002\165\006\011\140  
\206\110\001\206\370\102\001\015\004\202\002\146\026\202\002\142  
\106\111\107\131\105\114\105\115\041\040\105\172\145\156\040\164  
\141\156\165\163\151\164\166\141\156\171\040\141\040\116\145\164  
\114\157\143\153\040\113\146\164\056\040\115\151\156\157\163\151  
\164\145\164\164\040\123\172\157\154\147\141\154\164\141\164\141  
\163\151\040\123\172\141\142\141\154\171\172\141\164\141\142\141  
\156\040\154\145\151\162\164\040\145\154\152\141\162\141\163\157  
\153\040\141\154\141\160\152\141\156\040\153\145\163\172\165\154  
\164\056\040\101\040\155\151\156\157\163\151\164\145\164\164\040  
\145\154\145\153\164\162\157\156\151\153\165\163\040\141\154\141  
\151\162\141\163\040\152\157\147\150\141\164\141\163\040\145\162  
\166\145\156\171\145\163\165\154\145\163\145\156\145\153\054\040  
\166\141\154\141\155\151\156\164\040\145\154\146\157\147\141\144  
\141\163\141\156\141\153\040\146\145\154\164\145\164\145\154\145  
\040\141\040\115\151\156\157\163\151\164\145\164\164\040\123\172  
\157\154\147\141\154\164\141\164\141\163\151\040\123\172\141\142  
\141\154\171\172\141\164\142\141\156\054\040\141\172\040\101\154  
\164\141\154\141\156\157\163\040\123\172\145\162\172\157\144\145  
\163\151\040\106\145\154\164\145\164\145\154\145\153\142\145\156

\040\145\154\157\151\162\164\040\145\154\154\145\156\157\162\172  
\145\163\151\040\145\154\152\141\162\141\163\040\155\145\147\164  
\145\164\145\154\145\056\040\101\040\144\157\153\165\155\145\156  
\164\165\155\157\153\040\155\145\147\164\141\154\141\154\150\141  
\164\157\153\040\141\040\150\164\164\160\163\072\057\057\167\167  
\167\056\156\145\164\154\157\143\153\056\150\165\057\144\157\143  
\163\057\040\143\151\155\145\156\040\166\141\147\171\040\153\145  
\162\150\145\164\157\153\040\141\172\040\151\156\146\157\100\156  
\145\164\154\157\143\153\056\156\145\164\040\145\055\155\141\151  
\154\040\143\151\155\145\156\056\040\127\101\122\116\111\116\107  
\041\040\124\150\145\040\151\163\163\165\141\156\143\145\040\141  
\156\144\040\164\150\145\040\165\163\145\040\157\146\040\164\150  
\151\163\040\143\145\162\164\151\146\151\143\141\164\145\040\141  
\162\145\040\163\165\142\152\145\143\164\040\164\157\040\164\150  
\145\040\116\145\164\114\157\143\153\040\121\165\141\154\151\146  
\151\145\144\040\103\120\123\040\141\166\141\151\154\141\142\154  
\145\040\141\164\040\150\164\164\160\163\072\057\057\167\167\167  
\056\156\145\164\154\157\143\153\056\150\165\057\144\157\143\163  
\057\040\157\162\040\142\171\040\145\055\155\141\151\154\040\141  
\164\040\151\156\146\157\100\156\145\164\154\157\143\153\056\156  
\145\164\060\035\006\003\125\035\016\004\026\004\024\011\152\142  
\026\222\260\132\273\125\016\313\165\062\072\062\345\262\041\311  
\050\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000  
\003\202\001\001\000\221\152\120\234\333\170\201\233\077\213\102  
\343\073\374\246\303\356\103\340\317\363\342\200\065\111\105\166  
\002\342\343\057\005\305\361\052\347\300\101\063\306\266\233\320  
\063\071\315\300\333\241\255\154\067\002\114\130\101\073\362\227  
\222\306\110\250\315\345\212\071\211\141\371\122\227\351\275\366  
\371\224\164\350\161\016\274\167\206\303\006\314\132\174\112\176  
\064\120\060\056\373\177\062\232\215\075\363\040\133\370\152\312  
\206\363\061\114\054\131\200\002\175\376\070\311\060\165\034\267  
\125\343\274\237\272\250\155\204\050\005\165\263\213\015\300\221  
\124\041\347\246\013\264\231\365\121\101\334\315\243\107\042\331  
\307\001\201\304\334\107\117\046\352\037\355\333\315\015\230\364  
\243\234\264\163\062\112\226\231\376\274\177\310\045\130\370\130  
\363\166\146\211\124\244\246\076\304\120\134\272\211\030\202\165  
\110\041\322\117\023\350\140\176\007\166\333\020\265\121\346\252  
\271\150\252\315\366\235\220\165\022\352\070\032\312\104\350\267  
\231\247\052\150\225\146\225\253\255\357\211\313\140\251\006\022  
\306\224\107\351\050

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado"

```
Issuer: 1.2.840.113549.1.9.1=info@netlock.hu,CN=NetLock
 Minositett Kozjegyzoi (Class QA) Tanusitvanykiado,OU=Tanusitvanykiadok,O=NetLock Halozatbiztonsagi
 Kft.,L=Budapest,C=HU
Serial Number: 123 (0x7b)
Subject: 1.2.840.113549.1.9.1=info@netlock.hu,CN=NetLock Minositett Kozjegyzoi (Class QA)
 Tanusitvanykiado,OU=Tanusitvanykiadok,O=NetLock Halozatbiztonsagi Kft.,L=Budapest,C=HU
Not Valid Before: Sun Mar 30 01:47:11 2003
Not Valid After: Thu Dec 15 01:47:11 2022
Fingerprint (MD5): d4:80:65:68:24:f9:89:22:28:db:f5:a4:9a:17:8f:14
Fingerprint (SHA1): 01:68:97:e1:a0:b8:f2:c3:b1:34:66:5c:20:a7:27:b7:a1:58:e2:8f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\001\150\227\341\240\270\362\303\261\064\146\134\040\247\047\267
\241\130\342\217
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\324\200\145\150\044\371\211\042\050\333\365\244\232\027\217\024
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\311\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160
\145\163\164\061\047\060\045\006\003\125\004\012\023\036\116\145
\164\114\157\143\153\040\110\141\154\157\172\141\164\142\151\172
\164\157\156\163\141\147\151\040\113\146\164\056\061\032\060\030
\006\003\125\004\013\023\021\124\141\156\165\163\151\164\166\141
\156\171\153\151\141\144\157\153\061\102\060\100\006\003\125\004
\003\023\071\116\145\164\114\157\143\153\040\115\151\156\157\163
\151\164\145\164\164\040\113\157\172\152\145\147\171\172\157\151
\040\050\103\154\141\163\163\040\121\101\051\040\124\141\156\165
\163\151\164\166\141\156\171\153\151\141\144\157\061\036\060\034
\006\011\052\206\110\206\367\015\001\011\001\026\017\151\156\146
\157\100\156\145\164\154\157\143\153\056\150\165
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\173
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
```



```
Certificate "Staat der Nederlanden Root CA"
Issuer: CN=Staat der Nederlanden Root CA,O=Staat der Nederlanden,C=NL
Serial Number:98:96:8a
Subject: CN=Staat der Nederlanden Root CA,O=Staat der Nederlanden,C=NL
Not Valid Before: Tue Dec 17 09:23:49 2002
Not Valid After: Wed Dec 16 09:15:38 2015
Fingerprint (MD5): 60:84:7c:5a:ce:db:0c:d4:cb:a7:e9:fe:02:c6:a9:c0
Fingerprint (SHA1): 10:1d:fa:3f:d5:0b:cb:bb:9b:b5:60:0c:19:55:a4:1a:f4:73:3a:04
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\023\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\046\060\044\006\003\125\004\003\023\035\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\023\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\046\060\044\006\003\125\004\003\023\035\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\000\230\226\212
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\272\060\202\002\242\240\003\002\001\002\002\004\000
\230\226\212\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\125\061\013\060\011\006\003\125\004\006\023\002\116
\114\061\036\060\034\006\003\125\004\012\023\025\123\164\141\141
\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145
\156\061\046\060\044\006\003\125\004\003\023\035\123\164\141\141
\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145
\156\040\122\157\157\164\040\103\101\060\036\027\015\060\062\061
\062\061\067\060\071\062\063\064\071\132\027\015\061\065\061\062
\061\066\060\071\061\065\063\070\132\060\125\061\013\060\011\006
\003\125\004\006\023\002\116\114\061\036\060\034\006\003\125\004
\012\023\025\123\164\141\141\164\040\144\145\162\040\116\145\144
```

\145\162\154\141\156\144\145\156\061\046\060\044\006\003\125\004  
\003\023\035\123\164\141\141\164\040\144\145\162\040\116\145\144  
\145\162\154\141\156\144\145\156\040\122\157\157\164\040\103\101  
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001  
\000\230\322\265\121\021\172\201\246\024\230\161\155\276\314\347  
\023\033\326\047\016\172\263\152\030\034\266\141\132\325\141\011  
\277\336\220\023\307\147\356\335\363\332\305\014\022\236\065\125  
\076\054\047\210\100\153\367\334\335\042\141\365\302\307\016\365  
\366\325\166\123\115\217\214\274\030\166\067\205\235\350\312\111  
\307\322\117\230\023\011\242\076\042\210\234\177\326\362\020\145  
\264\356\137\030\325\027\343\370\305\375\342\235\242\357\123\016  
\205\167\242\017\341\060\107\356\000\347\063\175\104\147\032\013  
\121\350\213\240\236\120\230\150\064\122\037\056\155\001\362\140  
\105\362\061\353\251\061\150\051\273\172\101\236\306\031\177\224  
\264\121\071\003\177\262\336\247\062\233\264\107\216\157\264\112  
\256\345\257\261\334\260\033\141\274\231\162\336\344\211\267\172  
\046\135\332\063\111\133\122\234\016\365\212\255\303\270\075\350  
\006\152\302\325\052\013\154\173\204\275\126\005\313\206\145\222  
\354\104\053\260\216\271\334\160\013\106\332\255\274\143\210\071  
\372\333\152\376\043\372\274\344\110\364\147\053\152\021\020\041  
\111\002\003\001\000\001\243\201\221\060\201\216\060\014\006\003  
\125\035\023\004\005\060\003\001\001\377\060\117\006\003\125\035  
\040\004\110\060\106\060\104\006\004\125\035\040\000\060\074\060  
\072\006\010\053\006\001\005\005\007\002\001\026\056\150\164\164  
\160\072\057\057\167\167\167\056\160\153\151\157\166\145\162\150  
\145\151\144\056\156\154\057\160\157\154\151\143\151\145\163\057  
\162\157\157\164\055\160\157\154\151\143\171\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125  
\035\016\004\026\004\024\250\175\353\274\143\244\164\023\164\000  
\354\226\340\323\064\301\054\277\154\370\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\005\204  
\207\125\164\066\141\301\273\321\324\306\025\250\023\264\237\244  
\376\273\356\025\264\057\006\014\051\362\250\222\244\141\015\374  
\253\134\010\133\121\023\053\115\302\052\141\310\370\011\130\374  
\055\002\262\071\175\231\146\201\277\156\134\225\105\040\154\346  
\171\247\321\330\034\051\374\302\040\047\121\310\361\174\135\064  
\147\151\205\021\060\306\000\322\327\363\323\174\266\360\061\127  
\050\022\202\163\351\063\057\246\125\264\013\221\224\107\234\372  
\273\172\102\062\350\256\176\055\310\274\254\024\277\331\017\331  
\133\374\301\371\172\225\341\175\176\226\374\161\260\302\114\310  
\337\105\064\311\316\015\362\234\144\010\320\073\303\051\305\262  
\355\220\004\301\261\051\221\305\060\157\301\251\162\063\314\376  
\135\026\027\054\021\151\347\176\376\305\203\010\337\274\334\042  
\072\056\040\151\043\071\126\140\147\220\213\056\166\071\373\021  
\210\227\366\174\275\113\270\040\026\147\005\215\342\073\301\162  
\077\224\225\067\307\135\271\236\330\223\241\027\217\377\014\146  
\025\301\044\174\062\174\003\035\073\241\130\105\062\223

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "Staat der Nederlanden Root CA"
Issuer: CN=Staat der Nederlanden Root CA,O=Staat der Nederlanden,C=NL
Serial Number:98:96:8a
Subject: CN=Staat der Nederlanden
Root CA,O=Staat der Nederlanden,C=NL
Not Valid Before: Tue Dec 17 09:23:49 2002
Not Valid After: Wed Dec 16 09:15:38 2015
Fingerprint (MD5): 60:84:7c:5a:ce:db:0c:d4:cb:a7:e9:fe:02:c6:a9:c0
Fingerprint (SHA1): 10:1d:fa:3f:d5:0b:cb:bb:9b:b5:60:0c:19:55:a4:1a:f4:73:3a:04
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\020\035\372\077\325\013\313\273\233\265\140\014\031\125\244\032
\364\163\072\004
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\140\204\174\132\316\333\014\324\313\247\351\376\002\306\251\300
END
CKA_ISSUER MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\023\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\046\060\044\006\003\125\004\003\023\035\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\000\230\226\212
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "America Online Root Certification Authority 1"
Issuer: CN=America Online Root Certification Authority 1,O=America Online Inc.,C=US

```

```
Serial Number: 1 (0x1)
Subject: CN=America Online Root Certification Authority 1,O=America Online Inc.,C=US
Not Valid Before: Tue May 28 06:00:00 2002
Not Valid After: Thu Nov 19 20:43:00 2037
Fingerprint (MD5): 14:f1:08:ad:9d:fa:64:e2:89:e7:1c:cf:a8:ad:7d:5e
Fingerprint (SHA1): 39:21:c1:15:c1:5d:0e:ca:5c:cb:5b:c4:f0:7d:21:d8:05:0b:56:6a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "America Online Root Certification Authority 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\101\155\145\162\151\143
\141\040\117\156\154\151\156\145\040\111\156\143\056\061\066\060
\064\006\003\125\004\003\023\055\101\155\145\162\151\143\141\040
\117\156\154\151\156\145\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\101\155\145\162\151\143
\141\040\117\156\154\151\156\145\040\111\156\143\056\061\066\060
\064\006\003\125\004\003\023\055\101\155\145\162\151\143\141\040
\117\156\154\151\156\145\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\244\060\202\002\214\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061\034
\060\032\006\003\125\004\012\023\023\101\155\145\162\151\143\141
\040\117\156\154\151\156\145\040\111\156\143\056\061\066\060\064
\006\003\125\004\003\023\055\101\155\145\162\151\143\141\040\117
\156\154\151\156\145\040\122\157\157\164\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\061\060\036\027\015\060\062\060\065\062\070\060\066
\060\060\060\060\132\027\015\063\067\061\061\061\071\062\060\064
\063\060\060\132\060\143\061\013\060\011\006\003\125\004\006\023
```

\002\125\123\061\034\060\032\006\003\125\004\012\023\023\101\155  
\145\162\151\143\141\040\117\156\154\151\156\145\040\111\156\143  
\056\061\066\060\064\006\003\125\004\003\023\055\101\155\145\162  
\151\143\141\040\117\156\154\151\156\145\040\122\157\157\164\040  
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165  
\164\150\157\162\151\164\171\040\061\060\202\001\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017  
\000\060\202\001\012\002\202\001\001\000\250\057\350\244\151\006  
\003\107\303\351\052\230\377\031\242\160\232\306\120\262\176\245  
\337\150\115\033\174\017\266\227\150\175\055\246\213\227\351\144  
\206\311\243\357\240\206\277\140\145\234\113\124\210\302\110\305  
\112\071\277\024\343\131\125\345\031\264\164\310\264\005\071\134  
\026\245\342\225\005\340\022\256\131\213\242\063\150\130\034\246  
\324\025\267\330\237\327\334\161\253\176\232\277\233\216\063\017  
\042\375\037\056\347\007\066\357\142\071\305\335\313\272\045\024  
\043\336\014\306\075\074\316\202\010\346\146\076\332\121\073\026  
\072\243\005\177\240\334\207\325\234\374\162\251\240\175\170\344  
\267\061\125\036\145\273\324\141\260\041\140\355\020\062\162\305  
\222\045\036\370\220\112\030\170\107\337\176\060\067\076\120\033  
\333\034\323\153\232\206\123\007\260\357\254\006\170\370\204\231  
\376\041\215\114\200\266\014\202\366\146\160\171\032\323\117\243  
\317\361\317\106\260\113\017\076\335\210\142\270\214\251\011\050  
\073\172\307\227\341\036\345\364\237\300\300\256\044\240\310\241  
\331\017\326\173\046\202\151\062\075\247\002\003\001\000\001\243  
\143\060\141\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\000  
\255\331\243\366\171\366\156\164\251\177\063\075\201\027\327\114  
\317\063\336\060\037\006\003\125\035\043\004\030\060\026\200\024  
\000\255\331\243\366\171\366\156\164\251\177\063\075\201\027\327  
\114\317\063\336\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\206\060\015\006\011\052\206\110\206\367\015\001\001  
\005\005\000\003\202\001\001\000\174\212\321\037\030\067\202\340  
\270\260\243\355\126\225\310\142\141\234\005\242\315\302\142\046  
\141\315\020\026\327\314\264\145\064\320\021\212\255\250\251\005  
\146\357\164\363\155\137\235\231\257\366\213\373\353\122\262\005  
\230\242\157\052\305\124\275\045\275\137\256\310\206\352\106\054  
\301\263\275\301\351\111\160\030\026\227\010\023\214\040\340\033  
\056\072\107\313\036\344\000\060\225\133\364\105\243\300\032\260  
\001\116\253\275\300\043\156\143\077\200\112\305\007\355\334\342  
\157\307\301\142\361\343\162\326\004\310\164\147\013\372\210\253  
\241\001\310\157\360\024\257\322\231\315\121\223\176\355\056\070  
\307\275\316\106\120\075\162\343\171\045\235\233\210\053\020\040  
\335\245\270\062\237\215\340\051\337\041\164\206\202\333\057\202  
\060\306\307\065\206\263\371\226\137\106\333\014\105\375\363\120  
\303\157\306\303\110\255\106\246\341\047\107\012\035\016\233\266  
\302\167\177\143\362\340\175\032\276\374\340\337\327\307\247\154  
\260\371\256\272\074\375\164\264\021\350\130\015\200\274\323\250  
\200\072\231\355\165\314\106\173

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER
CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "America Online Root Certification Authority 1"
Issuer: CN=America Online Root Certification Authority 1,O=America Online Inc.,C=US
Serial Number: 1 (0x1)
Subject: CN=America Online Root Certification Authority 1,O=America Online Inc.,C=US
Not Valid Before: Tue May 28 06:00:00 2002
Not Valid After: Thu Nov 19 20:43:00 2037
Fingerprint (MD5): 14:f1:08:ad:9d:fa:64:e2:89:e7:1c:cf:a8:ad:7d:5e
Fingerprint (SHA1): 39:21:c1:15:c1:5d:0e:ca:5c:cb:5b:c4:f0:7d:21:d8:05:0b:56:6a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "America Online Root Certification Authority 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\071\041\301\025\301\135\016\312\134\313\133\304\360\175\041\330
\005\013\126\152
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\024\361\010\255\235\372\144\342\211\347\034\317\250\255\175\136
END
CKA_ISSUER
MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\101\155\145\162\151\143
\141\040\117\156\154\151\156\145\040\111\156\143\056\061\066\060
\064\006\003\125\004\003\023\055\101\155\145\162\151\143\141\040
\117\156\154\151\156\145\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Juur-SK"

```

```
Issuer: CN=Juur-SK,O=AS Sertifitseerimiskeskus,C=EE,1.2.840.1.13549.1.9.1=pki@sk.ee
Serial Number:3b:8e:4b:fc
Subject: CN=Juur-SK,O=AS Sertifitseerimiskeskus,C=EE,1.2.840.1.13549.1.9.1=pki@sk.ee
#
 Not Valid Before: Thu Aug 30 14:23:01 2001
Not Valid After: Fri Aug 26 14:23:01 2016
Fingerprint (MD5): aa:8e:5d:d9:f8:db:0a:58:b7:8d:26:87:6c:82:35:55
Fingerprint (SHA1): 40:9d:4b:d9:17:b5:5c:27:b6:9b:64:cb:98:22:44:0d:cd:09:b8:89
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Juur-SK"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\030\060\026\006\011\052\206\110\206\367\015\001\011
\001\026\011\160\153\151\100\163\153\056\145\145\061\013\060\011
\006\003\125\004\006\023\002\105\105\061\042\060\040\006\003\125
\004\012\023\031\101\123\040\123\145\162\164\151\146\151\164\163
\145\145\162\151\155\151\163\153\145\163\153\165\163\061\020\060
\016\006\003\125\004\003\023\007\112\165\165\162\055\123\113
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\030\060\026\006\011\052\206\110\206\367\015\001\011
\001\026\011\160\153\151\100\163\153\056\145\145\061\013\060\011
\006\003\125\004\006\023\002\105\105\061\042\060\040\006\003\125
\004\012\023\031\101\123\040\123\145\162\164\151\146\151\164\163
\145\145\162\151\155\151\163\153\145\163\153\165\163\061\020\060
\016\006\003\125\004\003\023\007\112\165\165\162\055\123\113
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\073\216\113\374
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\346\060\202\003\316\240\003\002\001\002\002\004\073
\216\113\374\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\135\061\030\060\026\006\011\052\206\110\206\367\015
\001\011\001\026\011\160\153\151\100\163\153\056\145\145\061\013
\060\011\006\003\125\004\006\023\002\105\105\061\042\060\040\006
\003\125\004\012\023\031\101\123\040\123\145\162\164\151\146\151
\164\163\145\145\162\151\155\151\163\153\145\163\153\165\163\061
\020\060\016\006\003\125\004\003\023\007\112\165\165\162\055\123
\113\060\036\027\015\060\061\060\070\063\060\061\064\062\063\060
\061\132\027\015\061\066\060\070\062\066\061\064\062\063\060\061
\132\060\135\061\030\060\026\006\011\052\206\110\206\367\015\001
\011\001\026\011\160\153\151\100\163\153\056\145\145\061\013\060
```

\011\006\003\125\004\006\023\002\105\105\061\042\060\040\006\003  
\125\004\012\023\031\101\123\040\123\145\162\164\151\146\151\164  
\163\145\145\162\151\155\151\163\153\145\163\153\165\163\061\020  
\060\016\006\003\125\004\003\023\007\112\165\165\162\055\123\113  
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001  
\000\201\161\066\076\063\007\326\343\060\215\023\176\167\062\106  
\313\317\031\262\140\061\106\227\206\364\230\106\244\302\145\105  
\317\323\100\174\343\132\042\250\020\170\063\314\210\261\323\201  
\112\366\142\027\173\137\115\012\056\320\317\213\043\356\117\002  
\116\273\353\016\312\275\030\143\350\200\034\215\341\034\215\075  
\340\377\133\137\352\144\345\227\350\077\231\177\014\012\011\063  
\000\032\123\247\041\341\070\113\326\203\033\255\257\144\302\371  
\034\172\214\146\110\115\146\037\030\012\342\076\273\037\007\145  
\223\205\271\032\260\271\304\373\015\021\366\365\326\371\033\307  
\054\053\267\030\121\376\340\173\366\250\110\257\154\073\117\057  
\357\370\321\107\036\046\127\360\121\035\063\226\377\357\131\075  
\332\115\321\025\064\307\352\077\026\110\173\221\034\200\103\017  
\075\270\005\076\321\263\225\315\330\312\017\302\103\147\333\267  
\223\340\042\202\056\276\365\150\050\203\271\301\073\151\173\040  
\332\116\234\155\341\272\315\217\172\154\260\011\042\327\213\013  
\333\034\325\132\046\133\015\300\352\345\140\320\237\376\065\337  
\077\002\003\001\000\001\243\202\001\254\060\202\001\250\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\202\001\026\006\003\125\035\040\004\202\001\015\060\202\001\011  
\060\202\001\005\006\012\053\006\001\004\001\316\037\001\001\001  
\060\201\366\060\201\320\006\010\053\006\001\005\005\007\002\002  
\060\201\303\036\201\300\000\123\000\145\000\145\000\040\000\163  
\000\145\000\162\000\164\000\151\000\146\000\151\000\153\000\141  
\000\141\000\164\000\040\000\157\000\156\000\040\000\166\000\344  
\000\154\000\152\000\141\000\163\000\164\000\141\000\164\000\165  
\000\144\000\040\000\101\000\123\000\055\000\151\000\163\000\040  
\000\123\000\145\000\162\000\164\000\151\000\146\000\151\000\164  
\000\163\000\145\000\145\000\162\000\151\000\155\000\151\000\163  
\000\153\000\145\000\163\000\153\000\165\000\163\000\040\000\141  
\000\154\000\141\000\155\000\055\000\123\000\113\000\040\000\163  
\000\145\000\162\000\164\000\151\000\146\000\151\000\153\000\141  
\000\141\000\164\000\151\000\144\000\145\000\040\000\153\000\151  
\000\156\000\156\000\151\000\164\000\141\000\155\000\151\000\163  
\000\145\000\153\000\163\060\041\006\010\053\006\001\005\005\007  
\002\001\026\025\150\164\164\160\072\057\057\167\167\167\056\163  
\153\056\145\145\057\143\160\163\057\060\053\006\003\125\035\037  
\004\044\060\042\060\040\240\036\240\034\206\032\150\164\164\160  
\072\057\057\167\167\167\056\163\153\056\145\145\057\152\165\165  
\162\057\143\162\154\057\060\035\006\003\125\035\016\004\026\004  
\024\004\252\172\107\243\344\211\257\032\317\012\100\247\030\077  
\157\357\351\175\276\060\037\006\003\125\035\043\004\030\060\026  
\200\024\004\252\172\107\243\344\211\257\032\317\012\100\247\030



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\077\157\357\351\175\276\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\346\060\015\006\011\052\206\110\206\367\015
\001\001\005\005\000\003\202\001\001\000\173\301\030\224\123\242
\011\363\376\046\147\232\120\344\303\005\057\053\065\170\221\114
\174\250\021\021\171\114\111\131\254\310\367\205\145\134\106\273
\073\020\240\002\257\315\117\265\314\066\052\354\135\376\357\240
\221\311\266\223\157\174\200\124\354\307\010\160\015\216\373\202
\354\052\140\170\151\066\066\321\305\234\213\151\265\100\310\224
\145\167\362\127\041\146\073\316\205\100\266\063\143\032\277\171
\036\374\134\035\323\035\223\033\213\014\135\205\275\231\060\062
\030\011\221\122\351\174\241\272\377\144\222\232\354\376\065\356
\214\057\256\374\040\206\354\112\336\033\170\062\067\246\201\322
\235\257\132\022\026\312\231\133\374\157\155\016\305\240\036\206
\311\221\320\134\230\202\137\143\014\212\132\253\330\225\246\314
\313\212\326\277\144\113\216\312\212\262\260\351\041\062\236\252
\250\205\230\064\201\071\041\073\250\072\122\062\075\366\153\067
\206\006\132\025\230\334\360\021\146\376\064\040\267\003\364\101
\020\175\071\204\171\226\162\143\266\226\002\345\153\271\255\031
\115\273\306\104\333\066\313\052\234\216
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Juur-SK"

# Issuer: CN=Juur-SK,O=AS Sertifitseerimiskeskus,C=EE,1.2.840.113549.1.9.1=pki@sk.ee

# Serial Number:3b:8e:4b:fc

# Subject: CN=Juur-SK,O=AS Sertifitseerimiskeskus,C=EE,1.2.840.113549.1.9.1=pki@sk.ee

# Not Valid Before: Thu Aug 30 14:23:01 2001

# Not Valid After: Fri Aug 26 14:23:01 2016

#

Fingerprint (MD5): aa:8e:5d:d9:f8:db:0a:58:b7:8d:26:87:6c:82:35:55

# Fingerprint (SHA1): 40:9d:4b:d9:17:b5:5c:27:b6:9b:64:cb:98:22:44:0d:cd:09:b8:89

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Juur-SK"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\100\235\113\331\027\265\134\047\266\233\144\313\230\042\104\015
\315\011\270\211
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\252\216\135\331\370\333\012\130\267\215\046\207\154\202\065\125
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\135\061\030\060\026\006\011\052\206\110\206\367\015\001\011
\001\026\011\160\153\151\100\163\153\056\145\145\061\013\060\011
\006\003\125\004\006\023\002\105\105\061\042\060\040\006\003\125
\004\012\023\031\101\123\040\123\145\162\164\151\146\151\164\163
\145\145\162\151\155\151\163\153\145\163\153\165\163\061\020\060
\016\006\003\125\004\003\023\007\112\165\165\162\055\123\113
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\004\073\216\113\374
```

END

CKA\_TRUST\_SERVER\_AUTH

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "SECOM Trust.net"

# Issuer: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP

# Serial Number: 0 (0x0)

# Subject: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP

# Not Valid Before: Tue Sep 30 04:20:49 2003

# Not Valid After: Sat Sep 30 04:20:49 2023

# Fingerprint (MD5): f1:bc:63:6a:54:e0:b5:27:f5:cd:e7:1a:e3:4d:6e:4a

# Fingerprint (SHA1): 36:b1:2b:49:f9:81:9e:d7:4c:9e:bc:38:0f:c6:56:8f:5d:ac:b2:f7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SECOM Trust.net"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040
\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125
\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155
\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103
\101\061
```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040
\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125
\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155
\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103
\101\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\132\060\202\002\102\240\003\002\001\002\002\001\000  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061\030  
\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040\124  
\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125\004  
\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155\155  
\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103\101  
\061\060\036\027\015\060\063\060\071\063\060\060\064\062\060\064  
\071\132\027\015\062\063\060\071\063\060\060\064\062\060\064\071  
\132\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120  
\061\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115  
\040\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003  
\125\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157  
\155\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164  
\103\101\061\060\202\001\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002  
\202\001\001\000\263\263\376\177\323\155\261\357\026\174\127\245  
\014\155\166\212\057\113\277\144\373\114\356\212\360\363\051\174  
\365\377\356\052\340\351\351\272\133\144\042\232\232\157\054\072  
\046\151\121\005\231\046\334\325\034\152\161\306\232\175\036\235  
\335\174\154\306\214\147\147\112\076\370\161\260\031\047\251\011  
\014\246\225\277\113\214\014\372\125\230\073\330\350\042\241\113  
\161\070\171\254\227\222\151\263\211\176\352\041\150\006\230\024  
\226\207\322\141\066\274\155\047\126\236\127\356\300\300\126\375  
\062\317\244\331\216\302\043\327\215\250\363\330\045\254\227\344  
\160\070\364\266\072\264\235\073\227\046\103\243\241\274\111\131  
\162\114\043\060\207\001\130\366\116\276\034\150\126\146\257\315  
\101\135\310\263\115\052\125\106\253\037\332\036\342\100\075\333  
\315\175\271\222\200\234\067\335\014\226\144\235\334\042\367\144  
\213\337\141\336\025\224\122\025\240\175\122\311\113\250\041\311  
\306\261\355\313\303\225\140\321\017\360\253\160\370\337\313\115  
\176\354\326\372\253\331\275\177\124\362\245\351\171\372\331\326  
\166\044\050\163\002\003\001\000\001\243\077\060\075\060\035\006  
\003\125\035\016\004\026\004\024\240\163\111\231\150\334\205\133  
\145\343\233\050\057\127\237\275\063\274\007\110\060\013\006\003  
\125\035\017\004\004\003\002\001\006\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\150\100  
\251\250\273\344\117\135\171\263\005\265\027\263\140\023\353\306  
\222\135\340\321\323\152\376\373\276\233\155\277\307\005\155\131  
\040\304\034\360\267\332\204\130\002\143\372\110\026\357\117\245  
\013\367\112\230\362\077\236\033\255\107\153\143\316\010\107\353  
\122\077\170\234\257\115\256\370\325\117\317\232\230\052\020\101

```
\071\122\304\335\331\233\016\357\223\001\256\262\056\312\150\102
\044\102\154\260\263\072\076\315\351\332\110\304\025\313\351\371
\007\017\222\120\111\212\335\061\227\137\311\351\067\252\073\131
\145\227\224\062\311\263\237\076\072\142\130\305\111\255\142\016
\161\245\062\252\057\306\211\166\103\100\023\023\147\075\242\124
\045\020\313\361\072\362\331\372\333\111\126\273\246\376\247\101
\065\303\340\210\141\311\210\307\337\066\020\042\230\131\352\260
\112\373\126\026\163\156\254\115\367\042\241\117\255\035\172\055
\105\047\345\060\301\136\362\332\023\313\045\102\121\225\107\003
\214\154\041\314\164\102\355\123\377\063\213\217\017\127\001\026
\057\317\246\356\311\160\042\024\275\375\276\154\013\003
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SECOM Trust.net"

# Issuer: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP

# Serial Number: 0 (0x0)

# Subject: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP

# Not Valid Before: Tue Sep 30 04:20:49 2003

# Not Valid After: Sat Sep 30 04:20:49 2023

# Fingerprint (MD5): f1:bc:63:6a:54:e0:b5:27:f5:cd:e7:1a:e3:4d:6e:4a

# Fingerprint (SHA1): 36:b1:2b:49:f9:81:9e:d7:4c:9e:bc:38:0f:c6:56:8f:5d:ac:b2:f7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL

UTF8 "SECOM Trust.net"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\066\261\053\111\371\201\236\327\114\236\274\070\017\306\126\217
\135\254\262\367
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\361\274\143\152\124\340\265\047\365\315\347\032\343\115\156\112
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040
\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125
\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155
\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103
\101\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "ComSign CA"
Issuer: C=IL,O=ComSign,CN=ComSign
CA
Serial Number: 14:13:96:83:14:55:8c:ea:7b:63:e5:fc:34:87:77:44
Subject: C=IL,O=ComSign,CN=ComSign CA
Not Valid Before: Wed Mar 24 11:32:18 2004
Not Valid After: Mon Mar 19 15:02:18 2029
Fingerprint (MD5): cd:f4:39:f3:b5:18:50:d7:3e:a4:c5:91:a0:3e:21:4b
Fingerprint (SHA1): e1:a4:5b:14:1a:21:da:1a:79:f4:1a:42:a9:61:d6:69:cd:06:34:c1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ComSign CA"
```

```
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\064\061\023\060\021\006\003\125\004\003\023\012\103\157\155
\123\151\147\156\040\103\101\061\020\060\016\006\003\125\004\012
\023\007\103\157\155\123\151\147\156\061\013\060\011\006\003\125
\004\006\023\002\111\114
```

END

```
CKA_ID UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
\060\064\061\023\060\021\006\003\125\004\003\023\012\103\157\155
\123\151\147\156\040\103\101\061\020\060\016\006\003\125\004\012
\023\007\103\157\155\123\151\147\156\061\013\060\011\006\003\125
\004\006\023\002\111\114
```

END

```
CKA_SERIAL_NUMBER
```

```
MULTILINE_OCTAL
\002\020\024\023\226\203\024\125\214\352\173\143\345\374\064\207
\167\104
```

END

```
CKA_VALUE MULTILINE_OCTAL
```

```
\060\202\003\223\060\202\002\173\240\003\002\001\002\002\020\024
\023\226\203\024\125\214\352\173\143\345\374\064\207\167\104\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\064
\061\023\060\021\006\003\125\004\003\023\012\103\157\155\123\151
\147\156\040\103\101\061\020\060\016\006\003\125\004\012\023\007
\103\157\155\123\151\147\156\061\013\060\011\006\003\125\004\006
```

\023\002\111\114\060\036\027\015\060\064\060\063\062\064\061\061  
\063\062\061\070\132\027\015\062\071\060\063\061\071\061\065\060  
\062\061\070\132\060\064\061\023\060\021\006\003\125\004\003\023  
\012\103\157\155\123\151\147\156\040\103\101\061\020\060\016\006  
\003\125\004\012\023\007\103\157\155\123\151\147\156\061\013\060  
\011\006\003\125\004\006\023\002\111\114\060\202\001\042\060\015  
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001  
\017\000\060\202\001\012\002\202\001\001\000\360\344\124\151\053  
\323\307\217\152\104\344\176\130\047\370\013\320\344\224\022\212  
\361\033\070\070\057\037\061\234\006\324\054\247\336\013\052\256  
\032\240\343\236\152\277\237\074\307\156\242\371\213\144\154\072  
\255\205\125\121\124\245\070\125\270\253\203\004\362\077\144\066  
\367\300\215\103\103\152\146\321\367\027\052\325\357\066\372\060  
\020\102\327\123\315\371\372\063\163\114\263\351\204\040\212\326  
\101\047\065\344\070\372\224\233\270\172\344\171\037\063\373\033  
\330\041\011\050\174\115\030\151\136\144\212\172\031\223\312\176  
\354\363\162\347\067\007\130\131\050\254\102\371\305\377\315\077  
\347\245\372\070\261\320\014\307\331\122\032\123\326\201\314\102  
\172\065\133\355\113\072\172\366\265\216\314\377\017\174\344\140  
\066\207\057\255\360\241\045\175\377\322\113\021\210\160\124\246  
\101\250\147\123\122\102\136\344\064\236\344\276\243\354\252\142  
\135\335\303\114\246\202\101\344\063\013\254\311\063\017\144\202  
\127\052\375\014\255\066\341\014\256\113\305\357\073\231\331\043  
\263\133\135\264\127\354\164\160\014\052\117\002\003\001\000\001  
\243\201\240\060\201\235\060\014\006\003\125\035\023\004\005\060  
\003\001\001\377\060\075\006\003\125\035\037\004\066\060\064\060  
\062\240\060\240\056\206\054\150\164\164\160\072\057\057\146\145  
\144\151\162\056\143\157\155\163\151\147\156\056\143\157\056\151  
\154\057\143\162\154\057\103\157\155\123\151\147\156\103\101\056  
\143\162\154\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\206\060\037\006\003\125\035\043\004\030\060\026\200\024  
\113\001\233\076\126\032\145\066\166\313\173\227\252\222\005\356  
\062\347\050\061\060\035\006\003\125\035\016\004\026\004\024\113  
\001\233\076\126\032\145\066\166\313\173\227\252\222\005\356\062  
\347\050\061\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\003\202\001\001\000\320\331\245\176\376\051\140\105\235  
\176\203\317\156\274\107\156\365\032\236\124\166\102\161\264\074  
\130\077\055\100\045\102\366\201\234\361\211\020\310\016\252\170  
\117\070\011\127\260\074\300\010\374\065\216\361\110\121\215\014  
\161\164\272\204\304\327\162\233\204\174\070\116\144\006\047\052  
\341\247\265\354\010\231\264\012\015\324\205\163\310\022\341\065  
\355\361\005\061\035\163\231\014\353\226\312\335\323\346\205\252  
\360\212\373\165\301\362\011\074\145\145\144\363\114\330\255\313  
\210\151\363\344\203\267\014\275\027\132\226\027\312\133\377\255  
\273\034\351\055\204\200\330\041\276\205\122\331\324\164\271\151  
\205\272\115\355\050\062\353\371\141\112\344\304\066\036\031\334  
\157\204\021\037\225\365\203\050\030\250\063\222\103\047\335\135  
\023\004\105\117\207\325\106\315\075\250\272\360\363\270\126\044

```
\105\353\067\307\341\166\117\162\071\030\337\176\164\162\307\163
\055\071\352\140\346\255\021\242\126\207\173\303\150\232\376\370
\214\160\250\337\145\062\364\244\100\214\241\302\104\003\016\224
\000\147\240\161\000\202\110
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ComSign CA"

# Issuer: C=IL,O=ComSign,CN=ComSign CA

# Serial Number: 14:13:96:83:14:55:8c:ea:7b:63:e5:fc:34:87:77:44

# Subject: C=IL,O=ComSign,CN=ComSign CA

# Not Valid Before: Wed Mar 24 11:32:18 2004

# Not Valid After: Mon Mar 19 15:02:18 2029

# Fingerprint (MD5): cd:f4:39:f3:b5:18:50:d7:3e:a4:c5:91:a0:3e:21:4b

# Fingerprint (SHA1): e1:a4:5b:14:1a:21:da:1a:79:f4:1a:42:a9:61:d6:69:cd:06:34:c1

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ComSign CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\341\244\133\024\032\041\332\032\171\364\032\102\251\141\326\151
\315\006\064\301
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\315\364\071\363\265\030\120\327\076\244\305\221\240\076\041\113
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\064\061\023\060\021\006\003\125\004\003\023\012\103\157\155
\123\151\147\156\040\103\101\061\020\060\016\006\003\125\004\012
\023\007\103\157\155\123\151\147\156\061\013\060\011\006\003\125
\004\006\023\002\111\114
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\024\023\226\203\024\125\214\352\173\143\345\374\064\207
\167\104
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

```
Microsoft Code Signing Only Certificate
Certificate "ComSign Secured CA"
Issuer: C=IL,O=ComSign,CN=ComSign Secured CA
Serial Number:c7:28:47:09:b3:b8:6c:45:8c:1d:fa:24:f5:36:4e:e9
Subject: C=IL,O=ComSign,CN=ComSign Secured CA
Not Valid Before: Wed Mar 24 11:37:20 2004
Not Valid After: Fri Mar 16 15:04:56 2029
Fingerprint (MD5): 40:01:25:06:8d:21:43:6a:0e:43:00:9c:e7:43:f3:d5
Fingerprint (SHA1): f9:cd:0e:2c:da:76:24:c1:8f:bd:f0:f0:ab:b6:45:b8:f7:fe:d5:7a
CKA_CLASS CK_OBJECT_CLASS
CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ComSign Secured CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\074\061\033\060\031\006\003\125\004\003\023\022\103\157\155
\123\151\147\156\040\123\145\143\165\162\145\144\040\103\101\061
\020\060\016\006\003\125\004\012\023\007\103\157\155\123\151\147
\156\061\013\060\011\006\003\125\004\006\023\002\111\114
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\033\060\031\006\003\125\004\003\023\022\103\157\155
\123\151\147\156\040\123\145\143\165\162\145\144\040\103\101\061
\020\060\016\006\003\125\004\012\023\007\103\157\155\123\151\147
\156\061\013\060\011\006\003\125\004\006\023\002\111\114
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\307\050\107\011\263\270\154\105\214\035\372\044\365
\066\116\351
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\253\060\202\002\223\240\003\002\001\002\002\021\000
\307\050\107\011\263\270\154\105\214\035\372\044\365\066\116\351
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\074\061\033\060\031\006\003\125\004\003\023\022\103\157\155\123
\151\147\156\040\123\145\143\165\162\145\144\040\103\101\061\020
\060\016\006\003\125\004\012\023\007\103\157\155\123\151\147\156
\061\013\060\011\006\003\125\004\006\023\002\111\114\060\036\027
\015\060\064\060\063\062\064\061\061\063\067\062\060\132\027\015
\062\071\060\063\061\066\061\065\060\064\065\066\132\060\074\061
\033\060\031\006\003\125\004\003\023\022\103\157\155\123\151\147
\156\040\123\145\143\165\162\145\144\040\103\101\061\020\060\016
\006\003\125\004\012\023\007\103\157\155\123\151\147\156\061\013
\060\011\006\003\125\004\006\023\002\111\114\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
```



\001\017\000\060\202\001\012\002\202\001\001\000\306\265\150\137  
\035\224\025\303\244\010\125\055\343\240\127\172\357\351\164\052  
\273\271\174\127\111\032\021\136\117\051\207\014\110\326\152\347  
\217\324\176\127\044\271\006\211\344\034\074\352\254\343\332\041  
\200\163\041\012\357\171\230\154\037\010\377\241\120\175\362\230  
\033\311\124\157\076\245\050\354\041\004\017\105\273\007\075\241  
\300\372\052\230\035\116\006\223\373\365\210\073\253\137\313\026  
\277\346\363\236\112\207\355\031\352\302\237\103\344\361\201\245  
\177\020\117\076\321\112\142\255\123\033\313\203\377\007\145\245  
\222\055\146\251\133\270\132\364\035\264\041\221\112\027\173\236  
\062\376\126\044\071\262\124\204\103\365\204\302\330\274\101\220  
\314\235\326\150\332\351\202\120\251\073\150\317\265\135\002\224  
\140\026\261\103\331\103\135\335\135\207\156\352\273\263\311\153  
\366\003\224\011\160\336\026\021\172\053\350\166\217\111\020\230  
\167\271\143\134\213\063\227\165\366\013\214\262\253\133\336\164  
\040\045\077\343\363\021\371\207\150\206\065\161\303\035\214\055  
\353\345\032\254\017\163\325\202\131\100\200\323\002\003\001\000  
\001\243\201\247\060\201\244\060\014\006\003\125\035\023\004\005  
\060\003\001\001\377\060\104\006\003\125\035\037\004\075\060\073  
\060\071\240\067\240\065\206\063\150\164\164\160\072\057\057\146  
\145\144\151\162\056\143\157\155\163\151\147\156\056\143\157\056  
\151\154\057\143\162\154\057\103\157\155\123\151\147\156\123\145  
\143\165\162\145\144\103\101\056\143\162\154\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\206\060\037\006\003\125  
\035\043\004\030\060\026\200\024\301\113\355\160\266\367\076\174  
\000\073\000\217\307\076\016\105\237\036\135\354\060\035\006\003  
\125\035\016\004\026\004\024\301\113\355\160\266\367\076\174\000  
\073\000\217\307\076\016\105\237\036\135\354\060\015\006\011\052  
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\026  
\317\356\222\023\120\253\173\024\236\063\266\102\040\152\324\025  
\275\011\253\374\162\350\357\107\172\220\254\121\301\144\116\351  
\210\275\103\105\201\343\146\043\077\022\206\115\031\344\005\260  
\346\067\302\215\332\006\050\311\017\211\244\123\251\165\077\260  
\226\373\253\114\063\125\371\170\046\106\157\033\066\230\373\102  
\166\301\202\271\216\336\373\105\371\143\033\142\073\071\006\312  
\167\172\250\074\011\317\154\066\075\017\012\105\113\151\026\032  
\105\175\063\003\145\371\122\161\220\046\225\254\114\014\365\213  
\223\077\314\165\164\205\230\272\377\142\172\115\037\211\376\256  
\275\224\000\231\277\021\245\334\340\171\305\026\013\175\002\141  
\035\352\205\371\002\025\117\347\132\211\116\024\157\343\067\113  
\205\365\301\074\141\340\375\005\101\262\222\177\303\035\240\320  
\256\122\144\140\153\030\306\046\234\330\365\144\344\066\032\142  
\237\212\017\076\377\155\116\031\126\116\040\221\154\237\064\063  
\072\064\127\120\072\157\201\136\006\306\365\076\174\116\216\053  
\316\145\006\056\135\322\052\123\164\136\323\156\047\236\217

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

```
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Trust for "ComSign Secured CA"
Issuer: C=IL,O=ComSign,CN=ComSign
Secured CA
Serial Number:c7:28:47:09:b3:b8:6c:45:8c:1d:fa:24:f5:36:4e:e9
Subject: C=IL,O=ComSign,CN=ComSign Secured CA
Not Valid Before: Wed Mar 24 11:37:20 2004
Not Valid After: Fri Mar 16 15:04:56 2029
Fingerprint (MD5): 40:01:25:06:8d:21:43:6a:0e:43:00:9c:e7:43:f3:d5
Fingerprint (SHA1): f9:cd:0e:2c:da:76:24:c1:8f:bd:f0:f0:ab:b6:45:b8:f7:fe:d5:7a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ComSign Secured CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\371\315\016\054\332\166\044\301\217\275\360\360\253\266\105\270
\367\376\325\172
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\100\001\045\006\215\041\103\152\016\103\000\234\347\103\363\325
END
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\033\060\031\006\003\125\004\003\023\022\103\157\155
\123\151\147\156\040\123\145\143\165\162\145\144\040\103\101\061
\020\060\016\006\003\125\004\012\023\007\103\157\155\123\151\147
\156\061\013\060\011\006\003\125\004\006\023\002\111\114
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\307\050\107\011\263\270\154\105\214\035\372\044\365
\066\116\351
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "ComSign Advanced Security CA"
Issuer: CN=ComSign Advanced Security CA
Serial Number:7a:5d:e9:33:d0:04:9e:b3:4a:1a:17:74:cb:16:9b:6d
Subject: CN=ComSign Advanced Security CA
Not Valid Before: Wed Mar 24 21:52:04 2004
```

```
Not Valid After: Sat Mar 24 21:55:55 2029
Fingerprint (MD5): f0:9e:63:93:76:a5:95:bc:18:61:f1:9b:fb:d3:64:dd
Fingerprint (SHA1): 80:bf:3d:e9:a4:1d:76:8d:19:4b:29:3c:85:63:2c:db:c8:ea:8c:f7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "ComSign Advanced Security CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\047\061\045\060\043\006\003\125\004\003\023\034\103\157\155
\123\151\147\156\040\101\144\166\141\156\143\145\144\040\123\145
\143\165\162\151\164\171\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\047\061\045\060\043\006\003\125\004\003\023\034\103\157\155
\123\151\147\156\040\101\144\166\141\156\143\145\144\040\123\145
\143\165\162\151\164\171\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\172\135\351\063\320\004\236\263\112\032\027\164\313\026
\233\155
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\033\060\202\004\003\240\003\002\001\002\002\020\172
\135\351\063\320\004\236\263\112\032\027\164\313\026\233\155\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\047
\061\045\060\043\006\003\125\004\003\023\034\103\157\155\123\151
\147\156\040\101\144\166\141\156\143\145\144\040\123\145\143\165
\162\151\164\171\040\103\101\060\036\027\015\060\064\060\063\062
\064\062\061\065\062\060\064\132\027\015\062\071\060\063\062\064
\062\061\065\065\065\065\132\060\047\061\045\060\043\006\003\125
\004\003\023\034\103\157\155\123\151\147\156\040\101\144\166\141
\156\143\145\144\040\123\145\143\165\162\151\164\171\040\103\101
\060\202\002\040\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\015\000\060\202\002\010\002\202\002\001
\000\235\234\134\073\001\204\127\132\364\053\376\155\024\262\154
\267\355\220\327\373\127\103\240\317\140\033\131\057\115\121\140
\075\034\111\242\152\101\143\253\270\355\146\276\100\106\215\252
\222\133\075\056\053\301\141\230\124\154\274\114\253\151\372\215
\105\105\201\052\032\155\370\263\370\017\143\313\216\174\355\124
\051\243\024\030\374\341\311\261\330\124\272\234\312\052\033\320
\254\302\211\030\026\112\376\112\004\322\322\233\265\207\206\301
\311\173\037\066\026\105\271\360\272\206\302\167\212\063\061\102
\242\316\014\162\075\022\345\221\070\364\047\147\141\114\314\342
\365\115\054\022\360\315\263\204\301\011\165\237\000\117\370\167
```

\323\363\062\157\201\217\027\176\073\233\153\363\036\347\372\223  
\117\014\056\227\335\160\130\023\175\363\221\203\215\242\075\061  
\332\143\343\071\166\166\063\346\324\146\015\224\216\025\224\234  
\070\173\334\161\037\332\265\340\327\227\132\202\164\336\073\006  
\332\357\305\053\361\150\335\047\123\370\271\354\214\017\123\042  
\344\071\202\344\371\256\141\374\030\050\176\307\151\351\150\364  
\176\340\321\274\340\155\310\326\321\253\104\061\141\264\354\170  
\065\054\106\336\350\363\266\074\230\263\251\034\007\112\230\315  
\107\046\202\360\324\221\357\020\223\347\150\346\122\152\227\176  
\271\040\227\027\372\031\062\224\043\236\307\163\262\110\350\230  
\265\367\165\126\240\113\235\167\250\032\051\164\070\130\340\310  
\315\261\063\033\057\376\230\223\170\005\001\164\253\256\102\305  
\033\035\057\174\101\174\245\323\140\252\120\301\363\310\210\101  
\130\366\265\222\030\375\256\146\216\234\347\073\232\321\267\333  
\332\307\114\313\042\033\112\077\140\337\071\366\332\352\256\314  
\207\225\270\122\233\132\235\121\105\014\166\357\051\101\245\012  
\271\370\136\304\275\054\114\064\110\107\325\213\310\314\317\321  
\073\130\345\172\306\375\041\354\167\051\257\363\132\124\016\251  
\244\144\174\367\134\321\241\023\345\073\324\133\113\000\224\311  
\313\015\335\004\117\333\150\262\267\147\043\366\141\245\254\017  
\071\076\232\303\057\251\144\303\022\205\232\244\242\122\324\171  
\374\272\043\253\011\032\355\075\231\235\331\347\050\370\017\120  
\117\002\001\003\243\202\001\103\060\202\001\077\060\013\006\003  
\125\035\017\004\004\003\002\001\206\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035  
\016\004\026\004\024\351\372\047\345\355\113\041\160\144\326\161  
\252\174\345\202\034\060\322\015\172\060\115\006\003\125\035\037  
\004\106\060\104\060\102\240\100\240\076\206\074\150\164\164\160  
\072\057\057\146\145\144\151\162\056\143\157\155\163\151\147\156  
\056\143\157\056\151\154\057\143\162\154\057\103\157\155\123\151  
\147\156\101\144\166\141\156\143\145\144\123\145\143\165\162\151  
\164\171\103\101\056\143\162\154\060\020\006\011\053\006\001\004  
\001\202\067\025\001\004\003\002\001\000\060\102\006\003\125\035  
\040\004\073\060\071\060\067\006\011\052\003\004\005\006\007\010  
\011\012\060\052\060\050\006\010\053\006\001\005\005\007\002\001  
\026\034\150\164\164\160\072\057\057\167\167\167\056\143\157\155  
\163\151\147\156\056\143\157\056\151\154\057\143\160\163\060\133  
\006\010\053\006\001\005\005\007\001\001\004\117\060\115\060\113  
\006\010\053\006\001\005\005\007\060\002\206\077\150\164\164\160  
\072\057\057\146\145\144\151\162\056\143\157\155\163\151\147\156  
\056\143\157\056\151\154\057\143\141\143\145\162\164\057\103\157  
\155\123\151\147\156\101\144\166\141\156\143\145\144\123\145\143  
\165\162\151\164\171\103\101\056\143\162\164\060\015\006\011\052  
\206\110\206\367\015\001\001\005\005\000\003\202\002\001\000\234  
\215\135\232\006\021\241\156\026\030\117\313\262\002\073\222\217  
\035\046\245\313\353\110\356\125\035\252\020\340\151\116\301\376  
\062\000\336\017\316\015\264\143\274\340\142\032\340\367\365\251  
\345\311\124\024\213\100\370\255\363\155\002\354\216\173\334\245

\171\222\001\265\377\241\131\143\071\021\265\276\122\256\164\332  
\331\041\243\022\330\307\225\370\333\157\126\125\277\225\022\275  
\062\043\307\311\154\145\001\357\373\164\216\273\044\206\117\175  
\335\360\132\217\073\204\214\171\165\051\364\206\266\323\301\014  
\131\025\302\003\127\253\075\110\327\054\105\224\100\334\340\251  
\113\137\314\020\327\226\277\251\234\003\052\144\362\274\176\370  
\245\247\231\221\047\005\376\111\247\330\255\012\206\066\074\016  
\075\246\341\174\152\201\021\173\105\273\150\215\065\061\375\046  
\123\101\076\074\156\153\036\330\253\055\211\201\231\306\037\227  
\363\132\365\037\141\275\376\025\131\223\012\336\372\121\372\106  
\337\106\364\374\142\154\130\243\014\336\311\031\036\300\034\133  
\070\073\101\217\005\061\016\256\355\054\135\267\017\334\071\304  
\137\042\263\245\262\130\060\044\277\371\011\255\360\226\033\067  
\157\100\146\376\267\052\211\325\306\343\176\003\130\260\175\070  
\346\212\253\077\365\201\363\012\101\167\002\163\355\247\124\335  
\007\061\134\266\265\166\222\164\167\271\157\246\011\272\016\335  
\014\347\166\304\113\276\313\073\325\105\300\211\343\053\167\172  
\142\230\303\133\374\175\127\136\216\356\335\033\120\041\155\221  
\277\031\134\217\227\171\052\301\213\141\157\252\136\122\365\351  
\117\064\230\060\275\034\007\303\267\304\174\201\331\243\103\062  
\146\306\055\274\071\133\251\135\211\353\004\053\104\225\107\371  
\122\364\117\005\356\243\052\143\021\015\036\272\304\370\112\133  
\120\100\121\167\056\364\344\337\361\003\024\346\171\151\332\130  
\104\202\130\024\203\221\064\003\327\172\155\152\321\062\042\051  
\221\033\032\344\013\275\062\025\047\040\277\032\157\122\202\323  
\371\057\111\017\220\154\001\200\111\256\030\356\062\054\316\021  
\307\376\240\004\230\150\224\360\374\213\305\054\157\207\375\331  
\302\304\034\351\055\314\016\254\237\365\361\374\222\070\215

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ComSign Advanced Security CA"

# Issuer: CN=ComSign Advanced Security CA

# Serial Number: 7a:5d:e9:33:d0:04:9e:b3:4a:1a:17:74:cb:16:9b:6d

# Subject: CN=ComSign Advanced Security CA

# Not Valid Before: Wed Mar 24 21:52:04 2004

# Not Valid After: Sat Mar 24 21:55:55 2029

# Fingerprint (MD5): f0:9e:63:93:76:a5:95:bc:18:61:f1:9b:fb:d3:64:dd

# Fingerprint (SHA1): 80:bf:3d:e9:a4:1d:76:8d:19:4b:29:3c:85:63:2c:db:c8:ea:8c:f7

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ComSign Advanced Security CA"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\200\277\075\351\244\035\166\215\031\113\051\074\205\143\054\333
\310\352\214\367
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\360\236\143\223\166\245\225\274\030\141\361\233\373\323\144\335
END
CKA_ISSUER
MULTILINE_OCTAL
\060\047\061\045\060\043\006\003\125\004\003\023\034\103\157\155
\123\151\147\156\040\101\144\166\141\156\143\145\144\040\123\145
\143\165\162\151\164\171\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\172\135\351\063\320\004\236\263\112\032\027\164\313\026
\233\155
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Chambers of Commerce Root"
Issuer: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
Serial Number: 0 (0x0)
Subject: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
Not Valid Before: Tue Sep 30 16:13:43 2003
Not Valid After: Wed Sep 30 16:13:44 2037
Fingerprint (MD5): b0:01:ee:14:d9:af:29:18:94:76:8e:f1:69:33:2a:84
#
Fingerprint (SHA1): 6e:3a:55:a4:19:0c:19:5c:93:84:3c:c0:db:72:2e:31:30:61:f0:b1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Chambers of Commerce Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163

```

```
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\275\060\202\003\245\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061\047
\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155\145
\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101\070
\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004\013
\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150\141
\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060\040
\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163\040
\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157\164
\060\036\027\015\060\063\060\071\063\060\061\066\061\063\064\063
\132\027\015\063\067\060\071\063\060\061\066\061\063\064\064\132
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164\060\202\001\040\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\015\000\060\202\001\010\002\202\001
\001\000\267\066\125\345\245\135\030\060\340\332\211\124\221\374
\310\307\122\370\057\120\331\357\261\165\163\145\107\175\033\133
\272\165\305\374\241\210\044\372\057\355\312\010\112\071\124\304
\121\172\265\332\140\352\070\074\201\262\313\361\273\331\221\043
\077\110\001\160\165\251\005\052\255\037\161\363\311\124\075\035
\006\152\100\076\263\014\205\356\134\033\171\302\142\304\270\066
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\216\065\135\001\014\043\004\107\065\252\233\140\116\240\146\075  
\313\046\012\234\100\241\364\135\230\277\161\253\245\000\150\052  
\355\203\172\017\242\024\265\324\042\263\200\260\074\014\132\121  
\151\055\130\030\217\355\231\236\361\256\342\225\346\366\107\250  
\326\014\017\260\130\130\333\303\146\067\236\233\221\124\063\067  
\322\224\034\152\110\311\311\362\245\332\245\014\043\367\043\016  
\234\062\125\136\161\234\204\005\121\232\055\375\346\116\052\064  
\132\336\312\100\067\147\014\124\041\125\167\332\012\014\314\227  
\256\200\334\224\066\112\364\076\316\066\023\036\123\344\254\116  
\072\005\354\333\256\162\234\070\213\320\071\073\211\012\076\167  
\376\165\002\001\003\243\202\001\104\060\202\001\100\060\022\006  
\003\125\035\023\001\001\377\004\010\060\006\001\001\377\002\001  
\014\060\074\006\003\125\035\037\004\065\060\063\060\061\240\057  
\240\055\206\053\150\164\164\160\072\057\057\143\162\154\056\143  
\150\141\155\142\145\162\163\151\147\156\056\157\162\147\057\143  
\150\141\155\142\145\162\163\162\157\157\164\056\143\162\154\060  
\035\006\003\125\035\016\004\026\004\024\343\224\365\261\115\351  
\333\241\051\133\127\213\115\166\006\166\341\321\242\212\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\021  
\006\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000  
\007\060\047\006\003\125\035\021\004\040\060\036\201\034\143\150  
\141\155\142\145\162\163\162\157\157\164\100\143\150\141\155\142  
\145\162\163\151\147\156\056\157\162\147\060\047\006\003\125\035  
\022\004\040\060\036\201\034\143\150\141\155\142\145\162\163\162  
\157\157\164\100\143\150\141\155\142\145\162\163\151\147\156\056  
\157\162\147\060\130\006\003\125\035\040\004\121\060\117\060\115  
\006\013\053\006\001\004\001\201\207\056\012\003\001\060\076\060  
\074\006\010\053\006\001\005\005\007\002\001\026\060\150\164\164  
\160\072\057\057\143\160\163\056\143\150\141\155\142\145\162\163  
\151\147\156\056\157\162\147\057\143\160\163\057\143\150\141\155  
\142\145\162\163\162\157\157\164\056\150\164\155\154\060\015\006  
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001  
\000\014\101\227\302\032\206\300\042\174\237\373\220\363\032\321  
\003\261\357\023\371\041\137\004\234\332\311\245\215\047\154\226  
\207\221\276\101\220\001\162\223\347\036\175\137\366\211\306\135  
\247\100\011\075\254\111\105\105\334\056\215\060\150\262\011\272  
\373\303\057\314\272\013\337\077\167\173\106\175\072\022\044\216  
\226\217\074\005\012\157\322\224\050\035\155\014\300\056\210\042  
\325\330\317\035\023\307\360\110\327\327\005\247\317\307\107\236  
\073\074\064\310\200\117\324\024\273\374\015\120\367\372\263\354  
\102\137\251\335\155\310\364\165\317\173\301\162\046\261\001\034  
\134\054\375\172\116\264\001\305\005\127\271\347\074\252\005\331  
\210\351\007\106\101\316\357\101\201\256\130\337\203\242\256\312  
\327\167\037\347\000\074\235\157\216\344\062\011\035\115\170\064  
\170\064\074\224\233\046\355\117\161\306\031\172\275\040\042\110  
\132\376\113\175\003\267\347\130\276\306\062\116\164\036\150\335  
\250\150\133\263\076\356\142\175\331\200\350\012\165\172\267\356  
\264\145\232\041\220\340\252\320\230\274\070\265\163\074\213\370



```
\334
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "Chambers of Commerce Root"
Issuer: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
Serial Number: 0 (0x0)
Subject: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
Not Valid Before: Tue Sep
30 16:13:43 2003
Not Valid After: Wed Sep 30 16:13:44 2037
Fingerprint (MD5): b0:01:ee:14:d9:af:29:18:94:76:8e:f1:69:33:2a:84
Fingerprint (SHA1): 6e:3a:55:a4:19:0c:19:5c:93:84:3c:c0:db:72:2e:31:30:61:f0:b1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Chambers of Commerce Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\156\072\125\244\031\014\031\134\223\204\074\300\333\162\056\061
\060\141\360\261
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\260\001\356\024\331\257\051\030\224\166\216\361\151\063\052\204
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Certificate "Global Chambersign Root"  
# Issuer: CN=Global Chambersign Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF  
A82743287,C=EU  
# Serial Number: 0 (0x0)  
# Subject: CN=Global Chambersign Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF  
A82743287,C=EU  
# Not Valid Before: Tue Sep 30 16:14:18 2003  
# Not Valid After: Wed Sep 30 16:14:18 2037  
# Fingerprint (MD5): c5:e6:7b:bf:06:d0:4f:43:ed:c4:7a:65:8a:fb:6b:19  
# Fingerprint (SHA1): 33:9b:6b:14:50:24:9b:55:7a:01:87:72:84:d9:e0:2f:c3:d2:d8:e9

CKA\_CLASS  
CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "Global Chambersign Root"  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509  
CKA\_SUBJECT MULTILINE\_OCTAL

\060\175\061\013\060\011\006\003\125\004\006\023\002\105\125\061  
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155  
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101  
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004  
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150  
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\040\060  
\036\006\003\125\004\003\023\027\107\154\157\142\141\154\040\103  
\150\141\155\142\145\162\163\151\147\156\040\122\157\157\164

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL  
\060\175\061\013\060\011\006\003\125\004\006\023\002\105\125\061  
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155  
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101  
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004  
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150  
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\040\060  
\036\006\003\125\004\003\023\027\107\154\157\142\141\154\040\103  
\150\141\155\142\145\162\163\151\147\156\040\122\157\157\164

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\305\060\202\003\255\240\003\002\001\002\002\001\000

\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\175\061\013\060\011\006\003\125\004\006\023\002\105\125\061\047  
\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155\145  
\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101\070  
\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004\013  
\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150\141  
\155\142\145\162\163\151\147\156\056\157\162\147\061\040\060\036  
\006\003\125\004\003\023\027\107\154\157\142\141\154\040\103\150  
\141\155\142\145\162\163\151\147\156\040\122\157\157\164\060\036  
\027\015\060\063\060\071\063\060\061\066\061\064\061\070\132\027  
\015\063\067\060\071\063\060\061\066\061\064\061\070\132\060\175  
\061\013\060\011\006\003\125\004\006\023\002\105\125\061\047\060  
\045\006\003\125\004\012\023\036\101\103\040\103\141\155\145\162  
\146\151\162\155\141\040\123\101\040\103\111\106\040\101\070\062  
\067\064\063\062\070\067\061\043\060\041\006\003\125\004\013\023  
\032\150\164\164\160\072\057\057\167\167\167\056\143\150\141\155  
\142\145\162\163\151\147\156\056\157\162\147\061\040\060\036\006  
\003\125\004\003\023\027\107\154\157\142\141\154\040\103\150\141  
\155\142\145\162\163\151\147\156\040\122\157\157\164\060\202\001  
\040\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\001\015\000\060\202\001\010\002\202\001\001\000\242\160  
\242\320\237\102\256\133\027\307\330\175\317\024\203\374\117\311  
\241\267\023\257\212\327\236\076\004\012\222\213\140\126\372\264  
\062\057\210\115\241\140\010\364\267\011\116\240\111\057\111\326  
\323\337\235\227\132\237\224\004\160\354\077\131\331\267\314\146  
\213\230\122\050\011\002\337\305\057\204\215\172\227\167\277\354  
\100\235\045\162\253\265\077\062\230\373\267\267\374\162\204\345  
\065\207\371\125\372\243\037\016\157\056\050\335\151\240\331\102  
\020\306\370\265\104\302\320\103\177\333\274\344\242\074\152\125  
\170\012\167\251\330\352\031\062\267\057\376\134\077\033\356\261  
\230\354\312\255\172\151\105\343\226\017\125\366\346\355\165\352  
\145\350\062\126\223\106\211\250\045\212\145\006\356\153\277\171  
\007\320\361\267\257\355\054\115\222\273\300\250\137\247\147\175  
\004\362\025\010\160\254\222\326\175\004\322\063\373\114\266\013  
\013\373\032\311\304\215\003\251\176\134\362\120\253\022\245\241  
\317\110\120\245\357\322\310\032\023\372\260\177\261\202\034\167  
\152\017\137\334\013\225\217\357\103\176\346\105\011\045\002\001  
\003\243\202\001\120\060\202\001\114\060\022\006\003\125\035\023  
\001\001\377\004\010\060\006\001\001\377\002\001\014\060\077\006  
\003\125\035\037\004\070\060\066\060\064\240\062\240\060\206\056  
\150\164\164\160\072\057\057\143\162\154\056\143\150\141\155\142  
\145\162\163\151\147\156\056\157\162\147\057\143\150\141\155\142  
\145\162\163\151\147\156\162\157\157\164\056\143\162\154\060\035  
\006\003\125\035\016\004\026\004\024\103\234\066\237\260\236\060  
\115\306\316\137\255\020\253\345\003\245\372\251\024\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\021\006  
\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007  
\060\052\006\003\125\035\021\004\043\060\041\201\037\143\150\141

\155\142\145\162\163\151\147\156\162\157\157\164\100\143\150\141  
\155\142\145\162\163\151\147\156\056\157\162\147\060\052\006\003  
\125\035\022\004\043\060\041\201\037\143\150\141\155\142\145\162  
\163\151\147\156\162\157\157\164\100\143\150\141\155\142\145\162  
\163\151\147\156\056\157\162\147\060\133\006\003\125\035\040\004  
\124\060\122\060\120\006\013\053\006\001\004\001\201\207\056\012  
\001\001\060\101\060\077\006\010\053\006\001\005\005\007\002\001  
\026\063\150\164\164\160\072\057\057\143\160\163\056\143\150\141  
\155\142\145\162\163\151\147\156\056\157\162\147\057\143\160\163  
\057\143\150\141\155\142\145\162\163\151\147\156\162\157\157\164  
\056\150\164\155\154\060\015\006\011\052\206\110\206\367\015\001  
\001\005\005\000\003\202\001\001\000\074\073\160\221\371\004\124  
\047\221\341\355\355\376\150\177\141\135\345\101\145\117\062\361  
\030\005\224\152\034\336\037\160\333\076\173\062\002\064\265\014  
\154\241\212\174\245\364\217\377\324\330\255\027\325\055\004\321  
\077\130\200\342\201\131\210\276\300\343\106\223\044\376\220\275  
\046\242\060\055\350\227\046\127\065\211\164\226\030\366\025\342  
\257\044\031\126\002\002\262\272\017\024\352\306\212\146\301\206  
\105\125\213\276\222\276\234\244\004\307\111\074\236\350\051\172  
\211\327\376\257\377\150\365\245\027\220\275\254\231\314\245\206  
\127\011\147\106\333\326\026\302\106\361\344\251\120\365\217\321  
\222\025\323\137\076\306\000\111\072\156\130\262\321\321\047\015  
\045\310\062\370\040\021\315\175\062\063\110\224\124\114\335\334  
\171\304\060\237\353\216\270\125\265\327\210\134\305\152\044\075  
\262\323\005\003\121\306\007\357\314\024\162\164\075\156\162\316  
\030\050\214\112\240\167\345\011\053\105\104\107\254\267\147\177  
\001\212\005\132\223\276\241\301\377\370\347\016\147\244\107\111  
\166\135\165\220\032\365\046\217\360

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Global Chambersign Root"

# Issuer: CN=Global Chambersign Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF  
A82743287,C=EU

# Serial Number: 0 (0x0)

# Subject: CN=Global Chambersign Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF  
A82743287,C=EU

# Not Valid Before: Tue Sep 30 16:14:18 2003

# Not Valid After: Wed Sep 30 16:14:18 2037

# Fingerprint (MD5): c5:e6:7b:bf:06:d0:4f:43:ed:c4:7a:65:8a:fb:6b:19

#

Fingerprint (SHA1): 33:9b:6b:14:50:24:9b:55:7a:01:87:72:84:d9:e0:2f:c3:d2:d8:e9

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Global Chambersign Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\063\233\153\024\120\044\233\125\172\001\207\162\204\331\340\057
\303\322\330\351
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\305\346\173\277\006\320\117\103\355\304\172\145\212\373\153\031
END
CKA_ISSUER MULTILINE_OCTAL
\060\175\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\040\060
\036\006\003\125\004\003\023\027\107\154\157\142\141\154\040\103
\150\141\155\142\145\162\163\151\147\156\040\122\157\157\164
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "GeoTrust Global CA"
Issuer: CN=GeoTrust Global CA,O=GeoTrust Inc.,C=US
Serial Number: 144470 (0x23456)
Subject: CN=GeoTrust Global CA,O=GeoTrust Inc.,C=US
Not Valid Before: Tue May 21 04:00:00 2002
Not Valid After: Sat May 21 04:00:00 2022
Fingerprint (MD5): f7:75:ab:29:fb:51:4e:b7:77:5e:ff:05:3c:99:8e:f5
Fingerprint (SHA1): de:28:f4:a4:ff:e5:b9:2f:a3:c5:03:d1:a3:49:a7:f9:96:2a:82:12
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Global CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\102\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\033\060\031\006\003\125\004\003
```

```
\023\022\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\102\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\033\060\031\006\003\125\004\003
\023\022\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\002\064\126
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\124\060\202\002\074\240\003\002\001\002\002\003\002
\064\126\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\102\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\033\060\031\006\003\125\004
\003\023\022\107\145\157\124\162\165\163\164\040\107\154\157\142
\141\154\040\103\101\060\036\027\015\060\062\060\065\062\061\060
\064\060\060\060\060\132\027\015\062\062\060\065\062\061\060\064
\060\060\060\060\132\060\102\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\026\060\024\006\003\125\004\012\023\015\107
\145\157\124\162\165\163\164\040\111\156\143\056\061\033\060\031
\006\003\125\004\003\023\022\107\145\157\124\162\165\163\164\040
\107\154\157\142\141\154\040\103\101\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\332\314\030\143\060\375
\364\027\043\032\126\176\133\337\074\154\070\344\161\267\170\221
\324\274\241\330\114\370\250\103\266\003\351\115\041\007\010\210
\332\130\057\146\071\051\275\005\170\213\235\070\350\005\267\152
\176\161\244\346\304\140\246\260\357\200\344\211\050\017\236\045
\326\355\203\363\255\246\221\307\230\311\102\030\065\024\235\255
\230\106\222\056\117\312\361\207\103\301\026\225\127\055\120\357
\211\055\200\172\127\255\362\356\137\153\322\000\215\271\024\370
\024\025\065\331\300\106\243\173\162\310\221\277\311\125\053\315
\320\227\076\234\046\144\314\337\316\203\031\161\312\116\346\324
\325\173\251\031\315\125\336\310\354\322\136\070\123\345\134\117
\214\055\376\120\043\066\374\146\346\313\216\244\071\031\000\267
\225\002\071\221\013\016\376\070\056\321\035\005\232\366\115\076
\157\017\007\035\257\054\036\217\140\071\342\372\066\123\023\071
\324\136\046\053\333\075\250\024\275\062\353\030\003\050\122\004
\161\345\253\063\075\341\070\273\007\066\204\142\234\171\352\026
\060\364\137\300\053\350\161\153\344\371\002\003\001\000\001\243
\123\060\121\060\017\006\003\125\035\023\001\001\377\004\005\060
```

```
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\300
\172\230\150\215\211\373\253\005\144\014\021\175\252\175\145\270
\312\314\116\060\037\006\003\125\035\043\004\030\060\026\200\024
\300\172\230\150\215\211\373\253\005\144\014\021\175\252\175\145
\270\312\314\116\060\015\006\011\052\206\110\206\367\015\001\001
\005\005\000\003\202\001\001\000\065\343\051\152\345\057\135\124
\216\051\120\224\237\231\032\024\344\217\170\052\142\224\242\047
\147\236\320\317\032\136\107\351\301\262\244\317\335\101\032\005
\116\233\113\356\112\157\125\122\263\044\241\067\012\353\144\166
\052\056\054\363\375\073\165\220\277\372\161\330\307\075\067\322
\265\005\225\142\271\246\336\211\075\066\173\070\167\110\227\254
\246\040\217\056\246\311\014\302\262\231\105\000\307\316\021\121
\042\042\340\245\352\266\025\110\011\144\352\136\117\164\367\005
\076\307\212\122\014\333\025\264\275\155\233\345\306\261\124\150
\251\343\151\220\266\232\245\017\270\271\077\040\175\256\112\265
\270\234\344\035\266\253\346\224\245\301\307\203\255\333\365\047
\207\016\004\154\325\377\335\240\135\355\207\122\267\053\025\002
\256\071\246\152\164\351\332\304\347\274\115\064\036\251\134\115
\063\137\222\011\057\210\146\135\167\227\307\035\166\023\251\325
\345\361\026\011\021\065\325\254\333\044\161\160\054\230\126\013
\331\027\264\321\343\121\053\136\165\350\325\320\334\117\064\355
\302\005\146\200\241\313\346\063
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GeoTrust Global CA"

# Issuer: CN=GeoTrust Global CA,O=GeoTrust Inc.,C=US

# Serial Number: 144470 (0x23456)

# Subject: CN=GeoTrust Global CA,O=GeoTrust Inc.,C=US

# Not Valid Before: Tue May 21 04:00:00 2002

# Not Valid After: Sat May 21 04:00:00 2022

# Fingerprint (MD5): f7:75:ab:29:fb:51:4e:b7:77:5e:ff:05:3c:99:8e:f5

# Fingerprint (SHA1): de:28:f4:a4:ff:e5:b9:2f:a3:c5:03:d1:a3:49:a7:f9:96:2a:82:12

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GeoTrust Global CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\336\050\364\244\377\345\271\057\243\305\003\321\243\111\247\371
\226\052\202\022
```

END

CKA\_CERT\_MD5\_HASH

```
MULTILINE_OCTAL
\367\165\253\051\373\121\116\267\167\136\377\005\074\231\216\365
END
CKA_ISSUER MULTILINE_OCTAL
\060\102\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\033\060\031\006\003\125\004\003
\023\022\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\002\064\126
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "GeoTrust Global CA 2"
Issuer: CN=GeoTrust Global CA 2,O=GeoTrust Inc.,C=US
Serial Number: 1 (0x1)
Subject: CN=GeoTrust Global CA 2,O=GeoTrust Inc.,C=US
Not Valid Before: Thu Mar 04
05:00:00 2004
Not Valid After: Mon Mar 04 05:00:00 2019
Fingerprint (MD5): 0e:40:a7:6c:de:03:5d:8f:d1:0f:e4:d1:8d:f9:6c:a9
Fingerprint (SHA1): a9:e9:78:08:14:37:58:88:f2:05:19:b0:6d:2b:0d:2b:60:16:90:7d
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Global CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\035\060\033\006\003\125\004\003
\023\024\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101\040\062
```

```
END
```

```
CKA_ID UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\035\060\033\006\003\125\004\003
\023\024\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101\040\062
```



END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\146\060\202\002\116\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026  
\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163  
\164\040\111\156\143\056\061\035\060\033\006\003\125\004\003\023  
\024\107\145\157\124\162\165\163\164\040\107\154\157\142\141\154  
\040\103\101\040\062\060\036\027\015\060\064\060\063\060\064\060  
\065\060\060\060\060\132\027\015\061\071\060\063\060\064\060\065  
\060\060\060\060\132\060\104\061\013\060\011\006\003\125\004\006  
\023\002\125\123\061\026\060\024\006\003\125\004\012\023\015\107  
\145\157\124\162\165\163\164\040\111\156\143\056\061\035\060\033  
\006\003\125\004\003\023\024\107\145\157\124\162\165\163\164\040  
\107\154\157\142\141\154\040\103\101\040\062\060\202\001\042\060  
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202  
\001\017\000\060\202\001\012\002\202\001\001\000\357\074\115\100  
\075\020\337\073\123\000\341\147\376\224\140\025\076\205\210\361  
\211\015\220\310\050\043\231\005\350\053\040\235\306\363\140\106  
\330\301\262\325\214\061\331\334\040\171\044\201\277\065\062\374  
\143\151\333\261\052\153\356\041\130\362\010\351\170\313\157\313  
\374\026\122\310\221\304\377\075\163\336\261\076\247\302\175\146  
\301\365\176\122\044\032\342\325\147\221\320\202\020\327\170\113  
\117\053\102\071\275\144\055\100\240\260\020\323\070\110\106\210  
\241\014\273\072\063\052\142\230\373\000\235\023\131\177\157\073  
\162\252\356\246\017\206\371\005\141\352\147\177\014\067\226\213  
\346\151\026\107\021\302\047\131\003\263\246\140\302\041\100\126  
\372\240\307\175\072\023\343\354\127\307\263\326\256\235\211\200  
\367\001\347\054\366\226\053\023\015\171\054\331\300\344\206\173  
\113\214\014\162\202\212\373\027\315\000\154\072\023\074\260\204  
\207\113\026\172\051\262\117\333\035\324\013\363\146\067\275\330  
\366\127\273\136\044\172\270\074\213\271\372\222\032\032\204\236  
\330\164\217\252\033\177\136\364\376\105\042\041\002\003\001\000  
\001\243\143\060\141\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004  
\024\161\070\066\362\002\061\123\107\053\156\272\145\106\251\020  
\025\130\040\005\011\060\037\006\003\125\035\043\004\030\060\026  
\200\024\161\070\066\362\002\061\123\107\053\156\272\145\106\251  
\020\025\130\040\005\011\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\206\060\015\006\011\052\206\110\206\367\015  
\001\001\005\005\000\003\202\001\001\000\003\367\265\053\253\135  
\020\374\173\262\262\136\254\233\016\176\123\170\131\076\102\004  
\376\165\243\255\254\201\116\327\002\213\136\304\055\310\122\166  
\307\054\037\374\201\062\230\321\113\306\222\223\063\065\061\057

```
\374\330\035\104\335\340\201\177\235\351\213\341\144\221\142\013
\071\010\214\254\164\235\131\331\172\131\122\227\021\271\026\173
\157\105\323\226\331\061\175\002\066\017\234\073\156\317\054\015
\003\106\105\353\240\364\177\110\104\306\010\100\314\336\033\160
\265\051\255\272\213\073\064\145\165\033\161\041\035\054\024\012
\260\226\225\270\326\352\362\145\373\051\272\117\352\221\223\164
\151\266\362\377\341\032\320\014\321\166\205\313\212\045\275\227
\136\054\157\025\231\046\347\266\051\377\042\354\311\002\307\126
\000\315\111\271\263\154\173\123\004\032\342\250\311\252\022\005
\043\302\316\347\273\004\002\314\300\107\242\344\304\051\057\133
\105\127\211\121\356\074\353\122\010\377\007\065\036\237\065\152
\107\112\126\230\321\132\205\037\214\365\042\277\253\316\203\363
\342\042\051\256\175\203\100\250\272\154
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GeoTrust Global CA 2"

# Issuer: CN=GeoTrust Global CA 2,O=GeoTrust Inc.,C=US

# Serial Number:

1 (0x1)

# Subject: CN=GeoTrust Global CA 2,O=GeoTrust Inc.,C=US

# Not Valid Before: Thu Mar 04 05:00:00 2004

# Not Valid After: Mon Mar 04 05:00:00 2019

# Fingerprint (MD5): 0e:40:a7:6c:de:03:5d:8f:d1:0f:e4:d1:8d:f9:6c:a9

# Fingerprint (SHA1): a9:e9:78:08:14:37:58:88:f2:05:19:b0:6d:2b:0d:2b:60:16:90:7d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GeoTrust Global CA 2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\251\351\170\010\024\067\130\210\362\005\031\260\155\053\015\053
\140\026\220\175
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\016\100\247\154\336\003\135\217\321\017\344\321\215\371\154\251
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\035\060\033\006\003\125\004\003
\023\024\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101\040\062
```

END

```
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "GeoTrust Universal CA"
Issuer: CN=GeoTrust Universal CA,O=GeoTrust Inc.,C=US
Serial Number: 1 (0x1)
Subject: CN=GeoTrust Universal CA,O=GeoTrust Inc.,C=US
Not Valid Before: Thu Mar 04 05:00:00 2004
Not Valid After: Sun Mar 04 05:00:00 2029
Fingerprint (MD5): 92:65:58:8b:a2:1a:31:72:73:68:5c:b4:a5:7a:07:48
Fingerprint (SHA1): e6:21:f3:35:43:79:05:9a:4b:68:30:9d:8a:2f:74:22:15:87:ec:79
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Universal CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\036\060\034\006\003\125\004\003
\023\025\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101
```

```
END
CKA_ID
UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\036\060\034\006\003\125\004\003
\023\025\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101
```

```
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
```

```
CKA_VALUE MULTILINE_OCTAL
\060\202\005\150\060\202\003\120\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026
\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163
```

\164\040\111\156\143\056\061\036\060\034\006\003\125\004\003\023  
\025\107\145\157\124\162\165\163\164\040\125\156\151\166\145\162  
\163\141\154\040\103\101\060\036\027\015\060\064\060\063\060\064  
\060\065\060\060\060\060\132\027\015\062\071\060\063\060\064\060  
\065\060\060\060\060\132\060\105\061\013\060\011\006\003\125\004  
\006\023\002\125\123\061\026\060\024\006\003\125\004\012\023\015  
\107\145\157\124\162\165\163\164\040\111\156\143\056\061\036\060  
\034\006\003\125\004\003\023\025\107\145\157\124\162\165\163\164  
\040\125\156\151\166\145\162\163\141\154\040\103\101\060\202\002  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\246\025  
\125\240\243\306\340\037\214\235\041\120\327\301\276\053\133\265  
\244\236\241\331\162\130\275\000\033\114\277\141\311\024\035\105  
\202\253\306\035\200\326\075\353\020\234\072\257\155\044\370\274  
\161\001\236\006\365\174\137\036\301\016\125\312\203\232\131\060  
\256\031\313\060\110\225\355\042\067\215\364\112\232\162\146\076  
\255\225\300\340\026\000\340\020\037\053\061\016\327\224\124\323  
\102\063\240\064\035\036\105\166\335\117\312\030\067\354\205\025  
\172\031\010\374\325\307\234\360\362\251\056\020\251\222\346\075  
\130\075\251\026\150\074\057\165\041\030\177\050\167\245\341\141  
\027\267\246\351\370\036\231\333\163\156\364\012\242\041\154\356  
\332\252\205\222\146\257\366\172\153\202\332\272\042\010\065\017  
\317\102\361\065\372\152\356\176\053\045\314\072\021\344\155\257  
\163\262\166\035\255\320\262\170\147\032\244\071\034\121\013\147  
\126\203\375\070\135\015\316\335\360\273\053\226\037\336\173\062  
\122\375\035\273\265\006\241\262\041\136\245\326\225\150\177\360  
\231\236\334\105\010\076\347\322\011\015\065\224\335\200\116\123  
\227\327\265\011\104\040\144\026\027\003\002\114\123\015\150\336  
\325\252\162\115\223\155\202\016\333\234\275\317\264\363\134\135  
\124\172\151\011\226\326\333\021\301\215\165\250\264\317\071\310  
\316\074\274\044\174\346\142\312\341\275\175\247\275\127\145\013  
\344\376\045\355\266\151\020\334\050\032\106\275\001\035\320\227  
\265\341\230\073\300\067\144\326\075\224\356\013\341\365\050\256  
\013\126\277\161\213\043\051\101\216\206\305\113\122\173\330\161  
\253\037\212\025\246\073\203\132\327\130\001\121\306\114\101\331  
\177\330\101\147\162\242\050\337\140\203\251\236\310\173\374\123  
\163\162\131\365\223\172\027\166\016\316\367\345\134\331\013\125  
\064\242\252\133\265\152\124\347\023\312\127\354\227\155\364\136  
\006\057\105\213\130\324\043\026\222\344\026\156\050\143\131\060  
\337\120\001\234\143\211\032\237\333\027\224\202\160\067\303\044  
\236\232\107\326\132\312\116\250\151\211\162\037\221\154\333\176  
\236\033\255\307\037\163\335\054\117\031\145\375\177\223\100\020  
\056\322\360\355\074\236\056\050\076\151\046\063\305\173\002\003  
\001\000\001\243\143\060\141\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004  
\026\004\024\332\273\056\252\260\014\270\210\046\121\164\134\155  
\003\323\300\330\217\172\326\060\037\006\003\125\035\043\004\030  
\060\026\200\024\332\273\056\252\260\014\270\210\046\121\164\134

\155\003\323\300\330\217\172\326\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\206\060\015\006\011\052\206\110\206  
\367\015\001\001\005\005\000\003\202\002\001\000\061\170\346\307  
\265\337\270\224\100\311\161\304\250\065\354\106\035\302\205\363  
\050\130\206\260\013\374\216\262\071\217\104\125\253\144\204\134  
\151\251\320\232\070\074\372\345\037\065\345\104\343\200\171\224  
\150\244\273\304\237\075\341\064\315\060\106\213\124\053\225\245  
\357\367\077\231\204\375\065\346\317\061\306\334\152\277\247\327  
\043\010\341\230\136\303\132\010\166\251\246\257\167\057\267\140  
\275\104\106\152\357\227\377\163\225\301\216\350\223\373\375\061  
\267\354\127\021\021\105\233\060\361\032\210\071\301\117\074\247  
\000\325\307\374\253\155\200\042\160\245\014\340\135\004\051\002  
\373\313\240\221\321\174\326\303\176\120\325\235\130\276\101\070  
\353\271\165\074\025\331\233\311\112\203\131\300\332\123\375\063  
\273\066\030\233\205\017\025\335\356\055\254\166\223\271\331\001  
\215\110\020\250\373\365\070\206\361\333\012\306\275\204\243\043  
\101\336\326\167\157\205\324\205\034\120\340\256\121\212\272\215  
\076\166\342\271\312\047\362\137\237\357\156\131\015\006\330\053  
\027\244\322\174\153\273\137\024\032\110\217\032\114\347\263\107  
\034\216\114\105\053\040\356\110\337\347\335\011\216\030\250\332  
\100\215\222\046\021\123\141\163\135\353\275\347\304\115\051\067  
\141\353\254\071\055\147\056\026\326\365\000\203\205\241\314\177  
\166\304\175\344\267\113\146\357\003\105\140\151\266\014\122\226  
\222\204\136\246\243\265\244\076\053\331\314\330\033\107\252\362  
\104\332\117\371\003\350\360\024\313\077\363\203\336\320\301\124  
\343\267\350\012\067\115\213\040\131\003\060\031\241\054\310\275  
\021\037\337\256\311\112\305\363\047\146\146\206\254\150\221\377  
\331\346\123\034\017\213\134\151\145\012\046\310\036\064\303\135  
\121\173\327\251\234\006\241\066\335\325\211\224\274\331\344\055  
\014\136\011\154\010\227\174\243\075\174\223\377\077\241\024\247  
\317\265\135\353\333\333\034\304\166\337\210\271\275\105\005\225  
\033\256\374\106\152\114\257\110\343\316\256\017\322\176\353\346  
\154\234\117\201\152\172\144\254\273\076\325\347\313\166\056\305  
\247\110\301\134\220\017\313\310\077\372\346\062\341\215\033\157  
\244\346\216\330\371\051\110\212\316\163\376\054

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GeoTrust Universal CA"

# Issuer: CN=GeoTrust Universal CA,O=GeoTrust Inc.,C=US

# Serial Number: 1 (0x1)

# Subject: CN=GeoTrust Universal CA,O=GeoTrust Inc.,C=US

# Not Valid Before: Thu Mar 04 05:00:00 2004

# Not Valid After: Sun Mar 04 05:00:00 2029

```

Fingerprint (MD5): 92:65:58:8b:a2:1a:31:72:73:68:5c:b4:a5:7a:07:48
Fingerprint (SHA1): e6:21:f3:35:43:79:05:9a:4b:68:30:9d:8a:2f:74:22:15:87:ec:79
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Universal CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\346\041\363\065\103\171\005\232\113\150\060\235\212\057\164\042
\025\207\354\171
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\222\145\130\213\242\032\061\162\163\150\134\264\245\172\007\110
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\036\060\034\006\003\125\004\003
\023\025\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "GeoTrust Universal
CA 2"
Issuer: CN=GeoTrust Universal CA 2,O=GeoTrust Inc.,C=US
Serial Number: 1 (0x1)
Subject: CN=GeoTrust Universal CA 2,O=GeoTrust Inc.,C=US
Not Valid Before: Thu Mar 04 05:00:00 2004
Not Valid After: Sun Mar 04 05:00:00 2029
Fingerprint (MD5): 34:fc:b8:d0:36:db:9e:14:b3:c2:f2:db:8f:e4:94:c7
Fingerprint (SHA1): 37:9a:19:7b:41:85:45:35:0c:a6:03:69:f3:3c:2e:af:47:4f:20:79
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Universal CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061

```

\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165  
\163\164\040\111\156\143\056\061\040\060\036\006\003\125\004\003  
\023\027\107\145\157\124\162\165\163\164\040\125\156\151\166\145  
\162\163\141\154\040\103\101\040\062

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165  
\163\164\040\111\156\143\056\061\040\060\036\006\003\125\004\003  
\023\027\107\145\157\124\162\165\163\164\040\125\156\151\166\145  
\162\163\141\154\040\103\101\040\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\154\060\202\003\124\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026  
\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163  
\164\040\111\156\143\056\061\040\060\036\006\003\125\004\003\023  
\027\107\145\157\124\162\165\163\164\040\125\156\151\166\145\162  
\163\141\154\040\103\101\040\062\060\036\027\015\060\064\060\063  
\060\064\060\065\060\060\060\060\132\027\015\062\071\060\063\060  
\064\060\065\060\060\060\060\132\060\107\061\013\060\011\006\003  
\125\004\006\023\002\125\123\061\026\060\024\006\003\125\004\012  
\023\015\107\145\157\124\162\165\163\164\040\111\156\143\056\061  
\040\060\036\006\003\125\004\003\023\027\107\145\157\124\162\165  
\163\164\040\125\156\151\166\145\162\163\141\154\040\103\101\040  
\062\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002  
\001\000\263\124\122\301\311\076\362\331\334\261\123\032\131\051  
\347\261\303\105\050\345\327\321\355\305\305\113\241\252\164\173  
\127\257\112\046\374\330\365\136\247\156\031\333\164\014\117\065  
\133\062\013\001\343\333\353\172\167\065\352\252\132\340\326\350  
\241\127\224\360\220\243\164\126\224\104\060\003\036\134\116\053  
\205\046\164\202\172\014\166\240\157\115\316\101\055\240\025\006  
\024\137\267\102\315\173\217\130\141\064\334\052\010\371\056\303  
\001\246\042\104\034\114\007\202\346\133\316\320\112\174\004\323  
\031\163\047\360\252\230\177\056\257\116\353\207\036\044\167\152  
\135\266\350\133\105\272\334\303\241\005\157\126\216\217\020\046  
\245\111\303\056\327\101\207\042\340\117\206\312\140\265\352\241  
\143\300\001\227\020\171\275\000\074\022\155\053\025\261\254\113  
\261\356\030\271\116\226\334\334\166\377\073\276\317\137\003\300  
\374\073\350\276\106\033\377\332\100\302\122\367\376\343\072\367  
\152\167\065\320\332\215\353\136\030\152\061\307\036\272\074\033

\050\326\153\124\306\252\133\327\242\054\033\031\314\242\002\366  
\233\131\275\067\153\206\265\155\202\272\330\352\311\126\274\251  
\066\130\375\076\031\363\355\014\046\251\223\070\370\117\301\135  
\042\006\320\227\352\341\255\306\125\340\201\053\050\203\072\372  
\364\173\041\121\000\276\122\070\316\315\146\171\250\364\201\126  
\342\320\203\011\107\121\133\120\152\317\333\110\032\135\076\367  
\313\366\145\367\154\361\225\370\002\073\062\126\202\071\172\133  
\275\057\211\033\277\241\264\350\377\177\215\214\337\003\361\140  
\116\130\021\114\353\243\077\020\053\203\232\001\163\331\224\155  
\204\000\047\146\254\360\160\100\011\102\222\255\117\223\015\141  
\011\121\044\330\222\325\013\224\141\262\207\262\355\377\232\065  
\377\205\124\312\355\104\103\254\033\074\026\153\110\112\012\034  
\100\210\037\222\302\013\000\005\377\362\310\002\112\244\252\251  
\314\231\226\234\057\130\340\175\341\276\273\007\334\137\004\162  
\134\061\064\303\354\137\055\340\075\144\220\042\346\321\354\270  
\056\335\131\256\331\241\067\277\124\065\334\163\062\117\214\004  
\036\063\262\311\106\361\330\134\310\125\120\311\150\275\250\272  
\066\011\002\003\001\000\001\243\143\060\141\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003  
\125\035\016\004\026\004\024\166\363\125\341\372\244\066\373\360  
\237\134\142\161\355\074\364\107\070\020\053\060\037\006\003\125  
\035\043\004\030\060\026\200\024\166\363\125\341\372\244\066\373  
\360\237\134\142\161\355\074\364\107\070\020\053\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\206\060\015\006\011  
\052\206\110\206\367\015\001\001\005\005\000\003\202\002\001\000  
\146\301\306\043\363\331\340\056\156\137\350\317\256\260\260\045  
\115\053\370\073\130\233\100\044\067\132\313\253\026\111\377\263  
\165\171\063\241\057\155\160\027\064\221\376\147\176\217\354\233  
\345\136\202\251\125\037\057\334\324\121\007\022\376\254\026\076  
\054\065\306\143\374\334\020\353\015\243\252\320\174\314\321\320  
\057\121\056\304\024\132\336\350\031\341\076\306\314\244\051\347  
\056\204\252\006\060\170\166\124\163\050\230\131\070\340\000\015  
\142\323\102\175\041\237\256\075\072\214\325\372\167\015\030\053  
\026\016\137\066\341\374\052\265\060\044\317\340\143\014\173\130  
\032\376\231\272\102\022\261\221\364\174\150\342\310\350\257\054  
\352\311\176\256\273\052\075\015\025\334\064\225\266\030\164\250  
\152\017\307\264\364\023\304\344\133\355\012\322\244\227\114\052  
\355\057\154\022\211\075\361\047\160\252\152\003\122\041\237\100  
\250\147\120\362\363\132\037\337\337\043\366\334\170\116\346\230  
\117\125\072\123\343\357\362\364\237\307\174\330\130\257\051\042  
\227\270\340\275\221\056\260\166\354\127\021\317\357\051\104\363  
\351\205\172\140\143\344\135\063\211\027\331\061\252\332\326\363  
\030\065\162\317\207\053\057\143\043\204\135\204\214\077\127\240  
\210\374\231\221\050\046\151\231\324\217\227\104\276\216\325\110  
\261\244\050\051\361\025\264\341\345\236\335\370\217\246\157\046  
\327\011\074\072\034\021\016\246\154\067\367\255\104\207\054\050  
\307\330\164\202\263\320\157\112\127\273\065\051\047\240\213\350  
\041\247\207\144\066\135\314\330\026\254\307\262\047\100\222\125



```
\070\050\215\121\156\335\024\147\123\154\161\134\046\204\115\165
\132\266\176\140\126\251\115\255\373\233\036\227\363\015\331\322
\227\124\167\332\075\022\267\340\036\357\010\006\254\371\205\207
\351\242\334\257\176\030\022\203\375\126\027\101\056\325\051\202
\175\231\364\061\366\161\251\317\054\001\047\245\005\271\252\262
\110\116\052\357\237\223\122\121\225\074\122\163\216\126\114\027
\100\300\011\050\344\213\152\110\123\333\354\315\125\125\361\306
\370\351\242\054\114\246\321\046\137\176\257\132\114\332\037\246
\362\034\054\176\256\002\026\322\126\320\057\127\123\107\350\222
END
```

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GeoTrust Universal CA 2"

# Issuer: CN=GeoTrust Universal CA 2,O=GeoTrust Inc.,C=US

# Serial Number: 1 (0x1)

# Subject: CN=GeoTrust Universal CA 2,O=GeoTrust Inc.,C=US

# Not Valid Before: Thu Mar 04 05:00:00 2004

# Not Valid After: Sun Mar 04 05:00:00 2029

# Fingerprint (MD5): 34:fc:b8:d0:36:db:9e:14:b3:c2:f2:db:8f:e4:94:c7

# Fingerprint (SHA1): 37:9a:19:7b:41:85:45:35:0c:a6:03:69:f3:3c:2e:af:47:4f:20:79

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GeoTrust Universal CA 2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\067\232\031\173\101\205\105\065\014\246\003\151\363\074\056\257
\107\117\040\171
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\064\374\270\320\066\333\236\024\263\302\362\333\217\344\224\307
```

END

CKA\_ISSUER

MULTILINE\_OCTAL

```
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\040\060\036\006\003\125\004\003
\023\027\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101\040\062
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\001\001
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

```
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "QuoVadis Root Certification Authority"
Issuer: CN=QuoVadis Root Certification Authority,OU=Root Certification Authority,O=QuoVadis
Limited,C=BM
Serial Number:3a:b6:50:8b
Subject: CN=QuoVadis Root Certification Authority,OU=Root Certification Authority,O=QuoVadis
Limited,C=BM
Not Valid Before: Mon Mar 19 18:33:33
2001
```

```
Not Valid After: Wed Mar 17 18:33:33 2021
Fingerprint (MD5): 27:de:36:fe:72:b7:00:03:00:9d:f4:f0:1e:6c:04:24
Fingerprint (SHA1): de:3f:40:bd:50:93:d3:9b:6c:60:f6:da:bc:07:62:01:00:89:76:c9
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\177\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\045\060\043\006\003
\125\004\013\023\034\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\056\060\054\006\003\125\004\003\023\045\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
```

```
END
```

```
CKA_ID
```

```
UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\045\060\043\006\003
\125\004\013\023\034\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\056\060\054\006\003\125\004\003\023\045\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
```

```
END
```

```
CKA_SERIAL_NUMBER MULTILINE_OCTAL
```

```
\002\004\072\266\120\213
```

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\320\060\202\004\270\240\003\002\001\002\002\004\072  
\266\120\213\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\060\177\061\013\060\011\006\003\125\004\006\023\002\102  
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126  
\141\144\151\163\040\114\151\155\151\164\145\144\061\045\060\043  
\006\003\125\004\013\023\034\122\157\157\164\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\061\056\060\054\006\003\125\004\003\023\045\121\165  
\157\126\141\144\151\163\040\122\157\157\164\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\060\036\027\015\060\061\060\063\061\071\061\070\063  
\063\063\063\132\027\015\062\061\060\063\061\067\061\070\063\063  
\063\063\132\060\177\061\013\060\011\006\003\125\004\006\023\002  
\102\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157  
\126\141\144\151\163\040\114\151\155\151\164\145\144\061\045\060  
\043\006\003\125\004\013\023\034\122\157\157\164\040\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171\061\056\060\054\006\003\125\004\003\023\045\121  
\165\157\126\141\144\151\163\040\122\157\157\164\040\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171\060\202\001\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012  
\002\202\001\001\000\277\141\265\225\123\272\127\374\372\362\147  
\013\072\032\337\021\200\144\225\264\321\274\315\172\317\366\051  
\226\056\044\124\100\044\070\367\032\205\334\130\114\313\244\047  
\102\227\320\237\203\212\303\344\006\003\133\000\245\121\036\160  
\004\164\342\301\324\072\253\327\255\073\007\030\005\216\375\203  
\254\352\146\331\030\033\150\212\365\127\032\230\272\365\355\166  
\075\174\331\336\224\152\073\113\027\301\325\217\275\145\070\072  
\225\320\075\125\066\116\337\171\127\061\052\036\330\131\145\111  
\130\040\230\176\253\137\176\237\351\326\115\354\203\164\251\307  
\154\330\356\051\112\205\052\006\024\371\124\346\323\332\145\007  
\213\143\067\022\327\320\354\303\173\040\101\104\243\355\313\240  
\027\341\161\145\316\035\146\061\367\166\001\031\310\175\003\130  
\266\225\111\035\246\022\046\350\306\014\166\340\343\146\313\352  
\135\246\046\356\345\314\137\275\147\247\001\047\016\242\312\124  
\305\261\172\225\035\161\036\112\051\212\003\334\152\105\301\244  
\031\136\157\066\315\303\242\260\267\376\134\070\342\122\274\370  
\104\103\346\220\273\002\003\001\000\001\243\202\002\122\060\202  
\002\116\060\075\006\010\053\006\001\005\005\007\001\001\004\061  
\060\057\060\055\006\010\053\006\001\005\005\007\060\001\206\041  
\150\164\164\160\163\072\057\057\157\143\163\160\056\161\165\157  
\166\141\144\151\163\157\146\146\163\150\157\162\145\056\143\157  
\155\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\202\001\032\006\003\125\035\040\004\202\001\021\060  
\202\001\015\060\202\001\011\006\011\053\006\001\004\001\276\130

\000\001\060\201\373\060\201\324\006\010\053\006\001\005\005\007  
\002\002\060\201\307\032\201\304\122\145\154\151\141\156\143\145  
\040\157\156\040\164\150\145\040\121\165\157\126\141\144\151\163  
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164  
\145\040\142\171\040\141\156\171\040\160\141\162\164\171\040\141  
\163\163\165\155\145\163\040\141\143\143\145\160\164\141\156\143  
\145\040\157\146\040\164\150\145\040\164\150\145\156\040\141\160  
\160\154\151\143\141\142\154\145\040\163\164\141\156\144\141\162  
\144\040\164\145\162\155\163\040\141\156\144\040\143\157\156\144  
\151\164\151\157\156\163\040\157\146\040\165\163\145\054\040\143  
\145\162\164\151\146\151\143\141\164\151\157\156\040\160\162\141  
\143\164\151\143\145\163\054\040\141\156\144\040\164\150\145\040  
\121\165\157\126\141\144\151\163\040\103\145\162\164\151\146\151  
\143\141\164\145\040\120\157\154\151\143\171\056\060\042\006\010  
\053\006\001\005\005\007\002\001\026\026\150\164\164\160\072\057  
\057\167\167\167\056\161\165\157\166\141\144\151\163\056\142\155  
\060\035\006\003\125\035\016\004\026\004\024\213\113\155\355\323  
\051\271\006\031\354\071\071\251\360\227\204\152\313\357\337\060  
\201\256\006\003\125\035\043\004\201\246\060\201\243\200\024\213  
\113\155\355\323\051\271\006\031\354\071\071\251\360\227\204\152  
\313\357\337\241\201\204\244\201\201\060\177\061\013\060\011\006  
\003\125\004\006\023\002\102\115\061\031\060\027\006\003\125\004  
\012\023\020\121\165\157\126\141\144\151\163\040\114\151\155\151  
\164\145\144\061\045\060\043\006\003\125\004\013\023\034\122\157  
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156  
\040\101\165\164\150\157\162\151\164\171\061\056\060\054\006\003  
\125\004\003\023\045\121\165\157\126\141\144\151\163\040\122\157  
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156  
\040\101\165\164\150\157\162\151\164\171\202\004\072\266\120\213  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\212\324\024\265\376\364\232\222\247\031\324\244  
\176\162\030\217\331\150\174\122\044\335\147\157\071\172\304\252  
\136\075\342\130\260\115\160\230\204\141\350\033\343\151\030\016  
\316\373\107\120\240\116\377\360\044\037\275\262\316\365\047\374  
\354\057\123\252\163\173\003\075\164\156\346\026\236\353\245\056  
\304\277\126\047\120\053\142\272\276\113\034\074\125\134\101\035  
\044\276\202\040\107\135\325\104\176\172\026\150\337\175\115\121  
\160\170\127\035\063\036\375\002\231\234\014\315\012\005\117\307  
\273\216\244\165\372\112\155\261\200\216\011\126\271\234\032\140  
\376\135\301\327\172\334\021\170\320\326\135\301\267\325\255\062  
\231\003\072\212\314\124\045\071\061\201\173\023\042\121\272\106  
\154\241\273\236\372\004\154\111\046\164\217\322\163\353\314\060  
\242\346\352\131\042\207\370\227\365\016\375\352\314\222\244\026  
\304\122\030\352\041\316\261\361\346\204\201\345\272\251\206\050  
\362\103\132\135\022\235\254\036\331\250\345\012\152\247\177\240  
\207\051\317\362\211\115\324\354\305\342\346\172\320\066\043\212  
\112\164\066\371

```

END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "QuoVadis Root Certification Authority"
Issuer: CN=QuoVadis Root Certification Authority,OU=Root
Certification Authority,O=QuoVadis Limited,C=BM
Serial Number:3a:b6:50:8b
Subject: CN=QuoVadis Root Certification Authority,OU=Root Certification Authority,O=QuoVadis
Limited,C=BM
Not Valid Before: Mon Mar 19 18:33:33 2001
Not Valid After: Wed Mar 17 18:33:33 2021
Fingerprint (MD5): 27:de:36:fe:72:b7:00:03:00:9d:f4:f0:1e:6c:04:24
Fingerprint (SHA1): de:3f:40:bd:50:93:d3:9b:6c:60:f6:da:bc:07:62:01:00:89:76:c9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\336\077\100\275\120\223\323\233\154\140\366\332\274\007\142\001
\000\211\166\311
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\047\336\066\376\162\267\000\003\000\235\364\360\036\154\004\044
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\045\060\043\006\003
\125\004\013\023\034\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\056\060\054\006\003\125\004\003\023\045\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\072\266\120\213
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "Sonera Class2 CA"
Issuer: CN=Sonera Class2 CA,O=Sonera,C=FI
Serial Number: 29 (0x1d)
Subject: CN=Sonera Class2 CA,O=Sonera,C=FI
Not Valid Before: Fri Apr 06 07:29:40 2001
Not Valid After: Tue Apr 06 07:29:40 2021
Fingerprint (MD5): a3:ec:75:0f:2e:88:df:fa:48:01:4e:0b:5c:48:6f:fb
#
Fingerprint (SHA1): 37:f7:6d:e6:07:7c:90:c5:b1:3e:93:1a:b7:41:10:b4:f2:e4:9a:27
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sonera Class2 CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\017\060\015\006\003\125\004\012\023\006\123\157\156\145\162\141
\061\031\060\027\006\003\125\004\003\023\020\123\157\156\145\162
\141\040\103\154\141\163\163\062\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\017\060\015\006\003\125\004\012\023\006\123\157\156\145\162\141
\061\031\060\027\006\003\125\004\003\023\020\123\157\156\145\162
\141\040\103\154\141\163\163\062\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\035
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\040\060\202\002\010\240\003\002\001\002\002\001\035
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\071\061\013\060\011\006\003\125\004\006\023\002\106\111\061\017
\060\015\006\003\125\004\012\023\006\123\157\156\145\162\141\061
\031\060\027\006\003\125\004\003\023\020\123\157\156\145\162\141
\040\103\154\141\163\163\062\040\103\101\060\036\027\015\060\061
\060\064\060\066\060\067\062\071\064\060\132\027\015\062\061\060
\064\060\066\060\067\062\071\064\060\132\060\071\061\013\060\011
\006\003\125\004\006\023\002\106\111\061\017\060\015\006\003\125
\004\012\023\006\123\157\156\145\162\141\061\031\060\027\006\003
\125\004\003\023\020\123\157\156\145\162\141\040\103\154\141\163
\163\062\040\103\101\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\220\027\112\065\235\312\360\015\226\307

```

\104\372\026\067\374\110\275\275\177\200\055\065\073\341\157\250  
\147\251\277\003\034\115\214\157\062\107\325\101\150\244\023\004  
\301\065\014\232\204\103\374\134\035\377\211\263\350\027\030\315  
\221\137\373\211\343\352\277\116\135\174\033\046\323\165\171\355  
\346\204\343\127\345\255\051\304\364\072\050\347\245\173\204\066  
\151\263\375\136\166\275\243\055\231\323\220\116\043\050\175\030  
\143\361\124\073\046\235\166\133\227\102\262\377\256\360\116\354  
\335\071\225\116\203\006\177\347\111\100\310\305\001\262\124\132  
\146\035\075\374\371\351\074\012\236\201\270\160\360\001\213\344  
\043\124\174\310\256\370\220\036\000\226\162\324\124\317\141\043  
\274\352\373\235\002\225\321\266\271\161\072\151\010\077\017\264  
\341\102\307\210\365\077\230\250\247\272\034\340\161\161\357\130  
\127\201\120\172\134\153\164\106\016\203\003\230\303\216\250\156  
\362\166\062\156\047\203\302\163\363\334\030\350\264\223\352\165  
\104\153\004\140\040\161\127\207\235\363\276\240\220\043\075\212  
\044\341\332\041\333\303\002\003\001\000\001\243\063\060\061\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\021\006\003\125\035\016\004\012\004\010\112\240\252\130\204  
\323\136\074\060\013\006\003\125\035\017\004\004\003\002\001\006  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003  
\202\001\001\000\132\316\207\371\026\162\025\127\113\035\331\233  
\347\242\046\060\354\223\147\337\326\055\322\064\257\367\070\245  
\316\253\026\271\253\057\174\065\313\254\320\017\264\114\053\374  
\200\357\153\214\221\137\066\166\367\333\263\033\031\352\364\262  
\021\375\141\161\104\277\050\263\072\035\277\263\103\350\237\277  
\334\061\010\161\260\235\215\326\064\107\062\220\306\145\044\367  
\240\112\174\004\163\217\071\157\027\214\162\265\275\113\310\172  
\370\173\203\303\050\116\234\011\352\147\077\262\147\004\033\303  
\024\332\370\347\111\044\221\320\035\152\372\141\071\357\153\347  
\041\165\006\007\330\022\264\041\040\160\102\161\201\332\074\232  
\066\276\246\133\015\152\154\232\037\221\173\371\371\357\102\272  
\116\116\236\314\014\215\224\334\331\105\234\136\354\102\120\143  
\256\364\135\304\261\022\334\312\073\250\056\235\024\132\005\165  
\267\354\327\143\342\272\065\266\004\010\221\350\332\235\234\366  
\146\265\030\254\012\246\124\046\064\063\322\033\301\324\177\032  
\072\216\013\252\062\156\333\374\117\045\237\331\062\307\226\132  
\160\254\337\114

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Sonera Class2 CA"

# Issuer: CN=Sonera Class2 CA,O=Sonera,C=FI

# Serial Number: 29 (0x1d)

# Subject: CN=Sonera Class2 CA,O=Sonera,C=FI

```

Not Valid Before: Fri Apr 06 07:29:40 2001
Not Valid After: Tue Apr 06 07:29:40 2021
Fingerprint (MD5): a3:ec:75:0f:2e:88:df:fa:48:01:4e:0b:5c:48:6f:fb
Fingerprint (SHA1): 37:f7:6d:e6:07:7c:90:c5:b1:3e:93:1a:b7:41:10:b4:f2:e4:9a:27
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sonera Class2 CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\067\367\155\346\007\174\220\305\261\076\223\032\267\101\020\264
\362\344\232\047
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\243\354\165\017\056\210\337\372\110\001\116\013\134\110\157\373
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\017\060\015\006\003\125\004\012\023\006\123\157\156\145\162\141
\061\031\060\027\006\003\125\004\003\023\020\123\157\156\145\162
\141\040\103\154\141\163\163\062\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\035
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "VeriSign Class 2 Public Primary Certification Authority - G3"
Issuer: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For
authorized use only,OU=VeriSign
Trust Network,O=VeriSign\, Inc.,C=US
Serial Number:61:70:cb:49:8c:5f:98:45:29:e7:b0:a6:d9:50:5b:7a
Subject: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
Not Valid Before: Fri Oct 01 00:00:00 1999
Not Valid After: Wed Jul 16 23:59:59 2036
Fingerprint (MD5): f8:be:c4:63:22:c9:a8:46:74:8b:b8:1d:1e:4a:2b:f6
Fingerprint (SHA1): 61:ef:43:d7:7f:ca:d4:61:51:bc:98:e0:c3:59:12:af:9f:eb:63:11
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 2 Public Primary Certification Authority - G3"

```



CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123  
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125  
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165  
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003  
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145  
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106  
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163  
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023  
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040  
\062\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171\040\055\040\107\063

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123  
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125  
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165  
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003  
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145  
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106  
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163  
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023  
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040  
\062\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171  
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101  
\165\164\150\157\162\151\164\171\040\055\040\107\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\141\160\313\111\214\137\230\105\051\347\260\246\331\120  
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END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\031\060\202\003\001\002\020\141\160\313\111\214\137  
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\110\206\367\015\001\001\005\005\000\060\201\312\061\013\060\011  
\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003\125  
\004\012\023\016\126\145\162\151\123\151\147\156\054\040\111\156  
\143\056\061\037\060\035\006\003\125\004\013\023\026\126\145\162  
\151\123\151\147\156\040\124\162\165\163\164\040\116\145\164\167  
\157\162\153\061\072\060\070\006\003\125\004\013\023\061\050\143  
\051\040\061\071\071\071\040\126\145\162\151\123\151\147\156\054

\040\111\156\143\056\040\055\040\106\157\162\040\141\165\164\150  
\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171\061  
\105\060\103\006\003\125\004\003\023\074\126\145\162\151\123\151  
\147\156\040\103\154\141\163\163\040\062\040\120\165\142\154\151  
\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164  
\171\040\055\040\107\063\060\036\027\015\071\071\061\060\060\061  
\060\060\060\060\060\060\132\027\015\063\066\060\067\061\066\062  
\063\065\071\065\071\132\060\201\312\061\013\060\011\006\003\125  
\004\006\023\002\125\123\061\027\060\025\006\003\125\004\012\023  
\016\126\145\162\151\123\151\147\156\054\040\111\156\143\056\061  
\037\060\035\006\003\125\004\013\023\026\126\145\162\151\123\151  
\147\156\040\124\162\165\163\164\040\116\145\164\167\157\162\153  
\061\072\060\070\006\003\125\004\013\023\061\050\143\051\040\061  
\071\071\071\040\126\145\162\151\123\151\147\156\054\040\111\156  
\143\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151  
\172\145\144\040\165\163\145\040\157\156\154\171\061\105\060\103  
\006\003\125\004\003\023\074\126\145\162\151\123\151\147\156\040  
\103\154\141\163\163\040\062\040\120\165\142\154\151\143\040\120  
\162\151\155\141\162\171\040\103\145\162\164\151\146\151\143\141  
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055  
\040\107\063\060\202\001\042\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002  
\202\001\001\000\257\012\015\302\325\054\333\147\271\055\345\224  
\047\335\245\276\340\260\115\217\263\141\126\074\326\174\303\364  
\315\076\206\313\242\210\342\341\330\244\151\305\265\342\277\301  
\246\107\120\136\106\071\213\325\226\272\265\157\024\277\020\316  
\047\023\236\005\107\233\061\172\023\330\037\331\323\002\067\213  
\255\054\107\360\216\201\006\247\015\060\014\353\367\074\017\040  
\035\334\162\106\356\245\002\310\133\303\311\126\151\114\305\030  
\301\221\173\013\325\023\000\233\274\357\303\110\076\106\140\040  
\205\052\325\220\266\315\213\240\314\062\335\267\375\100\125\262  
\120\034\126\256\314\215\167\115\307\040\115\247\061\166\357\150  
\222\212\220\036\010\201\126\262\255\151\243\122\320\313\034\304  
\043\075\037\231\376\114\350\026\143\216\306\010\216\366\061\366  
\322\372\345\166\335\265\034\222\243\111\315\315\001\315\150\315  
\251\151\272\243\353\035\015\234\244\040\246\301\240\305\321\106  
\114\027\155\322\254\146\077\226\214\340\204\324\066\377\042\131  
\305\371\021\140\250\137\004\175\362\032\366\045\102\141\017\304  
\112\270\076\211\002\003\001\000\001\060\015\006\011\052\206\110  
\206\367\015\001\001\005\005\000\003\202\001\001\000\064\046\025  
\074\300\215\115\103\111\035\275\351\041\222\327\146\234\267\336  
\305\270\320\344\135\137\166\042\300\046\371\204\072\072\371\214  
\265\373\354\140\361\350\316\004\260\310\335\247\003\217\060\363  
\230\337\244\346\244\061\337\323\034\013\106\334\162\040\077\256  
\356\005\074\244\063\077\013\071\254\160\170\163\113\231\053\337  
\060\302\124\260\250\073\125\241\376\026\050\315\102\275\164\156  
\200\333\047\104\247\316\104\135\324\033\220\230\015\036\102\224

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\261\000\054\004\320\164\243\002\005\042\143\143\315\203\265\373
\301\155\142\153\151\165\375\135\160\101\271\365\277\174\337\276
\301\062\163\042\041\213\130\201\173\025\221\172\272\343\144\110
\260\177\373\066\045\332\225\320\361\044\024\027\335\030\200\153
\106\043\071\124\365\216\142\011\004\035\224\220\246\233\346\045
\342\102\105\252\270\220\255\276\010\217\251\013\102\030\224\317
\162\071\341\261\103\340\050\317\267\347\132\154\023\153\111\263
\377\343\030\174\211\213\063\135\254\063\327\247\371\332\072\125
\311\130\020\371\252\357\132\266\317\113\113\337\052
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END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "VeriSign Class 2 Public Primary Certification Authority - G3"

# Issuer: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US

# Serial Number:61:70:cb:49:8c:5f:98:45:29:e7:b0:a6:d9:50:5b:7a

# Subject: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US

# Not Valid Before: Fri Oct 01 00:00:00 1999

# Not Valid After: Wed Jul 16 23:59:59 2036

# Fingerprint (MD5): f8:be:c4:63:22:c9:a8:46:74:8b:b8:1d:1e:4a:2b:f6

# Fingerprint (SHA1): 61:ef:43:d7:7f:ca:d4:61:51:bc:98:e0:c3:59:12:af:9f:eb:63:11

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL

UTF8 "VeriSign Class 2 Public Primary Certification Authority - G3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

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\141\357\103\327\177\312\324\141\121\274\230\340\303\131\022\257
\237\353\143\021
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END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

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\370\276\304\143\042\311\250\106\164\213\270\035\036\112\053\366
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
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\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\062\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

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\002\020\141\160\313\111\214\137\230\105\051\347\260\246\331\120
\133\172
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END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "VeriSign Class 3 Public Primary Certification Authority - G3"

# Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US

# Serial Number:9b:7e:06:49:a3:3e:62:b9:d5:ee:90:48:71:29:ef:57

# Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign

Trust Network,O=VeriSign\, Inc.,C=US

# Not Valid Before: Fri Oct 01 00:00:00 1999

# Not Valid After: Wed Jul 16 23:59:59 2036

# Fingerprint (MD5): cd:68:b6:a7:c7:c4:ce:75:e0:1d:4f:57:44:61:92:09

# Fingerprint (SHA1): 13:2d:0d:45:53:4b:69:97:cd:b2:d5:c3:39:e2:55:76:60:9b:5c:c6

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G3"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

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\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
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\165\164\150\157\162\151\164\171\040\055\040\107\063

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

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\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125  
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165  
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003  
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\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106  
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163  
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023  
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040  
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171  
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\165\164\150\157\162\151\164\171\040\055\040\107\063

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\021\000\233\176\006\111\243\076\142\271\325\356\220\110\161  
\051\357\127

END

CKA\_VALUE MULTILINE\_OCTAL

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\162\151\123\151\147\156\040\124\162\165\163\164\040\116\145\164  
\167\157\162\153\061\072\060\070\006\003\125\004\013\023\061\050  
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\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165\164  
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\151\147\156\040\103\154\141\163\163\040\063\040\120\165\142\154  
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\171\040\055\040\107\063\060\036\027\015\071\071\061\060\060  
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\062\063\065\071\065\071\132\060\201\312\061\013\060\011\006\003  
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\023\016\126\145\162\151\123\151\147\156\054\040\111\156\143\056  
\061\037\060\035\006\003\125\004\013\023\026\126\145\162\151\123  
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\061\071\071\071\040\126\145\162\151\123\151\147\156\054\040\111  
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\151\172\145\144\040\165\163\145\040\157\156\154\171\061\105\060  
\103\006\003\125\004\003\023\074\126\145\162\151\123\151\147\156  
\040\103\154\141\163\163\040\063\040\120\165\142\154\151\143\040  
\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040  
\055\040\107\063\060\202\001\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012  
\002\202\001\001\000\313\272\234\122\374\170\037\032\036\157\033  
\067\163\275\370\311\153\224\022\060\117\360\066\107\365\320\221  
\012\365\027\310\245\141\301\026\100\115\373\212\141\220\345\166  
\040\301\021\006\175\253\054\156\246\365\021\101\216\372\055\255  
\052\141\131\244\147\046\114\320\350\274\122\133\160\040\004\130  
\321\172\311\244\151\274\203\027\144\255\005\213\274\320\130\316  
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\223\025\034\160\274\040\115\057\030\336\222\210\350\154\205\127  
\021\032\351\176\343\046\021\124\242\105\226\125\203\312\060\211  
\350\334\330\243\355\052\200\077\177\171\145\127\076\025\040\146  
\010\057\225\223\277\252\107\057\250\106\227\360\022\342\376\302  
\012\053\121\346\166\346\267\106\267\342\015\246\314\250\303\114  
\131\125\211\346\350\123\134\034\352\235\360\142\026\013\247\311  
\137\014\360\336\302\166\316\257\367\152\362\372\101\246\242\063  
\024\311\345\172\143\323\236\142\067\325\205\145\236\016\346\123  
\044\164\033\136\035\022\123\133\307\054\347\203\111\073\025\256  
\212\150\271\127\227\002\003\001\000\001\060\015\006\011\052\206  
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\021\024  
\226\301\253\222\010\367\077\057\311\262\376\344\132\237\144\336  
\333\041\117\206\231\064\166\066\127\335\320\025\057\305\255\177  
\025\037\067\142\163\076\324\347\137\316\027\003\333\065\372\053  
\333\256\140\011\137\036\137\217\156\273\013\075\352\132\023\036  
\014\140\157\265\300\265\043\042\056\007\013\313\251\164\313\107  
\273\035\301\327\245\153\314\057\322\102\375\111\335\247\211\317  
\123\272\332\000\132\050\277\202\337\370\272\023\035\120\206\202  
\375\216\060\217\051\106\260\036\075\065\332\070\142\026\030\112  
\255\346\266\121\154\336\257\142\353\001\320\036\044\376\172\217  
\022\032\022\150\270\373\146\231\024\024\105\134\256\347\256\151  
\027\201\053\132\067\311\136\052\364\306\342\241\134\124\233\246  
\124\000\317\360\361\301\307\230\060\032\073\066\026\333\243\156  
\352\375\255\262\302\332\357\002\107\023\212\300\361\263\061\255  
\117\034\341\117\234\257\017\014\235\367\170\015\330\364\065\126  
\200\332\267\155\027\217\235\036\201\144\341\376\305\105\272\255  
\153\271\012\172\116\117\113\204\356\113\361\175\335\021

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

```
Microsoft Code Signing Only Certificate
Trust for "VeriSign Class 3 Public Primary Certification Authority - G3"
Issuer: CN=VeriSign Class 3 Public
 Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust
 Network,O=VeriSign\, Inc.,C=US
Serial Number:9b:7e:06:49:a3:3e:62:b9:d5:ee:90:48:71:29:ef:57
Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For
 authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
Not Valid Before: Fri Oct 01 00:00:00 1999
Not Valid After: Wed Jul 16 23:59:59 2036
Fingerprint (MD5): cd:68:b6:a7:c7:c4:ce:75:e0:1d:4f:57:44:61:92:09
Fingerprint (SHA1): 13:2d:0d:45:53:4b:69:97:cd:b2:d5:c3:39:e2:55:76:60:9b:5c:c6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\023\055\015\105\123\113\151\227\315\262\325\303\071\342\125\166
\140\233\134\306
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\315\150\266\247\307\304\316\165\340\035\117\127\104\141\222\011
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\233\176\006\111\243\076\142\271\325\356\220\110\161
\051\357\127
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
 CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Certificate "VeriSign, Inc."  
# Issuer: OU=VeriSign Commercial Software Publishers CA,O=VeriSign\, Inc.,L=Internet  
# Serial Number:03:c7:8f:37:db:92:28:df:3c:bb:1a:ad:82:fa:67:10  
# Subject: OU=VeriSign Commercial Software Publishers CA,O=VeriSign\, Inc.,L=Internet  
# Not Valid Before: Tue Apr 09 00:00:00 1996  
# Not Valid After: Wed Jan 07 23:59:59 2004  
# Fingerprint (MD5): dd:75:3f:56:bf:bb:c5:a1:7a:15:53:c6:90:f9:fb:cc  
# Fingerprint (SHA1): 24:a4:0a:1f:57:36:43:a6:7f:0a:4b:07:49:f6:a2:2b:f2:8a:bb:6b

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE  
CKA\_TOKEN CK\_BBOOL CK\_TRUE  
CKA\_PRIVATE CK\_BBOOL CK\_FALSE  
CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE  
CKA\_LABEL UTF8 "VeriSign, Inc."  
CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE  
CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL  
\060\141\061\021\060\017\006\003\125\004\007\023\010\111\156\164  
\145\162\156\145\164\061\027\060\025\006\003\125\004\012\023\016  
\126\145\162\151\123\151\147\156\054\040\111\156\143\056\061\063  
\060\061\006\003\125\004\013\023\052\126\145\162\151\123\151\147  
\156\040\103\157\155\155\145\162\143\151\141\154\040\123\157\146  
\164\167\141\162\145\040\120\165\142\154\151\163\150\145\162\163  
\040\103\101

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL  
\060\141\061\021\060\017\006\003\125\004\007\023\010\111\156\164  
\145\162\156\145\164\061\027\060\025\006\003\125\004\012\023\016  
\126\145\162\151\123\151\147\156\054\040\111\156\143\056\061\063  
\060\061\006\003\125\004\013\023\052\126\145\162\151\123\151\147  
\156\040\103\157\155\155\145\162\143\151\141\154\040\123\157\146  
\164\167\141\162\145\040\120\165\142\154\151\163\150\145\162\163  
\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\020\003\307\217\067\333\222\050\337\074\273\032\255\202\372  
\147\020

END

CKA\_VALUE  
MULTILINE\_OCTAL  
\060\202\002\100\060\202\001\251\002\020\003\307\217\067\333\222  
\050\337\074\273\032\255\202\372\147\020\060\015\006\011\052\206  
\110\206\367\015\001\001\002\005\000\060\141\061\021\060\017\006  
\003\125\004\007\023\010\111\156\164\145\162\156\145\164\061\027



\060\025\006\003\125\004\012\023\016\126\145\162\151\123\151\147  
\156\054\040\111\156\143\056\061\063\060\061\006\003\125\004\013  
\023\052\126\145\162\151\123\151\147\156\040\103\157\155\155\145  
\162\143\151\141\154\040\123\157\146\164\167\141\162\145\040\120  
\165\142\154\151\163\150\145\162\163\040\103\101\060\036\027\015  
\071\066\060\064\060\071\060\060\060\060\060\060\132\027\015\060  
\064\060\061\060\067\062\063\065\071\065\071\132\060\141\061\021  
\060\017\006\003\125\004\007\023\010\111\156\164\145\162\156\145  
\164\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151  
\123\151\147\156\054\040\111\156\143\056\061\063\060\061\006\003  
\125\004\013\023\052\126\145\162\151\123\151\147\156\040\103\157  
\155\155\145\162\143\151\141\154\040\123\157\146\164\167\141\162  
\145\040\120\165\142\154\151\163\150\145\162\163\040\103\101\060  
\201\237\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\201\215\000\060\201\211\002\201\201\000\303\323\151\145  
\122\001\224\124\253\050\306\142\030\263\124\125\305\104\207\105  
\112\073\302\176\330\323\327\310\200\206\215\330\014\361\026\234  
\314\153\251\051\262\217\166\163\222\310\305\142\246\074\355\036  
\005\165\360\023\000\154\024\115\324\230\220\007\276\151\163\201  
\270\142\116\061\036\321\374\311\014\353\175\220\277\256\264\107  
\121\354\157\316\144\065\002\326\175\147\005\167\342\217\331\121  
\327\373\227\031\274\076\327\167\201\306\103\335\362\335\337\312  
\243\203\213\313\101\301\075\042\110\110\246\031\002\003\001\000  
\001\060\015\006\011\052\206\110\206\367\015\001\001\002\005\000  
\003\201\201\000\265\274\260\165\152\211\242\206\275\144\170\303  
\247\062\165\162\021\252\046\002\027\140\060\114\343\110\064\031  
\271\122\112\121\030\200\376\123\055\173\325\061\214\305\145\231  
\101\101\057\362\256\143\172\350\163\231\025\220\032\037\172\213  
\101\320\216\072\320\315\070\064\104\320\165\370\352\161\304\201  
\031\070\027\065\112\256\305\076\062\346\041\270\005\300\223\341  
\307\070\134\330\367\223\070\144\220\355\124\316\312\323\323\320  
\137\357\004\233\336\002\202\335\210\051\261\303\117\245\315\161  
\144\061\074\074

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "VeriSign, Inc."

# Issuer: OU=VeriSign Commercial Software Publishers CA,O=VeriSign\, Inc.,L=Internet

# Serial Number:03:c7:8f:37:db:92:28:df:3c:bb:1a:ad:82:fa:67:10

# Subject: OU=VeriSign Commercial Software Publishers CA,O=VeriSign\, Inc.,L=Internet

# Not Valid Before: Tue Apr 09 00:00:00 1996

# Not Valid After: Wed Jan 07 23:59:59 2004

# Fingerprint (MD5): dd:75:3f:56:bf:bb:c5:a1:7a:15:53:c6:90:f9:fb:cc

#

Fingerprint (SHA1): 24:a4:0a:1f:57:36:43:a6:7f:0a:4b:07:49:f6:a2:2b:f2:8a:bb:6b

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "VeriSign, Inc."

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\044\244\012\037\127\066\103\246\177\012\113\007\111\366\242\053  
\362\212\273\153

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\335\165\077\126\277\273\305\241\172\025\123\306\220\371\373\314

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\141\061\021\060\017\006\003\125\004\007\023\010\111\156\164  
\145\162\156\145\164\061\027\060\025\006\003\125\004\012\023\016  
\126\145\162\151\123\151\147\156\054\040\111\156\143\056\061\063  
\060\061\006\003\125\004\013\023\052\126\145\162\151\123\151\147  
\156\040\103\157\155\155\145\162\143\151\141\154\040\123\157\146  
\164\167\141\162\145\040\120\165\142\154\151\163\150\145\162\163  
\040\103\101

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\003\307\217\067\333\222\050\337\074\273\032\255\202\372  
\147\020

END

CKA\_TRUST\_SERVER\_AUTH

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Microsoft Root Authority"

# Issuer: CN=Microsoft Root Authority,OU=Microsoft Corporation,OU=Copyright (c) 1997 Microsoft Corp.

# Serial Number:c1:00:8b:3c:3c:88:11:d1:3e:f6:63:ec:df:40

# Subject: CN=Microsoft Root Authority,OU=Microsoft Corporation,OU=Copyright (c) 1997 Microsoft Corp.

# Not Valid Before: Fri Jan 10 07:00:00 1997

# Not Valid After: Thu Dec 31 07:00:00 2020

# Fingerprint (MD5): 2a:95:4e:ca:79:b2:87:45:73:d9:2d:90:ba:f9:9f:b6

# Fingerprint (SHA1): a4:34:89:15:9a:52:0f:0d:93:d0:32:cc:af:37:e7:fe:20:a8:b4:19

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Microsoft Root Authority"

CKA\_CERTIFICATE\_TYPE

CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160  
\171\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040  
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061  
\036\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163  
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061  
\041\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163  
\157\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151  
\164\171

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160  
\171\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040  
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061  
\036\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163  
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061  
\041\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163  
\157\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151  
\164\171

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\017\000\301\000\213\074\074\210\021\321\076\366\143\354\337  
\100

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\022\060\202\002\372\240\003\002\001\002\002\017\000  
\301\000\213\074\074\210\021\321\076\366\143\354\337\100\060\015  
\006\011\052\206\110\206\367\015\001\001\004\005\000\060\160\061  
\053\060\051\006\003\125\004\013\023\042\103\157\160\171\162\151  
\147\150\164\040\050\143\051\040\061\071\071\067\040\115\151\143  
\162\157\163\157\146\164\040\103\157\162\160\056\061\036\060\034  
\006\003\125\004\013\023\025\115\151\143\162\157\163\157\146\164  
\040\103\157\162\160\157\162\141\164\151\157\156\061\041\060\037  
\006\003\125\004\003\023\030\115\151\143\162\157\163\157\146\164  
\040\122\157\157\164\040\101\165\164\150\157\162\151\164\171\060  
\036\027\015\071\067\060\061\061\060\060\067\060\060\060\060\132  
\027\015\062\060\061\062\063\061\060\067\060\060\060\060\132\060  
\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160\171  
\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040\115  
\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061\036  
\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163\157  
\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061\041  
\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163\157  
\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151\164  
\171\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001

\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001  
\001\000\251\002\275\301\160\346\073\362\116\033\050\237\227\170  
\136\060\352\242\251\215\045\137\370\376\225\114\243\267\376\235  
\242\040\076\174\121\242\233\242\217\140\062\153\321\102\144\171  
\356\254\166\311\124\332\362\353\234\206\034\217\237\204\146\263  
\305\153\172\142\043\326\035\074\336\017\001\222\350\226\304\277  
\055\146\232\232\150\046\231\320\072\054\277\014\265\130\046\301  
\106\347\012\076\070\226\054\251\050\071\250\354\111\203\102\343  
\204\017\273\232\154\125\141\254\202\174\241\140\055\167\114\351  
\231\264\144\073\232\120\034\061\010\044\024\237\251\347\221\053  
\030\346\075\230\143\024\140\130\005\145\237\035\067\122\207\367  
\247\357\224\002\306\033\323\277\125\105\263\211\200\277\072\354  
\124\224\116\256\375\247\172\155\164\116\257\030\314\226\011\050  
\041\000\127\220\140\151\067\273\113\022\007\074\126\377\133\373  
\244\146\012\010\246\322\201\126\127\357\266\073\136\026\201\167  
\004\332\366\276\256\200\225\376\260\315\177\326\247\032\162\134  
\074\312\274\360\010\243\042\060\263\006\205\311\263\040\167\023  
\205\337\002\003\001\000\001\243\201\250\060\201\245\060\201\242  
\006\003\125\035\001\004\201\232\060\201\227\200\020\133\320\160  
\357\151\162\236\043\121\176\024\262\115\216\377\313\241\162\060  
\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160\171  
\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040\115  
\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061\036  
\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163\157  
\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061\041  
\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163\157  
\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151\164  
\171\202\017\000\301\000\213\074\074\210\021\321\076\366\143\354  
\337\100\060\015\006\011\052\206\110\206\367\015\001\001\004\005  
\000\003\202\001\001\000\225\350\013\300\215\363\227\030\065\355  
\270\001\044\330\167\021\363\134\140\062\237\236\013\313\076\005  
\221\210\217\311\072\346\041\362\360\127\223\054\265\240\107\310  
\142\357\374\327\314\073\073\132\251\066\124\151\376\044\155\077  
\311\314\252\336\005\174\335\061\215\075\237\020\160\152\273\376  
\022\117\030\151\300\374\320\103\343\021\132\040\117\352\142\173  
\257\252\031\310\053\067\045\055\276\145\241\022\212\045\017\143  
\243\367\124\034\371\041\311\326\025\363\122\254\156\103\062\007  
\375\202\027\370\345\147\154\015\121\366\275\361\122\307\275\347  
\304\060\374\040\061\011\210\035\225\051\032\115\325\035\002\245  
\361\200\340\003\264\133\364\261\335\310\127\356\145\111\307\122  
\124\266\264\003\050\022\377\220\326\360\010\217\176\270\227\305  
\253\067\054\344\172\344\250\167\343\166\240\000\320\152\077\301  
\322\066\212\340\101\022\250\065\152\033\152\333\065\341\324\034  
\004\344\250\105\004\310\132\063\070\156\115\034\015\142\267\012  
\242\214\323\325\124\077\106\315\034\125\246\160\333\022\072\207  
\223\165\237\247\322\240

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE  
CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE  
CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Microsoft Root Authority"

# Issuer: CN=Microsoft Root Authority,OU=Microsoft Corporation,OU=Copyright (c) 1997 Microsoft Corp.

# Serial Number:c1:00:8b:3c:3c:88:11:d1:3e:f6:63:ec:df:40

# Subject: CN=Microsoft Root Authority,OU=Microsoft Corporation,OU=Copyright (c) 1997 Microsoft Corp.

# Not Valid Before: Fri Jan 10 07:00:00 1997

# Not Valid After:

Thu Dec 31 07:00:00 2020

# Fingerprint (MD5): 2a:95:4e:ca:79:b2:87:45:73:d9:2d:90:ba:f9:9f:b6

# Fingerprint (SHA1): a4:34:89:15:9a:52:0f:0d:93:d0:32:cc:af:37:e7:fe:20:a8:b4:19

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Microsoft Root Authority"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\244\064\211\025\232\122\017\015\223\320\062\314\257\067\347\376  
\040\250\264\031

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\052\225\116\312\171\262\207\105\163\331\055\220\272\371\237\266

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160  
\171\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040  
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061  
\036\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163  
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061  
\041\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163  
\157\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151  
\164\171

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\017\000\301\000\213\074\074\210\021\321\076\366\143\354\337  
\100

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Microsoft Root Certificate Authority"

```
Issuer: CN=Microsoft Root Certificate Authority,DC=microsoft,DC=com
Serial Number:79:ad:16:a1:4a:a0:a5:ad:4c:73:58:f4:07:13:2e:65
Subject: CN=Microsoft Root Certificate Authority,DC=microsoft,DC=com
Not Valid Before: Wed May 09 23:19:22 2001
Not Valid After: Sun May 09 23:28:13 2021
Fingerprint (MD5): e1:c0:7e:a0:aa:bb:d4:b7:7b:84:c2:28:11:78:08:a7
Fingerprint (SHA1): cd:d4:ee:ae:60:00:ac:7f:40:c3:80:2c:17:1e:30:14:80:30:c0:72
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL
CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\023\060\021\006\012\011\222\046\211\223\362\054\144
\001\031\026\003\143\157\155\061\031\060\027\006\012\011\222\046
\211\223\362\054\144\001\031\026\011\155\151\143\162\157\163\157
\146\164\061\055\060\053\006\003\125\004\003\023\044\115\151\143
\162\157\163\157\146\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\023\060\021\006\012\011\222\046\211\223\362\054\144
\001\031\026\003\143\157\155\061\031\060\027\006\012\011\222\046
\211\223\362\054\144\001\031\026\011\155\151\143\162\157\163\157
\146\164\061\055\060\053\006\003\125\004\003\023\044\115\151\143
\162\157\163\157\146\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\171\255\026\241\112\240\245\255\114\163\130\364\007\023
\056\145
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\231\060\202\003\201\240\003\002\001\002\002\020\171
\255\026\241\112\240\245\255\114\163\130\364\007\023\056\145\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\137
\061\023\060\021\006\012\011\222\046\211\223\362\054\144\001\031
\026\003\143\157\155\061\031\060\027\006\012\011\222\046\211\223
\362\054\144\001\031\026\011\155\151\143\162\157\163\157\146\164
\061\055\060\053\006\003\125\004\003\023\044\115\151\143\162\157
\163\157\146\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171\060
```

\036\027\015\060\061\060\065\060\071\062\063\061\071\062\062\132  
\027\015\062\061\060\065\060\071\062\063\062\070\061\063\132\060  
\137\061\023\060\021\006\012\011\222\046\211\223\362\054\144\001  
\031\026\003\143\157\155\061\031\060\027\006\012\011\222\046\211  
\223\362\054\144\001\031\026\011\155\151\143\162\157\163\157\146  
\164\061\055\060\053\006\003\125\004\003\023\044\115\151\143\162  
\157\163\157\146\164\040\122\157\157\164\040\103\145\162\164\151  
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\363\135\372\200\147\324\132\247\251\014\054\220\040\320\065  
\010\074\165\204\315\267\007\211\234\211\332\336\316\303\140\372  
\221\150\132\236\224\161\051\030\166\174\302\340\310\045\166\224  
\016\130\372\004\064\066\346\337\257\367\200\272\351\130\013\053  
\223\345\235\005\343\167\042\221\367\064\144\074\042\221\035\136  
\341\011\220\274\024\376\374\165\130\031\341\171\267\007\222\243  
\256\210\131\010\330\237\007\312\003\130\374\150\051\155\062\327  
\322\250\313\113\374\341\013\110\062\117\346\353\270\255\117\344  
\134\157\023\224\231\333\225\325\165\333\250\032\267\224\221\264  
\167\133\365\110\014\217\152\171\175\024\160\004\175\155\257\220  
\365\332\160\330\107\267\277\233\057\154\347\005\267\341\021\140  
\254\171\221\024\174\305\326\246\344\341\176\325\303\176\345\222  
\322\074\000\265\066\202\336\171\341\155\363\265\156\370\237\063  
\311\313\122\175\163\230\066\333\213\241\153\242\225\227\233\243  
\336\302\115\046\377\006\226\147\045\006\310\347\254\344\356\022  
\063\225\061\231\310\065\010\116\064\312\171\123\325\265\276\143  
\062\131\100\066\300\245\116\004\115\075\333\133\007\063\344\130  
\277\357\077\123\144\330\102\131\065\127\375\017\105\174\044\004  
\115\236\326\070\164\021\227\042\220\316\150\104\164\222\157\325  
\113\157\260\206\343\307\066\102\240\320\374\301\300\132\371\243  
\141\271\060\107\161\226\012\026\260\221\300\102\225\357\020\177  
\050\152\343\052\037\261\344\315\003\077\167\161\004\307\040\374  
\111\017\035\105\210\244\327\313\176\210\255\216\055\354\105\333  
\304\121\004\311\052\374\354\206\236\232\021\227\133\336\316\123  
\210\346\342\267\375\254\225\302\050\100\333\357\004\220\337\201  
\063\071\331\262\105\245\043\207\006\245\125\211\061\273\006\055  
\140\016\101\030\175\037\056\265\227\313\021\353\025\325\044\245  
\224\357\025\024\211\375\113\163\372\062\133\374\321\063\000\371  
\131\142\160\007\062\352\056\253\100\055\173\312\335\041\147\033  
\060\231\217\026\252\043\250\101\321\260\156\021\233\066\304\336  
\100\164\234\341\130\145\301\140\036\172\133\070\310\217\273\004  
\046\174\324\026\100\345\266\153\154\252\206\375\000\277\316\301  
\065\002\003\001\000\001\243\121\060\117\060\013\006\003\125\035  
\017\004\004\003\002\001\306\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004  
\026\004\024\016\254\202\140\100\126\047\227\345\045\023\374\052  
\341\012\123\225\131\344\244\060\020\006\011\053\006\001\004\001  
\202\067\025\001\004\003\002\001\000\060\015\006\011\052\206\110

\206\367\015\001\001\005\005\000\003\202\002\001\000\305\021\115  
\003\072\140\335\135\122\021\167\217\262\273\066\310\262\005\277  
\264\267\250\330\040\235\134\023\003\266\034\042\372\006\023\065  
\266\310\143\324\232\107\157\046\127\322\125\361\004\261\046\137  
\326\251\120\150\240\274\322\270\156\314\303\351\254\337\031\315  
\170\254\131\164\254\146\064\066\304\033\076\154\070\114\063\016  
\060\022\015\243\046\376\121\123\000\377\257\132\116\204\015\017  
\037\344\155\005\056\116\205\113\215\154\063\157\124\322\144\253  
\277\120\257\175\172\071\240\067\355\143\003\017\374\023\006\316  
\026\066\324\124\073\225\033\121\142\072\345\115\027\324\005\071  
\222\232\047\250\133\252\275\354\273\276\343\040\211\140\161\154  
\126\263\245\023\320\155\016\043\176\225\003\355\150\075\362\330  
\143\270\153\115\266\350\060\265\341\312\224\113\367\242\252\135  
\231\060\262\075\247\302\121\154\050\040\001\044\047\053\113\000  
\267\235\021\153\160\276\262\020\202\274\014\233\150\320\215\073  
\044\207\252\231\050\162\235\063\137\131\220\275\365\336\223\236  
\072\142\132\064\071\342\210\125\035\271\006\260\301\211\153\055  
\327\151\303\031\022\066\204\320\311\240\332\377\057\151\170\262  
\345\172\332\353\327\014\300\367\275\143\027\270\071\023\070\242  
\066\133\173\362\205\126\152\035\144\142\301\070\342\252\277\121  
\146\242\224\365\022\234\146\042\020\153\362\267\060\222\055\362  
\051\360\075\073\024\103\150\242\361\234\051\067\313\316\070\040  
\045\155\174\147\363\176\044\022\044\003\010\201\107\354\245\236  
\227\365\030\327\317\273\325\357\166\226\357\375\316\333\126\235  
\225\240\102\371\227\130\341\327\061\042\323\137\131\346\076\156  
\042\000\352\103\204\266\045\333\331\363\010\126\150\300\144\153  
\035\174\354\266\223\242\142\127\156\056\330\347\130\217\304\061  
\111\046\335\336\051\065\207\365\060\161\160\133\024\074\151\275  
\211\022\175\353\056\243\376\330\177\236\202\132\122\012\053\301  
\103\053\331\060\210\237\310\020\373\211\215\346\241\205\165\063  
\176\154\236\333\163\023\144\142\151\245\057\175\312\226\155\237  
\370\004\115\060\222\075\156\041\024\041\311\075\340\303\375\212  
\153\235\112\375\321\241\235\231\103\167\077\260\332

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Microsoft Root Certificate Authority"

# Issuer: CN=Microsoft Root Certificate Authority,DC=microsoft,DC=com

# Serial Number:79:ad:16:a1:4a:a0:a5:ad:4c:73:58:f4:07:13:2e:65

# Subject: CN=Microsoft Root Certificate Authority,DC=microsoft,DC=com

# Not Valid Before: Wed May 09 23:19:22 2001

# Not Valid After: Sun May 09 23:28:13 2021

# Fingerprint (MD5): e1:c0:7e:a0:aa:bb:d4:b7:7b:84:c2:28:11:78:08:a7

# Fingerprint (SHA1): cd:d4:ee:ae:60:00:ac:7f:40:c3:80:2c:17:1e:30:14:80:30:c0:72



```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\315\324\356\256\140\000\254\177\100\303\200\054\027\036\060\024
\200\060\300\162
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\341\300\176\240\252\273\324\267\173\204\302\050\021\170\010\247
END
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\023\060\021\006\012\011\222\046\211\223\362\054\144
\001\031\026\003\143\157\155\061\031\060\027\006\012\011\222\046
\211\223\362\054\144\001\031\026\011\155\151\143\162\157\163\157
\146\164\061\055\060\053\006\003\125\004\003\023\044\115\151\143
\162\157\163\157\146\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\171\255\026\241\112\240\245\255\114\163\130\364\007\023
\056\145
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Microsoft Root Certificate Authority 2010"
Issuer: CN=Microsoft Root
Certificate Authority 2010,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US
Serial Number:28:cc:3a:25:bf:ba:44:ac:44:9a:9b:58:6b:43:39:aa
Subject: CN=Microsoft Root Certificate Authority 2010,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
Not Valid Before: Wed Jun 23 21:57:24 2010
Not Valid After: Sat Jun 23 22:04:01 2035
Fingerprint (MD5): a2:66:bb:7d:cc:38:a5:62:63:13:61:bb:f6:1d:d1:1b
Fingerprint (SHA1): 3b:1e:fd:3a:66:ea:28:b1:66:97:39:47:03:a7:2c:a3:40:a0:5b:d5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority 2010"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

```

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151  
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007  
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012  
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160  
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003  
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164  
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164  
\150\157\162\151\164\171\040\062\060\061\060

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151  
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007  
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012  
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160  
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003  
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164  
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164  
\150\157\162\151\164\171\040\062\060\061\060

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\050\314\072\045\277\272\104\254\104\232\233\130\153\103  
\071\252

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\005\355\060\202\003\325\240\003\002\001\002\002\020\050  
\314\072\045\277\272\104\254\104\232\233\130\153\103\071\252\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201  
\210\061\013\060\011\006\003\125\004\006\023\002\125\123\061\023  
\060\021\006\003\125\004\010\023\012\127\141\163\150\151\156\147  
\164\157\156\061\020\060\016\006\003\125\004\007\023\007\122\145  
\144\155\157\156\144\061\036\060\034\006\003\125\004\012\023\025  
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\157\162  
\141\164\151\157\156\061\062\060\060\006\003\125\004\003\023\051  
\115\151\143\162\157\163\157\146\164\040\122\157\157\164\040\103  
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157  
\162\151\164\171\040\062\060\061\060\060\036\027\015\061\060\060  
\066\062\063\062\061\065\067\062\064\132\027\015\063\065\060\066  
\062\063\062\062\060\064\060\061\132\060\201\210\061\013\060\011  
\006\003\125\004\006\023\002\125\123\061\023\060\021\006\003\125  
\004\010\023\012\127\141\163\150\151\156\147\164\157\156\061\020  
\060\016\006\003\125\004\007\023\007\122\145\144\155\157\156\144  
\061\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157

\163\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156  
\061\062\060\060\006\003\125\004\003\023\051\115\151\143\162\157  
\163\157\146\164\040\122\157\157\164\040\103\145\162\164\151\146  
\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171\040  
\062\060\061\060\060\202\002\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012  
\002\202\002\001\000\271\010\236\050\344\344\354\006\116\120\150  
\263\101\305\173\353\256\266\216\257\201\272\042\104\037\145\064  
\151\114\276\160\100\027\362\026\173\342\171\375\206\355\015\071  
\364\033\250\255\222\220\036\313\075\166\217\132\331\265\221\020  
\056\074\005\215\212\155\044\124\347\037\355\126\255\203\264\120  
\234\025\245\027\164\210\131\040\374\010\305\204\166\323\150\324  
\157\050\170\316\134\270\363\120\220\104\377\343\143\137\276\241  
\232\054\226\025\004\326\007\376\036\204\041\340\102\061\021\304  
\050\066\224\317\120\244\142\236\311\326\253\161\000\262\133\014  
\346\226\324\012\044\226\365\377\306\325\267\033\327\313\267\041  
\142\257\022\334\241\135\067\343\032\373\032\106\230\300\233\300  
\347\143\037\052\010\223\002\176\036\152\216\362\237\030\211\344  
\042\205\242\261\204\127\100\377\365\016\330\157\234\355\342\105  
\061\001\315\027\351\177\260\201\105\343\252\041\100\046\241\162  
\252\247\117\074\001\005\176\356\203\130\261\136\006\143\231\142  
\221\170\202\267\015\223\014\044\152\264\033\333\047\354\137\225  
\004\077\223\112\060\365\227\030\263\247\371\031\247\223\063\035  
\001\310\333\042\122\134\327\045\311\106\371\242\373\207\131\103  
\276\233\142\261\215\055\206\104\032\106\254\170\141\176\060\011  
\372\256\211\304\101\052\042\146\003\221\071\105\234\307\213\014  
\250\312\015\057\373\122\352\014\367\143\063\043\235\376\260\037  
\255\147\326\247\120\003\306\004\160\143\265\054\261\206\132\103  
\267\373\256\371\156\051\156\041\041\101\046\006\214\311\303\356  
\260\302\205\223\241\271\205\331\346\062\154\113\114\077\326\135  
\243\345\265\235\167\303\234\300\125\267\164\000\343\270\070\253  
\203\227\120\341\232\102\044\035\306\300\243\060\321\032\132\310  
\122\064\367\163\361\307\030\037\063\255\172\354\313\101\140\363  
\043\224\040\302\110\105\254\134\121\306\056\200\302\342\167\025  
\275\205\207\355\066\235\226\221\356\000\265\243\160\354\237\343  
\215\200\150\203\166\272\257\135\160\122\042\026\342\146\373\272  
\263\305\302\367\076\057\167\246\312\336\301\246\306\110\114\303  
\067\121\043\323\047\327\270\116\160\226\360\241\104\166\257\170  
\317\232\341\146\023\002\003\001\000\001\243\121\060\117\060\013  
\006\003\125\035\017\004\004\003\002\001\206\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003  
\125\035\016\004\026\004\024\325\366\126\313\217\350\242\134\142  
\150\321\075\224\220\133\327\316\232\030\304\060\020\006\011\053  
\006\001\004\001\202\067\025\001\004\003\002\001\000\060\015\006  
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001  
\000\254\245\226\214\277\273\256\246\366\327\161\207\103\061\126  
\210\375\034\062\161\133\065\267\324\360\221\362\257\067\342\024  
\361\363\002\046\005\076\026\024\177\024\272\270\117\373\211\262

\262\347\324\011\314\155\271\133\073\144\145\160\146\267\362\261  
\132\337\032\002\363\365\121\270\147\155\171\363\277\126\173\344  
\204\271\053\036\233\100\234\046\064\371\107\030\230\151\330\034  
\327\266\321\277\217\141\302\147\304\265\357\140\103\216\020\033  
\066\111\344\040\312\255\247\301\261\047\145\011\370\315\365\133  
\052\320\204\063\363\357\037\362\365\234\013\130\223\067\240\165  
\240\336\162\336\154\165\052\146\042\365\214\006\060\126\237\100  
\271\060\252\100\167\025\202\327\213\354\300\323\262\275\203\305  
\167\014\036\256\257\031\123\240\115\171\161\237\017\257\060\316  
\147\371\326\054\314\042\101\172\007\362\227\102\030\316\131\171  
\020\125\336\157\020\344\270\332\203\146\100\026\011\150\043\133  
\227\056\046\232\002\273\127\214\305\270\272\151\142\062\200\211  
\236\241\375\300\222\174\173\053\063\031\204\052\143\305\000\150  
\142\372\237\107\215\231\172\105\072\247\351\355\356\151\102\265  
\363\201\233\107\126\020\173\374\160\066\204\030\163\352\357\371  
\227\115\236\063\043\335\046\013\272\052\267\077\104\334\203\047  
\377\275\141\131\053\021\267\312\117\333\305\213\014\034\061\256  
\062\370\370\271\102\367\177\334\141\232\166\261\132\004\341\021  
\075\146\105\267\030\161\276\311\044\205\326\363\324\272\101\064  
\135\022\055\045\271\215\246\023\110\155\113\260\007\175\231\223  
\011\141\201\164\127\046\212\253\151\343\344\331\307\210\314\044  
\330\354\122\044\134\036\274\221\024\342\226\336\353\012\332\236  
\335\137\263\133\333\324\202\354\306\040\120\207\045\100\072\373  
\307\356\315\376\063\345\156\303\204\011\125\003\045\071\300\351  
\065\135\145\061\250\366\277\240\011\315\051\307\263\066\062\056  
\334\225\363\203\301\132\317\213\215\366\352\263\041\370\244\355  
\036\061\016\266\114\021\253\140\013\244\022\043\042\027\243\066  
\144\202\221\004\022\340\253\157\036\313\120\005\141\264\100\377  
\131\206\161\321\325\063\151\174\251\163\212\070\327\144\014\361  
\151

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Microsoft Root Certificate Authority 2010"

# Issuer: CN=Microsoft Root Certificate Authority 2010,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US

# Serial Number:28:cc:3a:25:bf:ba:44:ac:44:9a:9b:58:6b:43:39:aa

# Subject: CN=Microsoft Root Certificate Authority 2010,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US

# Not Valid Before: Wed Jun 23 21:57:24 2010

# Not Valid After: Sat Jun 23 22:04:01 2035

# Fingerprint (MD5): a2:66:bb:7d:cc:38:a5:62:63:13:61:bb:f6:1d:d1:1b

# Fingerprint (SHA1): 3b:1e:fd:3a:66:ea:28:b1:66:97:39:47:03:a7:2c:a3:40:a0:5b:d5

CKA\_CLASS

```

CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority 2010"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\073\036\375\072\146\352\050\261\146\227\071\107\003\247\054\243
\100\240\133\325
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\242\146\273\175\314\070\245\142\143\023\141\273\366\035\321\033
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\062\060\061\060
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\050\314\072\045\277\272\104\254\104\232\233\130\153\103
\071\252
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "GTE CyberTrust Global Root"
Issuer: CN=GTE CyberTrust Global Root,OU=GTE CyberTrust Solutions\, Inc.,O=GTE Corporation,C=US
Serial Number: 421 (0x1a5)
Subject: CN=GTE CyberTrust Global Root,OU=GTE CyberTrust Solutions\, Inc.,O=GTE Corporation,C=US
Not Valid Before: Thu Aug 13 00:29:00 1998
Not Valid After: Mon Aug 13 23:59:00 2018
Fingerprint (MD5): ca:3d:d3:68:f1:03:5c:d0:32:fa:b8:2b:59:e8:5a:db
Fingerprint (SHA1): 97:81:79:50:d8:1c:96:70:cc:34:d8:09:cf:79:44:31:36:7e:f4:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTE CyberTrust Global Root"

```

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\165\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\030\060\026\006\003\125\004\012\023\017\107\124\105\040\103\157  
\162\160\157\162\141\164\151\157\156\061\047\060\045\006\003\125  
\004\013\023\036\107\124\105\040\103\171\142\145\162\124\162\165  
\163\164\040\123\157\154\165\164\151\157\156\163\054\040\111\156  
\143\056\061\043\060\041\006\003\125\004\003\023\032\107\124\105  
\040\103\171\142\145\162\124\162\165\163\164\040\107\154\157\142  
\141\154\040\122\157\157\164

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\165\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\030\060\026\006\003\125\004\012\023\017\107\124\105\040\103\157  
\162\160\157\162\141\164\151\157\156\061\047\060\045\006\003\125  
\004\013\023\036\107\124\105\040\103\171\142\145\162\124\162\165  
\163\164\040\123\157\154\165\164\151\157\156\163\054\040\111\156  
\143\056\061\043\060\041\006\003\125\004\003\023\032\107\124\105  
\040\103\171\142\145\162\124\162\165\163\164\040\107\154\157\142  
\141\154\040\122\157\157\164

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\002\001\245

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\132\060\202\001\303\002\002\001\245\060\015\006\011  
\052\206\110\206\367\015\001\001\004\005\000\060\165\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003  
\125\004\012\023\017\107\124\105\040\103\157\162\160\157\162\141  
\164\151\157\156\061\047\060\045\006\003\125\004\013\023\036\107  
\124\105\040\103\171\142\145\162\124\162\165\163\164\040\123\157  
\154\165\164\151\157\156\163\054\040\111\156\143\056\061\043\060  
\041\006\003\125\004\003\023\032\107\124\105\040\103\171\142\145  
\162\124\162\165\163\164\040\107\154\157\142\141\154\040\122\157  
\157\164\060\036\027\015\071\070\060\070\061\063\060\060\062\071  
\060\060\132\027\015\061\070\060\070\061\063\062\063\065\071\060  
\060\132\060\165\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\030\060\026\006\003\125\004\012\023\017\107\124\105\040  
\103\157\162\160\157\162\141\164\151\157\156\061\047\060\045\006  
\003\125\004\013\023\036\107\124\105\040\103\171\142\145\162\124  
\162\165\163\164\040\123\157\154\165\164\151\157\156\163\054\040  
\111\156\143\056\061\043\060\041\006\003\125\004\003\023\032\107  
\124\105\040\103\171\142\145\162\124\162\165\163\164\040\107\154  
\157\142\141\154\040\122\157\157\164\060\201\237\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\201\215\000\060  
\201\211\002\201\201\000\225\017\240\266\360\120\234\350\172\307

```
\210\315\335\027\016\056\260\224\320\033\075\016\366\224\300\212
\224\307\006\310\220\227\310\270\144\032\172\176\154\074\123\341
\067\050\163\140\177\262\227\123\007\237\123\371\155\130\224\322
\257\215\155\210\147\200\346\355\262\225\317\162\061\312\245\034
\162\272\134\002\347\144\102\347\371\251\054\326\072\015\254\215
\102\252\044\001\071\346\234\077\001\205\127\015\130\207\105\370
\323\205\252\223\151\046\205\160\110\200\077\022\025\307\171\264
\037\005\057\073\142\231\002\003\001\000\001\060\015\006\011\052
\206\110\206\367\015\001\001\004\005\000\003\201\201\000\155\353
\033\011\351\136\331\121\333\147\042\141\244\052\074\110\167\343
\240\174\246\336\163\242\024\003\205\075\373\253\016\060\305\203
\026\063\201\023\010\236\173\064\116\337\100\310\164\327\271\175
\334\364\166\125\175\233\143\124\030\351\360\352\363\134\261\331
\213\102\036\271\300\225\116\272\372\325\342\174\365\150\141\277
\216\354\005\227\137\133\260\327\243\205\064\304\044\247\015\017
\225\223\357\313\224\330\236\037\235\134\205\155\307\252\256\117
\037\042\265\315\225\255\272\247\314\371\253\013\172\177
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GTE CyberTrust Global Root"

# Issuer: CN=GTE CyberTrust Global Root,OU=GTE

CyberTrust Solutions\, Inc.,O=GTE Corporation,C=US

# Serial Number: 421 (0x1a5)

# Subject: CN=GTE CyberTrust Global Root,OU=GTE CyberTrust Solutions\, Inc.,O=GTE Corporation,C=US

# Not Valid Before: Thu Aug 13 00:29:00 1998

# Not Valid After: Mon Aug 13 23:59:00 2018

# Fingerprint (MD5): ca:3d:d3:68:f1:03:5c:d0:32:fa:b8:2b:59:e8:5a:db

# Fingerprint (SHA1): 97:81:79:50:d8:1c:96:70:cc:34:d8:09:cf:79:44:31:36:7e:f4:74

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GTE CyberTrust Global Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\227\201\171\120\330\034\226\160\314\064\330\011\317\171\104\061
\066\176\364\164
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\312\075\323\150\361\003\134\320\062\372\270\053\131\350\132\333
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\165\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\023\017\107\124\105\040\103\157
```

```
\162\160\157\162\141\164\151\157\156\061\047\060\045\006\003\125
\004\013\023\036\107\124\105\040\103\171\142\145\162\124\162\165
\163\164\040\123\157\154\165\164\151\157\156\163\054\040\111\156
\143\056\061\043\060\041\006\003\125\004\003\023\032\107\124\105
\040\103\171\142\145\162\124\162\165\163\164\040\107\154\157\142
\141\154\040\122\157\157\164
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\002\001\245
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Thawte Server CA"

# Issuer: 1.2.840.113549.1.9.1=server-certs@thawte.com,CN=Thawte Server CA,OU=Certification Services  
Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA

# Serial Number: 1 (0x1)

# Subject: 1.2.840.113549.1.9.1=server-certs@thawte.com,CN=Thawte Server CA,OU=Certification Services  
Division,O=Thawte

Consulting cc,L=Cape Town,ST=Western Cape,C=ZA

# Not Valid Before: Thu Aug 01 00:00:00 1996

# Not Valid After: Thu Dec 31 23:59:59 2020

# Fingerprint (MD5): c5:70:c4:a2:ed:53:78:0c:c8:10:53:81:64:cb:d0:1d

# Fingerprint (SHA1): 23:e5:94:94:51:95:f2:41:48:03:b4:d5:64:d2:a3:a3:f5:d8:8b:8c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Thawte Server CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\201\304\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151
\163\151\157\156\061\031\060\027\006\003\125\004\003\023\020\124
\150\141\167\164\145\040\123\145\162\166\145\162\040\103\101\061
\046\060\044\006\011\052\206\110\206\367\015\001\011\001\026\027
\163\145\162\166\145\162\055\143\145\162\164\163\100\164\150\141
\167\164\145\056\143\157\155
```



END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\304\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007  
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006  
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156  
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003  
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151  
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151  
\163\151\157\156\061\031\060\027\006\003\125\004\003\023\020\124  
\150\141\167\164\145\040\123\145\162\166\145\162\040\103\101\061  
\046\060\044\006\011\052\206\110\206\367\015\001\011\001\026\027  
\163\145\162\166\145\162\055\143\145\162\164\163\100\164\150\141  
\167\164\145\056\143\157\155

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\023\060\202\002\174\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\004\005\000\060  
\201\304\061\013\060\011\006\003\125\004\006\023\002\132\101\061  
\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145\162  
\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007\023  
\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006\003  
\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156\163  
\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003\125  
\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151\163  
\151\157\156\061\031\060\027\006\003\125\004\003\023\020\124\150  
\141\167\164\145\040\123\145\162\166\145\162\040\103\101\061\046  
\060\044\006\011\052\206\110\206\367\015\001\011\001\026\027\163  
\145\162\166\145\162\055\143\145\162\164\163\100\164\150\141\167  
\164\145\056\143\157\155\060\036\027\015\071\066\060\070\060\061  
\060\060\060\060\060\060\132\027\015\062\060\061\062\063\061\062  
\063\065\071\065\071\132\060\201\304\061\013\060\011\006\003\125  
\004\006\023\002\132\101\061\025\060\023\006\003\125\004\010\023  
\014\127\145\163\164\145\162\156\040\103\141\160\145\061\022\060  
\020\006\003\125\004\007\023\011\103\141\160\145\040\124\157\167  
\156\061\035\060\033\006\003\125\004\012\023\024\124\150\141\167  
\164\145\040\103\157\156\163\165\154\164\151\156\147\040\143\143  
\061\050\060\046\006\003\125\004\013\023\037\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145  
\163\040\104\151\166\151\163\151\157\156\061\031\060\027\006\003

\125\004\003\023\020\124\150\141\167\164\145\040\123\145\162\166  
\145\162\040\103\101\061\046\060\044\006\011\052\206\110\206\367  
\015\001\011\001\026\027\163\145\162\166\145\162\055\143\145\162  
\164\163\100\164\150\141\167\164\145\056\143\157\155\060\201\237  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\201\215\000\060\201\211\002\201\201\000\323\244\120\156\310\377  
\126\153\346\317\135\266\352\014\150\165\107\242\252\302\332\204  
\045\374\250\364\107\121\332\205\265\040\164\224\206\036\017\165  
\311\351\010\141\365\006\155\060\156\025\031\002\351\122\300\142  
\333\115\231\236\342\152\014\104\070\315\376\276\343\144\011\160  
\305\376\261\153\051\266\057\111\310\073\324\047\004\045\020\227  
\057\347\220\155\300\050\102\231\327\114\103\336\303\365\041\155  
\124\237\135\303\130\341\300\344\331\133\260\270\334\264\173\337  
\066\072\302\265\146\042\022\326\207\015\002\003\001\000\001\243  
\023\060\021\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001  
\004\005\000\003\201\201\000\007\372\114\151\134\373\225\314\106  
\356\205\203\115\041\060\216\312\331\250\157\111\032\346\332\121  
\343\140\160\154\204\141\021\241\032\310\110\076\131\103\175\117  
\225\075\241\213\267\013\142\230\172\165\212\335\210\116\116\236  
\100\333\250\314\062\164\271\157\015\306\343\263\104\013\331\212  
\157\232\051\233\231\030\050\073\321\343\100\050\232\132\074\325  
\265\347\040\033\213\312\244\253\215\351\121\331\342\114\054\131  
\251\332\271\262\165\033\366\102\362\357\307\362\030\371\211\274  
\243\377\212\043\056\160\107

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Thawte Server CA"

# Issuer: 1.2.840.113549.1.9.1=server-certs@thawte.com,CN=Thawte Server CA,OU=Certification Services  
Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA

# Serial Number: 1 (0x1)

# Subject: 1.2.840.113549.1.9.1=server-certs@thawte.com,CN=Thawte Server CA,OU=Certification  
Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA

# Not Valid Before: Thu Aug 01 00:00:00 1996

# Not Valid After: Thu Dec 31 23:59:59 2020

# Fingerprint (MD5): c5:70:c4:a2:ed:53:78:0c:c8:10:53:81:64:cb:d0:1d

# Fingerprint (SHA1): 23:e5:94:94:51:95:f2:41:48:03:b4:d5:64:d2:a3:a3:f5:d8:8b:8c

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Thawte Server CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\043\345\224\224\121\225\362\101\110\003\264\325\144\322\243\243  
\365\330\213\214

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\305\160\304\242\355\123\170\014\310\020\123\201\144\313\320\035

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\304\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007  
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006  
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156  
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003  
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151  
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151  
\163\151\157\156\061\031\060\027\006\003\125\004\003\023\020\124  
\150\141\167\164\145\040\123\145\162\166\145\162\040\103\101\061  
\046\060\044\006\011\052\206\110\206\367\015\001\011\001\026\027  
\163\145\162\166\145\162\055\143\145\162\164\163\100\164\150\141  
\167\164\145\056\143\157\155

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Thawte Premium Server CA"

# Issuer: 1.2.840.113549.1.9.1=premium-server@thawte.com,CN=Thawte Premium Server CA,OU=Certification  
Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA

# Serial Number: 1 (0x1)

# Subject: 1.2.840.113549.1.9.1=premium-server@thawte.com,CN=Thawte Premium Server CA,OU=Certification  
Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA

# Not Valid Before: Thu Aug 01 00:00:00 1996

# Not Valid After: Thu Dec 31 23:59:59 2020

# Fingerprint (MD5): 06:9f:69:79:16:66:90:02:1b:8c:8c:a2:c3:07:6f:3a

# Fingerprint (SHA1): 62:7f:8d:78:27:65:63:99:d2:7d:7f:90:44:c9:fe:b3:f3:3e:fa:9a

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Thawte Premium Server CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007  
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006  
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156  
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003  
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151  
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151  
\163\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124  
\150\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145  
\162\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110  
\206\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055  
\163\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157  
\155

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007  
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006  
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156  
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003  
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151  
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151  
\163\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124  
\150\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145  
\162\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110  
\206\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055  
\163\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157  
\155

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\001

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\047\060\202\002\220\240\003\002\001\002\002\001\001  
\060\015\006\011\052\206\110\206\367\015\001\001\004\005\000\060  
\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101\061  
\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145\162  
\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007\023  
\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006\003  
\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156\163  
\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003\125  
\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151\157  
\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151\163

\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124\150  
\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145\162  
\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110\206  
\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055\163  
\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157\155  
\060\036\027\015\071\066\060\070\060\061\060\060\060\060\060\060  
\132\027\015\062\060\061\062\063\061\062\063\065\071\065\071\132  
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101  
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145  
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007  
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006  
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156  
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003  
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151  
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151  
\163\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124  
\150\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145  
\162\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110  
\206\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055  
\163\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157  
\155\060\201\237\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\201\215\000\060\201\211\002\201\201\000\322\066  
\066\152\213\327\302\133\236\332\201\101\142\217\070\356\111\004  
\125\326\320\357\034\033\225\026\107\357\030\110\065\072\122\364  
\053\152\006\217\073\057\352\126\343\257\206\215\236\027\367\236  
\264\145\165\002\115\357\313\011\242\041\121\330\233\320\147\320  
\272\015\222\006\024\163\324\223\313\227\052\000\234\134\116\014  
\274\372\025\122\374\362\104\156\332\021\112\156\010\237\057\055  
\343\371\252\072\206\163\266\106\123\130\310\211\005\275\203\021  
\270\163\077\252\007\215\364\102\115\347\100\235\034\067\002\003  
\001\000\001\243\023\060\021\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\015\006\011\052\206\110\206  
\367\015\001\001\004\005\000\003\201\201\000\046\110\054\026\302  
\130\372\350\026\164\014\252\252\137\124\077\362\327\311\170\140  
\136\136\156\067\143\042\167\066\176\262\027\304\064\271\365\010  
\205\374\311\001\070\377\115\276\362\026\102\103\347\273\132\106  
\373\301\306\021\037\361\112\260\050\106\311\303\304\102\175\274  
\372\253\131\156\325\267\121\210\021\343\244\205\031\153\202\114  
\244\014\022\255\351\244\256\077\361\303\111\145\232\214\305\310  
\076\045\267\224\231\273\222\062\161\007\360\206\136\355\120\047  
\246\015\246\043\371\273\313\246\007\024\102

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER

CK\_BBOOL CK\_FALSE

```
Microsoft Code Signing Only Certificate
Trust for "Thawte Premium Server CA"
Issuer: 1.2.840.113549.1.9.1=premium-server@thawte.com,CN=Thawte Premium Server CA,OU=Certification
Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
Serial Number: 1 (0x1)
Subject: 1.2.840.113549.1.9.1=premium-server@thawte.com,CN=Thawte Premium Server CA,OU=Certification
Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
Not Valid Before: Thu Aug 01 00:00:00 1996
Not Valid After: Thu Dec 31 23:59:59 2020
Fingerprint (MD5): 06:9f:69:79:16:66:90:02:1b:8c:8c:a2:c3:07:6f:3a
Fingerprint (SHA1): 62:7f:8d:78:27:65:63:99:d2:7d:7f:90:44:c9:fe:b3:f3:3e:fa:9a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Thawte Premium Server CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\142\177\215\170\047\145\143\231\322\175\177\220\104\311\376\263
\363\076\372\232
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\006\237\151\171\026\146\220\002\033\214\214\242\303\007\157\072
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151
\163\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124
\150\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145
\162\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110
\206\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055
\163\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157
\155
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "Equifax Secure Global eBusiness CA-1"
Issuer: CN=Equifax Secure Global eBusiness CA-1,O=Equifax Secure Inc.,C=US
Serial Number: 1 (0x1)
Subject: CN=Equifax Secure Global eBusiness CA-1,O=Equifax Secure Inc.,C=US
Not Valid Before: Mon Jun 21 04:00:00 1999
Not Valid After: Sun Jun 21 04:00:00 2020
Fingerprint (MD5): 8f:5d:77:06:27:c4:98:3c:5b:93:78:e7:d7:7d:9b:cc
Fingerprint (SHA1): 7e:78:4a:10:1c:82:65:cc:2d:e1:f1:6d:47:b4:40:ca:d9:0a:19:45
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Equifax Secure Global eBusiness CA-1"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\105\161\165\151\146\141
\170\040\123\145\143\165\162\145\040\111\156\143\056\061\055\060
\053\006\003\125\004\003\023\044\105\161\165\151\146\141\170\040
\123\145\143\165\162\145\040\107\154\157\142\141\154\040\145\102
\165\163\151\156\145\163\163\040\103\101\055\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\105\161\165\151\146\141
\170\040\123\145\143\165\162\145\040\111\156\143\056\061\055\060
\053\006\003\125\004\003\023\044\105\161\165\151\146\141\170\040
\123\145\143\165\162\145\040\107\154\157\142\141\154\040\145\102
\165\163\151\156\145\163\163\040\103\101\055\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\220\060\202\001\371\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\004\005\000\060
\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061\034
\060\032\006\003\125\004\012\023\023\105\161\165\151\146\141\170
\040\123\145\143\165\162\145\040\111\156\143\056\061\055\060\053
\006\003\125\004\003\023\044\105\161\165\151\146\141\170\040\123
\145\143\165\162\145\040\107\154\157\142\141\154\040\145\102\165
\163\151\156\145\163\163\040\103\101\055\061\060\036\027\015\071
\071\060\066\062\061\060\064\060\060\060\060\132\027\015\062\060
\060\066\062\061\060\064\060\060\060\060\132\060\132\061\013\060
```

\011\006\003\125\004\006\023\002\125\123\061\034\060\032\006\003  
\125\004\012\023\023\105\161\165\151\146\141\170\040\123\145\143  
\165\162\145\040\111\156\143\056\061\055\060\053\006\003\125\004  
\003\023\044\105\161\165\151\146\141\170\040\123\145\143\165\162  
\145\040\107\154\157\142\141\154\040\145\102\165\163\151\156\145  
\163\163\040\103\101\055\061\060\201\237\060\015\006\011\052\206  
\110\206\367\015\001\001\001\005\000\003\201\215\000\060\201\211  
\002\201\201\000\272\347\027\220\002\145\261\064\125\074\111\302  
\121\325\337\247\321\067\217\321\347\201\163\101\122\140\233\235  
\241\027\046\170\255\307\261\350\046\224\062\265\336\063\215\072  
\057\333\362\232\172\132\163\230\243\134\351\373\212\163\033\134  
\347\303\277\200\154\315\251\364\326\053\300\367\371\231\252\143  
\242\261\107\002\017\324\344\121\072\022\074\154\212\132\124\204  
\160\333\301\305\220\317\162\105\313\250\131\300\315\063\235\077  
\243\226\353\205\063\041\034\076\036\076\140\156\166\234\147\205  
\305\310\303\141\002\003\001\000\001\243\146\060\144\060\021\006  
\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\037\006\003\125\035\043\004\030\060\026\200\024\276\250  
\240\164\162\120\153\104\267\311\043\330\373\250\377\263\127\153  
\150\154\060\035\006\003\125\035\016\004\026\004\024\276\250\240  
\164\162\120\153\104\267\311\043\330\373\250\377\263\127\153\150  
\154\060\015\006\011\052\206\110\206\367\015\001\001\004\005\000  
\003\201\201\000\060\342\001\121\252\307\352\137\332\271\320\145  
\017\060\326\076\332\015\024\111\156\221\223\047\024\061\357\304  
\367\055\105\370\354\307\277\242\101\015\043\264\222\371\031\000  
\147\275\001\257\315\340\161\374\132\317\144\304\340\226\230\320  
\243\100\342\001\212\357\047\007\361\145\001\212\104\055\006\145  
\165\122\300\206\020\040\041\137\154\153\017\154\256\011\034\257  
\362\242\030\064\304\165\244\163\034\361\215\334\357\255\371\263  
\166\264\222\277\334\225\020\036\276\313\310\073\132\204\140\031  
\126\224\251\125

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Equifax Secure Global eBusiness CA-1"

# Issuer: CN=Equifax Secure Global eBusiness CA-1,O=Equifax Secure Inc.,C=US

# Serial Number: 1 (0x1)

# Subject: CN=Equifax Secure Global

eBusiness CA-1,O=Equifax Secure Inc.,C=US

# Not Valid Before: Mon Jun 21 04:00:00 1999

# Not Valid After: Sun Jun 21 04:00:00 2020

# Fingerprint (MD5): 8f:5d:77:06:27:c4:98:3c:5b:93:78:e7:d7:7d:9b:cc

# Fingerprint (SHA1): 7e:78:4a:10:1c:82:65:cc:2d:e1:f1:6d:47:b4:40:ca:d9:0a:19:45



```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Equifax Secure Global eBusiness CA-1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\176\170\112\020\034\202\145\314\055\341\361\155\107\264\100\312
\331\012\031\105
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\217\135\167\006\047\304\230\074\133\223\170\347\327\175\233\314
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\105\161\165\151\146\141
\170\040\123\145\143\165\162\145\040\111\156\143\056\061\055\060
\053\006\003\125\004\003\023\044\105\161\165\151\146\141\170\040
\123\145\143\165\162\145\040\107\154\157\142\141\154\040\145\102
\165\163\151\156\145\163\163\040\103\101\055\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "Equifax"
Issuer: OU=Equifax Secure Certificate Authority,O=Equifax,C=US
Serial Number:35:de:f4:cf
Subject: OU=Equifax Secure Certificate Authority,O=Equifax,C=US
Not Valid Before: Sat Aug 22 16:41:51 1998
Not Valid After: Wed Aug 22 16:41:51 2018
Fingerprint (MD5): 67:cb:9d:c0:13:24:8a:82:9b:b2:17:1e:d1:1b:ec:d4
Fingerprint (SHA1): d2:32:09:ad:23:d3:14:23:21:74:e4:0d:7f:9d:62:13:97:86:63:3a

```

```

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Equifax"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\012\023\007\105\161\165\151\146\141

```

\170\061\055\060\053\006\003\125\004\013\023\044\105\161\165\151  
\146\141\170\040\123\145\143\165\162\145\040\103\145\162\164\151  
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171  
END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\020\060\016\006\003\125\004\012\023\007\105\161\165\151\146\141  
\170\061\055\060\053\006\003\125\004\013\023\044\105\161\165\151  
\146\141\170\040\123\145\143\165\162\145\040\103\145\162\164\151  
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171  
END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\004\065\336\364\317

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\040\060\202\002\211\240\003\002\001\002\002\004\065  
\336\364\317\060\015\006\011\052\206\110\206\367\015\001\001\005  
\005\000\060\116\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\020\060\016\006\003\125\004\012\023\007\105\161\165\151  
\146\141\170\061\055\060\053\006\003\125\004\013\023\044\105\161  
\165\151\146\141\170\040\123\145\143\165\162\145\040\103\145\162  
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151  
\164\171\060\036\027\015\071\070\060\070\062\062\061\066\064\061  
\065\061\132\027\015\061\070\060\070\062\062\061\066\064\061\065  
\061\132\060\116\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\020\060\016\006\003\125\004\012\023\007\105\161\165\151  
\146\141\170\061\055\060\053\006\003\125\004\013\023\044\105\161  
\165\151\146\141\170\040\123\145\143\165\162\145\040\103\145\162  
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151  
\164\171\060\201\237\060\015\006\011\052\206\110\206\367\015\001  
\001\001\005\000\003\201\215\000\060\201\211\002\201\201\000\301  
\135\261\130\147\010\142\356\240\232\055\037\010\155\221\024\150  
\230\012\036\376\332\004\157\023\204\142\041\303\321\174\316\237  
\005\340\270\001\360\116\064\354\342\212\225\004\144\254\361\153  
\123\137\005\263\313\147\200\277\102\002\216\376\335\001\011\354  
\341\000\024\117\374\373\360\014\335\103\272\133\053\341\037\200  
\160\231\025\127\223\026\361\017\227\152\267\302\150\043\034\314  
\115\131\060\254\121\036\073\257\053\326\356\143\105\173\305\331  
\137\120\322\343\120\017\072\210\347\277\024\375\340\307\271\002  
\003\001\000\001\243\202\001\011\060\202\001\005\060\160\006\003  
\125\035\037\004\151\060\147\060\145\240\143\240\141\244\137\060  
\135\061\013\060\011\006\003\125\004\006\023\002\125\123\061\020  
\060\016\006\003\125\004\012\023\007\105\161\165\151\146\141\170  
\061\055\060\053\006\003\125\004\013\023\044\105\161\165\151\146  
\141\170\040\123\145\143\165\162\145\040\103\145\162\164\151\146  
\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171\061  
\015\060\013\006\003\125\004\003\023\004\103\122\114\061\060\032

```
\006\003\125\035\020\004\023\060\021\201\017\062\060\061\070\060
\070\062\062\061\066\064\061\065\061\132\060\013\006\003\125\035
\017\004\004\003\002\001\006\060\037\006\003\125\035\043\004\030
\060\026\200\024\110\346\150\371\053\322\262\225\327\107\330\043
\040\020\117\063\230\220\237\324\060\035\006\003\125\035\016\004
\026\004\024\110\346\150\371\053\322\262\225\327\107\330\043\040
\020\117\063\230\220\237\324\060\014\006\003\125\035\023\004\005
\060\003\001\001\377\060\032\006\011\052\206\110\206\366\175\007
\101\000\004\015\060\013\033\005\126\063\056\060\143\003\002\006
\300\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\201\201\000\130\316\051\352\374\367\336\265\316\002\271\027
\265\205\321\271\343\340\225\314\045\061\015\000\246\222\156\177
\266\222\143\236\120\225\321\232\157\344\021\336\143\205\156\230
\356\250\377\132\310\323\125\262\146\161\127\336\300\041\353\075
\052\247\043\111\001\004\206\102\173\374\356\177\242\026\122\265
\147\147\323\100\333\073\046\130\262\050\167\075\256\024\167\141
\326\372\052\146\047\240\015\372\247\163\134\352\160\361\224\041
\145\104\137\372\374\357\051\150\251\242\207\171\357\171\357\117
\254\007\167\070
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Equifax"

# Issuer: OU=Equifax Secure Certificate Authority,O=Equifax,C=US

# Serial Number:35:de:f4:cf

# Subject: OU=Equifax Secure Certificate Authority,O=Equifax,C=US

# Not Valid Before: Sat Aug 22 16:41:51 1998

# Not Valid After: Wed Aug 22 16:41:51 2018

# Fingerprint (MD5): 67:cb:9d:c0:13:24:8a:82:9b:b2:17:1e:d1:1b:ec:d4

# Fingerprint (SHA1): d2:32:09:ad:23:d3:14:23:21:74:e4:0d:7f:9d:62:13:97:86:63:3a

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Equifax"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\322\062\011\255\043\323\024\043\041\164\344\015\177\235\142\023
\227\206\143\072
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\147\313\235\300\023\044\212\202\233\262\027\036\321\033\354\324
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\012\023\007\105\161\165\151\146\141
\170\061\055\060\053\006\003\125\004\013\023\044\105\161\165\151
\146\141\170\040\123\145\143\165\162\145\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
END
```

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\004\065\336\364\317
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "Class 1 Primary CA"

# Issuer: CN=Class 1 Primary CA,O=Certplus,C=FR

# Serial Number:86:fe:1d:5f:c3:81:f8:47:d7:33:2c:73:94:75:7b:37

# Subject: CN=Class 1 Primary CA,O=Certplus,C=FR

# Not Valid

Before: Wed Jul 07 17:01:00 1999

# Not Valid After: Mon Jul 06 23:59:59 2020

# Fingerprint (MD5): 21:24:a6:81:c1:d8:f2:19:af:49:98:e3:9d:fe:0b:f4

# Fingerprint (SHA1): 6a:17:45:70:a9:16:fb:e8:44:53:ee:d3:d0:70:a1:d8:da:44:28:29

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Class 1 Primary CA"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\075\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\023\010\103\145\162\164\160\154
\165\163\061\033\060\031\006\003\125\004\003\023\022\103\154\141
\163\163\040\061\040\120\162\151\155\141\162\171\040\103\101
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\075\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\023\010\103\145\162\164\160\154
\165\163\061\033\060\031\006\003\125\004\003\023\022\103\154\141
\163\163\040\061\040\120\162\151\155\141\162\171\040\103\101
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\021\000\206\376\035\137\303\201\370\107\327\063\054\163\224
\165\173\067
```

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\222\060\202\002\172\240\003\002\001\002\002\021\000  
\206\376\035\137\303\201\370\107\327\063\054\163\224\165\173\067  
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060  
\075\061\013\060\011\006\003\125\004\006\023\002\106\122\061\021  
\060\017\006\003\125\004\012\023\010\103\145\162\164\160\154\165  
\163\061\033\060\031\006\003\125\004\003\023\022\103\154\141\163  
\163\040\061\040\120\162\151\155\141\162\171\040\103\101\060\036  
\027\015\071\071\060\067\060\067\061\067\060\061\060\060\132\027  
\015\062\060\060\067\060\066\062\063\065\071\065\071\132\060\075  
\061\013\060\011\006\003\125\004\006\023\002\106\122\061\021\060  
\017\006\003\125\004\012\023\010\103\145\162\164\160\154\165\163  
\061\033\060\031\006\003\125\004\003\023\022\103\154\141\163\163  
\040\061\040\120\162\151\155\141\162\171\040\103\101\060\202\001  
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000  
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\303\153  
\051\310\056\307\256\174\122\005\351\223\211\126\012\132\171\311  
\314\334\045\357\207\212\055\005\330\201\027\004\033\072\105\370  
\171\016\015\111\324\201\101\310\253\105\373\165\310\025\362\342  
\320\274\331\141\154\204\244\023\031\247\331\371\362\111\334\114  
\017\306\175\127\264\023\334\036\011\161\051\066\235\200\130\364  
\033\330\211\024\353\323\322\223\113\052\361\167\347\152\145\275  
\031\345\252\375\014\112\143\341\302\231\264\017\004\266\132\033  
\066\074\067\074\277\305\345\136\361\137\127\016\037\307\375\054  
\347\344\157\152\233\142\226\071\021\233\146\360\054\266\122\334  
\341\047\377\333\155\376\353\253\143\024\035\143\210\143\342\026  
\014\371\040\124\017\233\335\025\152\166\203\117\275\047\213\123  
\246\067\322\207\362\107\120\122\073\146\351\321\170\032\033\262  
\073\151\360\131\074\070\133\321\052\114\063\136\016\312\126\245  
\355\055\133\202\203\115\326\070\116\212\126\266\152\057\044\153  
\022\060\246\052\336\257\014\273\252\104\022\034\023\305\145\017  
\343\375\330\032\061\113\344\077\014\174\105\350\026\063\002\003  
\001\000\001\243\201\214\060\201\211\060\017\006\003\125\035\023  
\004\010\060\006\001\001\377\002\001\012\060\013\006\003\125\035  
\017\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026  
\004\024\043\056\337\351\201\264\320\204\375\216\273\251\335\371  
\014\243\343\363\111\123\060\021\006\011\140\206\110\001\206\370  
\102\001\001\004\004\003\002\001\006\060\067\006\003\125\035\037  
\004\060\060\056\060\054\240\052\240\050\206\046\150\164\164\160  
\072\057\057\167\167\167\056\143\145\162\164\160\154\165\163\056  
\143\157\155\057\103\122\114\057\143\154\141\163\163\061\056\143  
\162\154\060\015\006\011\052\206\110\206\367\015\001\001\005\005  
\000\003\202\001\001\000\276\046\123\326\136\237\220\077\001\224  
\002\354\010\301\210\232\320\247\372\120\015\332\374\224\035\250  
\324\120\043\320\237\034\213\141\261\262\252\104\017\254\330\023  
\015\325\326\241\350\061\170\320\357\036\203\100\232\345\375\101  
\351\222\375\356\243\225\220\363\300\270\157\176\367\064\245\241  
\337\074\363\336\126\262\307\337\207\046\104\307\342\203\271\023

```
\157\060\105\161\051\042\025\253\304\333\077\117\363\167\371\231
\030\064\365\163\222\175\067\146\147\111\156\063\232\115\051\224
\213\275\120\071\143\145\017\020\347\173\020\152\321\107\371\236
\045\014\047\051\302\333\010\210\347\252\211\072\105\252\237\111
\262\175\352\150\212\100\376\221\301\302\111\377\041\321\147\016
\032\022\035\112\056\034\373\224\371\155\073\171\062\371\036\051
\221\012\102\226\105\361\357\312\130\017\162\235\014\251\203\274
\062\335\230\004\321\131\341\144\027\275\314\201\243\003\136\226
\140\345\177\026\070\012\153\321\372\263\204\235\052\312\076\373
\102\370\117\350\247\133\050\031\030\255\340\246\146\036\260\051
\041\362\270\231\217\377
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL

CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Class 1 Primary CA"

# Issuer: CN=Class 1 Primary CA,O=Certplus,C=FR

# Serial Number:86:fe:1d:5f:c3:81:f8:47:d7:33:2c:73:94:75:7b:37

# Subject: CN=Class 1 Primary CA,O=Certplus,C=FR

# Not Valid Before: Wed Jul 07 17:01:00 1999

# Not Valid After: Mon Jul 06 23:59:59 2020

# Fingerprint (MD5): 21:24:a6:81:c1:d8:f2:19:af:49:98:e3:9d:fe:0b:f4

# Fingerprint (SHA1): 6a:17:45:70:a9:16:fb:e8:44:53:ee:d3:d0:70:a1:d8:da:44:28:29

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Class 1 Primary CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\152\027\105\160\251\026\373\350\104\123\356\323\320\160\241\330
\332\104\050\051
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\041\044\246\201\301\330\362\031\257\111\230\343\235\376\013\364
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\075\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\023\010\103\145\162\164\160\154
\165\163\061\033\060\031\006\003\125\004\003\023\022\103\154\141
\163\163\040\061\040\120\162\151\155\141\162\171\040\103\101
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\021\000\206\376\035\137\303\201\370\107\327\063\054\163\224
```

\165\173\067

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST  
CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "UTN-USERFirst-Object"

# Issuer: CN=UTN-USERFirst-Object,OU=http://www.usertrust.com,O=The USERTRUST Network,L=Salt Lake  
City,ST=UT,C=US

# Serial Number:44:be:0c:8b:50:00:24:b4:11:d3:36:2d:e0:b3:5f:1b

# Subject: CN=UTN-USERFirst-Object,OU=http://www.usertrust.com,O=The USERTRUST Network,L=Salt Lake  
City,ST=UT,C=US

# Not Valid Before: Fri Jul 09 18:31:20 1999

# Not Valid After: Tue Jul 09 18:40:36

2019

# Fingerprint (MD5): a7:f2:e4:16:06:41:11:50:30:6b:9c:e3:b4:9c:b0:c9

# Fingerprint (SHA1): e1:2d:fb:4b:41:d7:d9:c3:2b:30:51:4b:ac:1d:81:d8:38:5e:2d:46

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "UTN-USERFirst-Object"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\225\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\013\060\011\006\003\125\004\010\023\002\125\124\061\027\060  
\025\006\003\125\004\007\023\016\123\141\154\164\040\114\141\153  
\145\040\103\151\164\171\061\036\060\034\006\003\125\004\012\023  
\025\124\150\145\040\125\123\105\122\124\122\125\123\124\040\116  
\145\164\167\157\162\153\061\041\060\037\006\003\125\004\013\023  
\030\150\164\164\160\072\057\057\167\167\167\056\165\163\145\162  
\164\162\165\163\164\056\143\157\155\061\035\060\033\006\003\125  
\004\003\023\024\125\124\116\055\125\123\105\122\106\151\162\163  
\164\055\117\142\152\145\143\164

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\225\061\013\060\011\006\003\125\004\006\023\002\125\123  
\061\013\060\011\006\003\125\004\010\023\002\125\124\061\027\060  
\025\006\003\125\004\007\023\016\123\141\154\164\040\114\141\153  
\145\040\103\151\164\171\061\036\060\034\006\003\125\004\012\023  
\025\124\150\145\040\125\123\105\122\124\122\125\123\124\040\116  
\145\164\167\157\162\153\061\041\060\037\006\003\125\004\013\023  
\030\150\164\164\160\072\057\057\167\167\167\056\165\163\145\162  
\164\162\165\163\164\056\143\157\155\061\035\060\033\006\003\125

\004\003\023\024\125\124\116\055\125\123\105\122\106\151\162\163  
\164\055\117\142\152\145\143\164

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\104\276\014\213\120\000\044\264\021\323\066\055\340\263  
\137\033

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\146\060\202\003\116\240\003\002\001\002\002\020\104  
\276\014\213\120\000\044\264\021\323\066\055\340\263\137\033\060  
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201  
\225\061\013\060\011\006\003\125\004\006\023\002\125\123\061\013  
\060\011\006\003\125\004\010\023\002\125\124\061\027\060\025\006  
\003\125\004\007\023\016\123\141\154\164\040\114\141\153\145\040  
\103\151\164\171\061\036\060\034\006\003\125\004\012\023\025\124  
\150\145\040\125\123\105\122\124\122\125\123\124\040\116\145\164  
\167\157\162\153\061\041\060\037\006\003\125\004\013\023\030\150  
\164\164\160\072\057\057\167\167\167\056\165\163\145\162\164\162  
\165\163\164\056\143\157\155\061\035\060\033\006\003\125\004\003  
\023\024\125\124\116\055\125\123\105\122\106\151\162\163\164\055  
\117\142\152\145\143\164\060\036\027\015\071\071\060\067\060\071  
\061\070\063\061\062\060\132\027\015\061\071\060\067\060\071\061  
\070\064\060\063\066\132\060\201\225\061\013\060\011\006\003\125  
\004\006\023\002\125\123\061\013\060\011\006\003\125\004\010\023  
\002\125\124\061\027\060\025\006\003\125\004\007\023\016\123\141  
\154\164\040\114\141\153\145\040\103\151\164\171\061\036\060\034  
\006\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124  
\122\125\123\124\040\116\145\164\167\157\162\153\061\041\060\037  
\006\003\125\004\013\023\030\150\164\164\160\072\057\057\167\167  
\167\056\165\163\145\162\164\162\165\163\164\056\143\157\155\061  
\035\060\033\006\003\125\004\003\023\024\125\124\116\055\125\123  
\105\122\106\151\162\163\164\055\117\142\152\145\143\164\060\202  
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005  
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\316  
\252\201\077\243\243\141\170\252\061\000\125\225\021\236\047\017  
\037\034\337\072\233\202\150\060\300\112\141\035\361\057\016\372  
\276\171\367\245\043\357\125\121\226\204\315\333\343\271\156\076  
\061\330\012\040\147\307\364\331\277\224\353\107\004\076\002\316  
\052\242\135\207\004\011\366\060\235\030\212\227\262\252\034\374  
\101\322\241\066\313\373\075\221\272\347\331\160\065\372\344\347  
\220\303\233\243\233\323\074\365\022\231\167\261\267\011\340\150  
\346\034\270\363\224\143\210\152\152\376\013\166\311\276\364\042  
\344\147\271\253\032\136\167\301\205\007\335\015\154\277\356\006  
\307\167\152\101\236\247\017\327\373\356\224\027\267\374\205\276  
\244\253\304\034\061\335\327\266\321\344\360\357\337\026\217\262  
\122\223\327\241\324\211\241\007\056\277\341\001\022\102\036\032  
\341\330\225\064\333\144\171\050\377\272\056\021\302\345\350\133  
\222\110\373\107\013\302\154\332\255\062\203\101\363\245\345\101



\160\375\145\220\155\372\372\121\304\371\275\226\053\031\004\054  
\323\155\247\334\360\177\157\203\145\342\152\253\207\206\165\002  
\003\001\000\001\243\201\257\060\201\254\060\013\006\003\125\035  
\017\004\004\003\002\001\306\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004  
\026\004\024\332\355\144\164\024\234\024\074\253\335\231\251\275  
\133\050\115\213\074\311\330\060\102\006\003\125\035\037\004\073  
\060\071\060\067\240\065\240\063\206\061\150\164\164\160\072\057  
\057\143\162\154\056\165\163\145\162\164\162\165\163\164\056\143  
\157\155\057\125\124\116\055\125\123\105\122\106\151\162\163\164  
\055\117\142\152\145\143\164\056\143\162\154\060\051\006\003\125  
\035\045\004\042\060\040\006\010\053\006\001\005\005\007\003\003  
\006\010\053\006\001\005\005\007\003\010\006\012\053\006\001\004  
\001\202\067\012\003\004\060\015\006\011\052\206\110\206\367\015  
\001\001\005\005\000\003\202\001\001\000\010\037\122\261\067\104  
\170\333\375\316\271\332\225\226\230\252\125\144\200\265\132\100  
\335\041\245\305\301\363\137\054\114\310\107\132\151\352\350\360  
\065\065\364\320\045\363\310\246\244\207\112\275\033\261\163\010  
\275\324\303\312\266\065\273\131\206\167\061\315\247\200\024\256  
\023\357\374\261\110\371\153\045\045\055\121\266\054\155\105\301  
\230\310\212\126\135\076\356\103\116\076\153\047\216\320\072\113  
\205\013\137\323\355\152\247\165\313\321\132\207\057\071\165\023  
\132\162\260\002\201\237\276\360\017\204\124\040\142\154\151\324  
\341\115\306\015\231\103\001\015\022\226\214\170\235\277\120\242  
\261\104\252\152\317\027\172\317\157\017\324\370\044\125\137\360  
\064\026\111\146\076\120\106\311\143\161\070\061\142\270\142\271  
\363\123\255\154\265\053\242\022\252\031\117\011\332\136\347\223  
\306\216\024\010\376\360\060\200\030\240\206\205\115\310\175\327  
\213\003\376\156\325\367\235\026\254\222\054\240\043\345\234\221  
\122\037\224\337\027\224\163\303\263\301\301\161\005\040\000\170  
\275\023\122\035\250\076\315\000\037\310

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "UTN-USERFirst-Object"

# Issuer: CN=UTN-USERFirst-Object,OU=http://www.usertrust.com,O=The USERTRUST Network,L=Salt Lake City,ST=UT,C=US

# Serial Number:44:be:0c:8b:50:00:24:b4:11:d3:36:2d:e0:b3:5f:1b

# Subject: CN=UTN-USERFirst-Object,OU=http://www.usertrust.com,O=The USERTRUST Network,L=Salt Lake City,ST=UT,C=US

# Not Valid Before: Fri Jul 09 18:31:20 1999

# Not Valid After:

Tue Jul 09 18:40:36 2019

# Fingerprint (MD5): a7:f2:e4:16:06:41:11:50:30:6b:9c:e3:b4:9c:b0:c9

```

Fingerprint (SHA1): e1:2d:fb:4b:41:d7:d9:c3:2b:30:51:4b:ac:1d:81:d8:38:5e:2d:46
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UTN-USERFirst-Object"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\341\055\373\113\101\327\331\303\053\060\121\113\254\035\201\330
\070\136\055\106
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\247\362\344\026\006\101\021\120\060\153\234\343\264\234\260\311
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\225\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\125\124\061\027\060
\025\006\003\125\004\007\023\016\123\141\154\164\040\114\141\153
\145\040\103\151\164\171\061\036\060\034\006\003\125\004\012\023
\025\124\150\145\040\125\123\105\122\124\122\125\123\124\040\116
\145\164\167\157\162\153\061\041\060\037\006\003\125\004\013\023
\030\150\164\164\160\072\057\057\167\167\167\056\165\163\145\162
\164\162\165\163\164\056\143\157\155\061\035\060\033\006\003\125
\004\003\023\024\125\124\116\055\125\123\105\122\106\151\162\163
\164\055\117\142\152\145\143\164
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\104\276\014\213\120\000\044\264\021\323\066\055\340\263
\137\033
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "BYTE Root Certification Authority 001"
Issuer: CN=BYTE Root Certification Authority 001,O=BYTE Computer S.A.,C=GR
Serial Number:71:8c:2f:39:7c:40:74:40
Subject: CN=BYTE Root Certification Authority 001,O=BYTE Computer S.A.,C=GR
Not Valid Before: Wed Sep 10 22:01:54 2014
Not Valid After: Sat Sep 10 22:01:54 2039
Fingerprint (MD5): fa:fb:82:6a:e5:b3:a2:83:50:9b:83:28:b6:41:42:03
#
Fingerprint (SHA1): 3f:0f:eb:17:a7:ef:58:04:cf:d9:0a:77:b7:bb:02:1e:a6:9c:64:18
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BYTE Root Certification Authority 001"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\033\060\031\006\003\125\004\012\014\022\102\131\124\105\040\103
\157\155\160\165\164\145\162\040\123\056\101\056\061\056\060\054
\006\003\125\004\003\014\045\102\131\124\105\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\060\060\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\033\060\031\006\003\125\004\012\014\022\102\131\124\105\040\103
\157\155\160\165\164\145\162\040\123\056\101\056\061\056\060\054
\006\003\125\004\003\014\045\102\131\124\105\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\060\060\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\161\214\057\071\174\100\164\100
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\231\060\202\003\201\240\003\002\001\002\002\010\161
\214\057\071\174\100\164\100\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\132\061\013\060\011\006\003\125\004
\006\023\002\107\122\061\033\060\031\006\003\125\004\012\014\022
\102\131\124\105\040\103\157\155\160\165\164\145\162\040\123\056
\101\056\061\056\060\054\006\003\125\004\003\014\045\102\131\124
\105\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\060
\060\061\060\036\027\015\061\064\060\071\061\060\062\062\060\061
\065\064\132\027\015\063\071\060\071\061\060\062\062\060\061\065
\064\132\060\132\061\013\060\011\006\003\125\004\006\023\002\107
\122\061\033\060\031\006\003\125\004\012\014\022\102\131\124\105
\040\103\157\155\160\165\164\145\162\040\123\056\101\056\061\056
\060\054\006\003\125\004\003\014\045\102\131\124\105\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\060\060\061\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\355
\022\056\027\163\236\157\364\363\231\350\236\010\127\011\064\044
\021\100\037\214\041\176\033\257\070\303\321\307\346\024\345\372
\033\272\136\146\365\045\151\367\355\315\156\202\160\257\272\102
\360\261\031\134\053\374\105\204\030\054\172\027\117\141\205\106
\031\174\316\301\215\237\124\236\167\045\146\017\340\366\370\222
```

\312\051\316\047\127\025\052\154\202\070\155\047\346\276\115\163  
\016\163\257\343\161\075\274\011\102\017\325\015\241\355\175\153  
\256\367\301\360\154\315\302\227\241\130\375\065\025\226\027\114  
\237\277\365\361\071\113\160\267\347\112\154\034\077\301\160\133  
\317\326\213\353\357\157\060\350\137\310\106\167\041\142\026\136  
\306\124\105\071\365\164\272\147\044\150\245\161\133\076\301\373  
\011\223\353\042\231\370\322\365\173\002\154\217\130\342\253\357  
\335\164\041\344\044\151\224\100\326\301\004\030\016\330\102\360  
\375\327\212\005\300\137\033\212\353\056\300\015\007\006\163\001  
\205\216\037\301\300\212\241\130\246\121\271\130\221\102\017\156  
\341\274\012\350\273\050\203\025\165\345\015\376\111\060\051\051  
\102\302\302\066\377\244\074\175\056\367\332\362\242\057\026\274  
\141\250\231\130\030\244\111\306\152\007\022\353\033\174\264\316  
\347\373\041\200\053\160\246\310\316\255\125\036\037\035\204\320  
\375\124\152\114\126\143\310\335\176\240\371\071\333\357\174\132  
\367\214\065\245\156\052\126\372\376\343\137\223\124\162\016\150  
\343\111\053\223\115\065\042\227\024\225\146\117\247\167\072\056  
\045\114\366\011\213\022\033\161\305\162\247\233\271\274\353\034  
\240\245\311\124\203\141\334\127\125\255\265\346\332\170\053\166  
\247\376\370\333\376\214\063\244\212\243\106\134\255\262\012\022  
\016\212\344\120\236\360\270\313\231\123\114\144\041\153\212\070  
\052\340\210\206\000\324\027\254\146\262\347\276\055\073\051\345  
\370\247\224\333\214\130\370\322\113\060\237\362\304\142\145\120  
\107\162\200\317\244\160\100\266\275\104\376\331\277\050\053\056  
\067\307\263\121\016\202\051\265\261\157\255\176\054\223\300\251  
\177\221\372\307\037\065\360\273\227\311\117\141\050\220\204\101  
\350\175\041\100\305\311\206\074\355\232\255\205\234\242\123\002  
\003\001\000\001\243\143\060\141\060\035\006\003\125\035\016\004  
\026\004\024\264\115\146\267\323\263\310\231\174\001\062\320\221  
\072\367\326\250\022\061\336\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043\004  
\030\060\026\200\024\264\115\146\267\323\263\310\231\174\001\062  
\320\221\072\367\326\250\022\061\336\060\016\006\003\125\035\017  
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110  
\206\367\015\001\001\013\005\000\003\202\002\001\000\034\032\353  
\006\256\125\275\073\077\066\054\141\236\352\307\123\374\160\252  
\062\157\344\102\252\353\275\205\354\033\212\132\362\225\226\051  
\241\004\006\222\316\044\127\377\100\043\170\116\311\370\060\115  
\102\125\104\116\067\242\175\153\216\150\376\016\376\177\337\260  
\237\143\121\363\341\305\245\224\237\212\043\050\110\363\101\213  
\322\376\170\355\331\320\010\017\155\175\325\235\225\254\325\376  
\022\146\032\344\276\165\124\363\321\115\234\116\023\324\236\160  
\064\155\250\272\012\063\210\215\255\005\067\376\113\171\177\175  
\003\101\171\023\015\237\075\367\070\234\065\132\104\117\076\074  
\242\345\201\305\177\137\166\117\033\073\156\157\232\155\267\355  
\017\313\062\037\210\264\105\014\234\021\322\370\004\132\023\067  
\131\230\201\316\114\364\345\224\050\004\304\265\123\311\124\215  
\160\077\150\001\333\314\023\012\344\045\243\154\231\355\020\263

```
\172\040\251\111\274\005\364\370\033\150\326\272\040\035\202\147
\146\340\260\237\134\312\065\322\105\256\325\210\031\333\172\006
\233\214\240\067\207\121\043\276\105\332\134\263\177\153\317\306
\250\034\063\212\173\035\221\372\236\274\354\175\073\105\025\117
\033\247\073\065\264\171\363\133\202\120\340\234\247\355\026\165
\333\143\200\142\241\332\030\002\152\200\336\202\252\104\115\104
\070\050\252\156\372\030\143\071\140\367\103\051\111\132\272\044
\300\277\263\012\227\035\147\111\132\042\262\147\004\234\130\251
\370\014\064\134\100\226\264\207\265\105\141\031\345\216\357\006
\336\221\025\300\270\212\312\224\311\012\165\175\161\073\130\201
\063\310\367\007\101\125\230\051\103\265\313\232\103\351\162\372
\317\360\213\061\274\347\357\271\152\343\101\235\041\076\015\025
\250\205\275\033\116\207\216\107\262\020\376\067\030\152\204\345
\211\034\024\143\350\271\203\251\265\273\350\143\232\172\031\214
\313\164\367\370\027\010\361\213\031\330\264\354\036\156\111\163
\077\134\040\335\065\052\226\167\351\106\157\026\073\313\251\357
\233\012\041\021\310\303\244\311\043\105\155\077\142\225\235\323
\050\307\235\017\263\376\067\215\035\110\262\120\346\045\271\116
\063\141\066\326\026\034\312\062\067\040\166\034\054
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "BYTE Root Certification Authority 001"

# Issuer: CN=BYTE Root Certification Authority 001,O=BYTE Computer S.A.,C=GR

# Serial Number:71:8c:2f:39:7c:40:74:40

# Subject: CN=BYTE Root Certification Authority 001,O=BYTE Computer S.A.,C=GR

# Not Valid Before: Wed Sep 10 22:01:54 2014

# Not Valid After: Sat Sep 10 22:01:54 2039

# Fingerprint (MD5): fa:fb:82:6a:e5:b3:a2:83:50:9b:83:28:b6:41:42:03

# Fingerprint (SHA1): 3f:0f:eb:17:a7:ef:58:04:cf:d9:0a:77:b7:bb:02:1e:a6:9c:64:18

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "BYTE Root Certification Authority 001"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\077\017\353\027\247\357\130\004\317\331\012\167\267\273\002\036
\246\234\144\030
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\372\373\202\152\345\263\242\203\120\233\203\050\266\101\102\003
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\033\060\031\006\003\125\004\012\014\022\102\131\124\105\040\103
\157\155\160\165\164\145\162\040\123\056\101\056\061\056\060\054
\006\003\125\004\003\014\045\102\131\124\105\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\060\060\061
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\010\161\214\057\071\174\100\164\100
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "CISRCA1"

# Issuer: CN=CISRCA1,OU=Certification Authorities,O=Carillon

Information Security Inc.,C=CA

# Serial Number:0b:82:dc:94:33:76

# Subject: CN=CISRCA1,OU=Certification Authorities,O=Carillon Information Security Inc.,C=CA

# Not Valid Before: Tue Oct 16 18:28:33 2012

# Not Valid After: Sat Oct 16 18:28:33 2032

# Fingerprint (MD5): 21:48:4b:8f:d5:50:78:27:86:80:c9:86:93:ad:b1:38

# Fingerprint (SHA1): a6:9e:03:36:c4:e5:90:23:ff:65:3c:71:f9:28:eb:73:f2:1c:00:f0

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CISRCA1"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\101\061
\053\060\051\006\003\125\004\012\023\042\103\141\162\151\154\154
\157\156\040\111\156\146\157\162\155\141\164\151\157\156\040\123
\145\143\165\162\151\164\171\040\111\156\143\056\061\042\060\040
\006\003\125\004\013\023\031\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\151\145\163
\061\020\060\016\006\003\125\004\003\023\007\103\111\123\122\103
\101\061
```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\101\061
\053\060\051\006\003\125\004\012\023\042\103\141\162\151\154\154
\157\156\040\111\156\146\157\162\155\141\164\151\157\156\040\123
\145\143\165\162\151\164\171\040\111\156\143\056\061\042\060\040
```

\006\003\125\004\013\023\031\103\145\162\164\151\146\151\143\141  
\164\151\157\156\040\101\165\164\150\157\162\151\164\151\145\163  
\061\020\060\016\006\003\125\004\003\023\007\103\111\123\122\103  
\101\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\006\013\202\334\224\063\166

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\242\060\202\003\212\240\003\002\001\002\002\006\013  
\202\334\224\063\166\060\015\006\011\052\206\110\206\367\015\001  
\001\013\005\000\060\160\061\013\060\011\006\003\125\004\006\023  
\002\103\101\061\053\060\051\006\003\125\004\012\023\042\103\141  
\162\151\154\154\157\156\040\111\156\146\157\162\155\141\164\151  
\157\156\040\123\145\143\165\162\151\164\171\040\111\156\143\056  
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151  
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151  
\164\151\145\163\061\020\060\016\006\003\125\004\003\023\007\103  
\111\123\122\103\101\061\060\036\027\015\061\062\061\060\061\066  
\061\070\062\070\063\063\132\027\015\063\062\061\060\061\066\061  
\070\062\070\063\063\132\060\160\061\013\060\011\006\003\125\004  
\006\023\002\103\101\061\053\060\051\006\003\125\004\012\023\042  
\103\141\162\151\154\154\157\156\040\111\156\146\157\162\155\141  
\164\151\157\156\040\123\145\143\165\162\151\164\171\040\111\156  
\143\056\061\042\060\040\006\003\125\004\013\023\031\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\151\145\163\061\020\060\016\006\003\125\004\003\023  
\007\103\111\123\122\103\101\061\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\304\166\361\142\152\137\315  
\051\315\004\066\177\156\141\176\163\364\235\146\337\042\132\232  
\203\104\201\146\375\116\021\260\076\254\350\210\262\123\071\377  
\343\272\276\324\377\323\205\330\275\133\257\150\117\063\254\270  
\024\175\022\133\172\225\153\307\066\376\053\217\364\210\140\211  
\072\252\131\070\114\301\135\125\201\245\337\330\037\061\172\323  
\243\116\360\121\313\303\061\207\256\013\336\312\136\033\241\164  
\070\360\222\167\161\074\313\023\176\240\301\012\230\275\330\270  
\370\124\064\230\116\147\026\232\127\113\046\206\137\033\146\162  
\252\301\362\150\202\235\130\101\174\161\042\342\317\001\061\376  
\342\340\126\251\150\340\255\063\257\065\071\056\234\156\006\114  
\363\043\166\057\151\046\350\005\071\151\267\365\110\032\367\337  
\331\071\067\062\125\021\047\004\201\037\235\074\213\214\203\122  
\167\301\256\054\315\053\052\112\345\055\361\031\151\272\207\136  
\213\235\340\161\310\164\322\315\356\156\070\067\152\135\031\000  
\322\166\335\242\353\156\073\252\035\365\066\006\117\137\136\154  
\302\020\363\335\157\265\332\171\132\376\325\106\104\064\110\257  
\206\000\064\174\044\204\335\105\220\371\026\202\254\250\221\324  
\351\106\063\157\176\272\107\037\341\357\257\345\120\326\306\371

\247\355\154\227\252\053\051\116\135\305\370\036\366\164\311\253  
\044\370\015\123\307\150\025\276\374\134\253\075\162\013\322\160  
\004\267\026\343\151\251\361\147\272\306\000\114\173\200\064\065  
\056\136\355\037\240\045\367\245\202\152\020\177\277\217\131\157  
\303\106\246\312\102\116\102\043\205\006\071\065\214\265\361\327  
\301\043\102\105\375\057\045\161\370\363\007\323\007\150\276\333  
\230\154\052\366\245\107\367\260\145\140\255\256\174\346\021\035  
\047\124\010\145\260\330\202\300\141\153\351\176\217\042\326\161  
\035\153\101\040\145\330\127\232\037\174\016\132\124\340\224\260  
\155\165\357\050\062\065\074\125\303\155\147\370\044\275\373\100  
\363\132\235\066\331\065\114\273\342\153\331\261\066\017\344\157  
\040\032\305\157\172\303\221\071\257\257\314\363\366\275\040\206  
\272\323\044\041\074\037\067\051\346\237\374\032\277\230\337\074  
\272\040\041\022\251\302\072\052\223\002\003\001\000\001\243\102  
\060\100\060\035\006\003\125\035\016\004\026\004\024\352\225\025  
\332\134\071\000\342\232\333\304\272\055\147\372\241\367\165\064  
\355\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\306\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\003\202\002\001\000\065\320\330\270\236\362\011\370\360\237  
\262\156\110\262\327\352\241\233\050\211\071\315\376\026\152\035  
\351\234\202\137\121\107\072\365\236\321\274\256\037\237\342\134  
\112\310\354\355\106\102\361\174\103\007\025\337\156\227\366\355  
\206\374\237\305\010\136\202\016\243\056\250\012\056\274\216\033  
\061\022\050\366\171\050\301\042\266\321\225\151\100\350\131\011  
\047\242\221\144\166\352\320\023\215\160\374\145\303\157\021\237  
\052\110\312\247\142\365\203\024\345\032\026\307\221\213\264\011  
\305\316\173\343\344\035\155\227\242\351\313\046\036\153\264\334  
\076\203\166\057\136\115\250\150\211\124\375\116\322\106\250\100  
\366\330\312\170\317\066\032\075\131\145\214\233\365\053\037\114  
\202\337\170\170\115\046\112\107\151\255\157\063\037\003\036\042  
\116\331\006\131\236\106\374\120\065\137\306\205\033\344\033\370  
\000\311\340\323\072\253\046\103\315\107\372\132\370\205\013\307  
\062\332\265\015\055\060\051\072\171\263\024\351\245\017\160\045  
\321\215\011\120\224\355\115\222\236\060\067\100\333\132\170\111  
\217\017\071\057\275\056\327\253\010\224\311\051\212\367\335\214  
\275\202\174\060\133\142\350\065\106\126\070\135\221\366\016\157  
\214\356\225\237\375\164\235\355\355\020\253\316\213\217\267\255  
\177\115\151\111\360\307\021\125\233\232\202\367\242\372\063\362  
\104\021\372\025\113\106\251\233\153\227\102\326\264\267\011\021  
\024\171\123\246\347\177\055\047\072\012\064\044\104\316\125\214  
\172\200\165\163\002\113\342\372\106\224\175\063\024\015\102\126  
\271\240\346\057\205\110\221\237\104\272\241\050\251\261\037\211  
\172\046\012\123\134\205\271\174\204\230\214\050\140\245\266\172  
\215\075\240\000\075\334\177\252\110\351\250\056\254\137\336\207  
\055\134\244\153\026\352\275\350\225\265\316\170\011\370\161\066  
\345\220\150\322\007\226\272\274\000\213\016\230\155\115\160\123  
\300\303\314\033\023\234\110\232\231\075\022\300\047\216\141\222



```
\114\150\122\157\215\003\034\211\365\323\206\300\377\161\111\117
\040\153\375\321\157\221\044\365\361\107\043\115\131\337\320\275
\111\102\375\100\070\076\342\361\005\134\045\350\020\344\132\002
\003\343\273\174\045\052
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CISRCA1"

# Issuer: CN=CISRCA1,OU=Certification Authorities,O=Carillon Information Security Inc.,C=CA

# Serial Number:0b:82:dc:94:33:76

# Subject: CN=CISRCA1,OU=Certification Authorities,O=Carillon Information  
Security Inc.,C=CA

# Not Valid Before: Tue Oct 16 18:28:33 2012

# Not Valid After: Sat Oct 16 18:28:33 2032

# Fingerprint (MD5): 21:48:4b:8f:d5:50:78:27:86:80:c9:86:93:ad:b1:38

# Fingerprint (SHA1): a6:9e:03:36:c4:e5:90:23:ff:65:3c:71:f9:28:eb:73:f2:1c:00:f0

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "CISRCA1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\246\236\003\066\304\345\220\043\377\145\074\161\371\050\353\163
\362\034\000\360
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\041\110\113\217\325\120\170\047\206\200\311\206\223\255\261\070
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\101\061
\053\060\051\006\003\125\004\012\023\042\103\141\162\151\154\154
\157\156\040\111\156\146\157\162\155\141\164\151\157\156\040\123
\145\143\165\162\151\164\171\040\111\156\143\056\061\042\060\040
\006\003\125\004\013\023\031\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\151\145\163
\061\020\060\016\006\003\125\004\003\023\007\103\111\123\122\103
\101\061
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\006\013\202\334\224\063\166
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate  
# Certificate "ePKI Root Certification Authority - G2"  
# Issuer: CN=ePKI Root Certification Authority - G2,O=Chunghwa Telecom Co., Ltd.,C=TW  
# Serial Number:d6:96:2e:c1:0a:15:93:12:af:8f:63:bc:d4:44:c9:5b  
# Subject: CN=ePKI Root Certification Authority - G2,O=Chunghwa Telecom Co., Ltd.,C=TW  
# Not Valid Before: Tue Nov 17 08:23:42 2015  
# Not Valid After: Thu Dec 31 15:59:59 2037  
# Fingerprint (MD5): 7d:f0:01:73:ed:fc:31:9d:16:86:7b:35:c7:26:dd:72  
# Fingerprint (SHA1): d9:9b:10:42:98:59:47:63:f0:b9:a9:27:b7:92:69:cb:47:dd:15:8b

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ePKI Root Certification Authority - G2"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\143\061\013\060\011\006\003\125\004\006\023\002\124\127\061  
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150  
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040  
\114\164\144\056\061\057\060\055\006\003\125\004\003\014\046\145  
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171  
\040\055\040\107\062

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\143\061\013\060\011\006\003\125\004\006\023\002\124\127\061  
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150  
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040  
\114\164\144\056\061\057\060\055\006\003\125\004\003\014\046\145  
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171  
\040\055\040\107\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\021\000\326\226\056\301\012\025\223\022\257\217\143\274\324  
\104\311\133

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\223\060\202\003\173\240\003\002\001\002\002\021\000  
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\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\143\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043

\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167  
\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114  
\164\144\056\061\057\060\055\006\003\125\004\003\014\046\145\120  
\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151\143  
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040  
\055\040\107\062\060\036\027\015\061\065\061\061\061\067\060\070  
\062\063\064\062\132\027\015\063\067\061\062\063\061\061\065\065  
\071\065\071\132\060\143\061\013\060\011\006\003\125\004\006\023  
\002\124\127\061\043\060\041\006\003\125\004\012\014\032\103\150  
\165\156\147\150\167\141\040\124\145\154\145\143\157\155\040\103  
\157\056\054\040\114\164\144\056\061\057\060\055\006\003\125\004  
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\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171\040\055\040\107\062\060\202\002\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017  
\000\060\202\002\012\002\202\002\001\000\244\131\037\240\057\337  
\276\340\373\351\334\265\211\376\132\227\003\311\072\167\247\216  
\134\257\362\343\030\071\365\252\335\017\106\322\150\017\127\234  
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\351\320\247\000\304\027\115\155\342\017\305\016\046\043\040\253  
\367\072\050\242\114\012\013\314\216\316\346\000\232\132\100\015  
\324\120\032\233\321\015\234\224\371\333\356\134\320\361\212\007  
\315\232\053\100\054\111\244\135\142\137\247\153\337\356\126\010  
\120\363\102\030\154\061\260\136\345\234\163\222\274\016\322\014  
\175\305\070\127\274\273\130\333\046\031\002\355\343\103\204\212  
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\261\200\111\226\335\053\354\137\217\233\340\235\227\210\365\204  
\003\243\257\263\245\163\055\101\272\345\007\267\157\153\161\367  
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\225\235\017\174\321\306\005\205\346\010\336\210\027\201\366\325  
\265\156\352\241\034\327\141\252\343\131\102\211\234\131\176\261  
\174\144\064\335\141\043\052\071\265\020\253\374\206\251\123\032  
\305\353\152\342\200\116\131\221\300\070\211\376\263\135\326\373  
\221\351\327\260\175\331\170\010\314\365\053\314\053\341\241\326  
\224\163\301\376\121\364\214\175\012\265\232\212\271\365\332\340  
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\230\115\076\307\026\127\034\137\341\010\157\034\114\130\103\126  
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\265\277\300\225\277\030\137\054\366\153\065\016\374\061\310\355  
\104\016\222\227\334\257\335\126\317\265\037\272\162\234\060\310  
\233\261\221\300\166\167\324\017\032\225\032\351\115\024\210\241  
\317\153\002\246\152\353\144\105\115\144\215\336\374\353\154\362  
\123\011\241\205\121\025\320\117\236\142\372\021\271\316\310\044  
\016\162\144\210\165\064\043\060\052\077\274\074\071\314\314\335  
\013\066\273\275\006\202\217\022\001\305\161\005\321\044\241\231  
\154\312\344\367\252\355\212\327\247\012\255\257\360\340\200\273  
\241\262\077\132\207\144\160\206\063\173\015\036\327\000\206\203  
\103\227\165\365\073\301\110\375\266\016\103\250\002\156\270\076  
\177\217\116\342\135\264\175\236\060\064\057\250\361\353\047\207  
\150\015\132\012\115\001\333\311\024\130\225\362\232\115\026\252  
\163\333\364\045\210\027\070\267\257\131\011\011\264\037\055\017  
\253\365\270\047\125\356\105\060\063\270\355\033\216\274\210\154  
\257\370\132\052\153\340\254\261\005\044\241\011\374\243\017\363  
\260\055\173\226\272\266\224\007\025\105\216\051\334\130\016\251  
\005\330\073\072\240\173\315\212\307\146\202\227\317\326\063\340  
\147\374\246\333\100\057\005\345\305\213\172\052\172\360\260\066  
\233\014\030\366\067\351\101\241\375\261\050\371\157\153\275\353  
\037\114\143\161\173\120\335\051\362\377\356\367\307\105\137\350  
\066\012\350\154\133\042\303\350\300\347\046\334\343\250\225\200  
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\261\135\053\265\126\265\102\213\237\201\305\374\223\114\020\265  
\272\012\274\176\067\343\372\124\155\365\004\305\160\263\251\004  
\322\121\327\205\315\175\157\103\217\131\150\345\061\126\021\161  
\371\144\051\011\023\376\320\037\274\213\000\070\262\320\312\064  
\126\166\020\071\126\163\146\303\321\111\331\276\127\117\077\026  
\175\152\170\267\250\202\270\133\316\256\205\212\012\102\014\003  
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\351\056\334\157\272\220\222\356\145\260\120\064\323\007\332\001  
\227\017\274\347\163\202\173

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "ePKI Root Certification Authority - G2"

# Issuer: CN=ePKI Root Certification Authority - G2,O=Chunghwa Telecom Co., Ltd.,C=TW

# Serial Number:d6:96:2e:c1:0a:15:93:12:af:8f:63:bc:d4:44:c9:5b

```
Subject: CN=ePKI Root Certification Authority - G2,O=Chunghwa Telecom Co., Ltd.,C=TW
Not Valid Before: Tue Nov 17 08:23:42 2015
Not Valid After: Thu Dec 31 15:59:59 2037
Fingerprint (MD5): 7d:f0:01:73:ed:fc:31:9d:16:86:7b:35:c7:26:dd:72
Fingerprint (SHA1): d9:9b:10:42:98:59:47:63:f0:b9:a9:27:b7:92:69:cb:47:dd:15:8b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ePKI Root Certification Authority
- G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\331\233\020\102\230\131\107\143\360\271\251\047\267\222\151\313
\107\335\025\213
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\175\360\001\163\355\374\061\235\026\206\173\065\307\046\335\162
END
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\057\060\055\006\003\125\004\003\014\046\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\326\226\056\301\012\025\223\022\257\217\143\274\324
\104\311\133
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "SSL.com EV Root Certification Authority RSA"
Issuer: CN=SSL.com EV Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
Serial Number:1d:6c:11:eb:6f:da:39:9d
Subject: CN=SSL.com EV Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
Not Valid Before: Fri Feb 12 17:50:48 2016
Not Valid After: Tue Feb 12 17:50:48 2041
Fingerprint (MD5): ad:b7:7b:b6:c4:5a:d9:dd:9f:eb:b3:ef:3f:c6:31:31
Fingerprint (SHA1): 1c:b7:ed:e1:76:bc:df:ef:0c:86:6f:46:fb:f9:80:e9:01:e5:ce:35
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122\123
\101
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CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
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\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122\123
\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\035\154\021\353\157\332\071\235
END
CKA_VALUE
MULTILINE_OCTAL
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\015\001\001\013\005\000\060\177\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014\005
\124\145\170\141\163\061\020\060\016\006\003\125\004\007\014\007
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\014\017\123\123\114\040\103\157\162\160\157\162\141\164\151\157
\156\061\064\060\062\006\003\125\004\003\014\053\123\123\114\056
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\062\061\067\065\060\064\070\132\027\015\064\061\060\062\061\062
\061\067\065\060\064\070\132\060\177\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014
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\157\156\061\064\060\062\006\003\125\004\003\014\053\123\123\114  
\056\143\157\155\040\105\126\040\122\157\157\164\040\103\145\162  
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157  
\162\151\164\171\040\122\123\101\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
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\067\061\100\020\064\101\172\375\313\224\215\142\177\270\220\315  
\316\151\226\072\304\377\331\327\143\346\320\204\045\200\021\277  
\321\355\060\350\204\006\341\240\227\270\125\220\035\255\363\244  
\232\033\116\234\021\367\365\331\326\217\140\052\076\067\370\165  
\354\200\243\125\240\364\047\101\302\252\071\344\122\337\020\371  
\365\145\071\077\214\235\314\173\047\317\006\024\167\116\075\122  
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\217\213\145\130\051\054\217\016\216\111\324\324\330\012\132\323  
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\153\135\363\362\000\060\063\372\133\313\022\152\172\101\157\157  
\011\114\267\151\015\017\171\043\043\032\146\215\131\066\143\226  
\200\173\030\042\153\036\042\030\055\344\245\165\012\020\131\373  
\243\176\046\020\123\306\310\031\056\036\047\030\373\060\005\075  
\221\004\172\256\160\306\314\017\240\064\323\044\026\030\001\005  
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\061\064\311\073\337\304\075\051\105\065\124\270\177\226\317\010  
\017\351\261\236\125\312\147\204\240\047\140\253\372\120\061\071  
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\132\052\377\245\316\235\241\221\175\377\207\135\253\152\065\022  
\331\311\114\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\206\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\002\001\000\274\214\317\043\372\275\063\127\226

\037\320\202\360\022\256\064\104\352\361\274\041\327\365\211\306  
\064\036\170\246\342\121\337\335\170\200\325\352\155\306\252\157  
\011\002\214\247\346\313\310\211\132\224\172\112\263\126\357\335  
\335\123\062\143\360\151\357\335\100\271\220\242\056\003\167\226  
\265\051\000\122\356\373\016\247\224\150\305\074\003\055\351\153  
\252\235\356\247\330\147\222\342\021\132\070\337\230\146\243\240  
\216\313\014\102\066\114\305\126\133\237\165\360\100\321\350\073  
\052\010\233\122\303\034\137\220\064\127\373\306\371\035\161\374  
\045\174\317\172\175\036\151\306\273\364\024\376\035\035\347\227  
\242\206\233\362\337\127\222\006\122\144\223\051\131\012\057\241  
\027\334\273\356\255\073\263\000\145\070\331\250\234\201\255\315  
\065\234\213\351\342\364\204\217\016\317\215\161\155\000\200\071  
\157\263\004\065\240\070\141\251\362\057\364\065\215\330\337\336  
\244\151\060\372\240\046\174\132\042\171\360\150\376\313\315\274  
\357\225\214\047\345\204\371\375\204\102\306\272\375\271\311\306  
\132\161\060\166\066\002\037\320\174\251\023\016\341\040\331\122  
\014\254\036\210\167\240\051\206\072\210\146\123\257\303\245\311  
\333\124\261\244\350\356\114\156\077\271\173\060\243\102\350\002  
\246\275\204\155\052\174\375\364\355\105\267\060\372\154\134\043  
\126\132\074\141\052\307\233\346\305\362\104\267\007\277\166\235  
\102\344\134\360\356\271\076\020\363\317\122\322\315\316\122\030  
\177\140\366\056\225\114\065\000\114\106\326\020\354\064\313\130  
\173\152\015\344\143\125\314\130\331\117\143\147\061\302\122\241  
\171\017\052\317\311\116\314\022\313\215\032\132\252\106\061\023  
\073\015\351\127\150\132\013\204\004\066\057\237\021\274\074\172  
\255\132\277\106\343\267\040\211\035\334\007\174\334\172\353\351  
\166\311\000\015\160\267\237\227\032\142\357\030\346\144\276\010  
\247\244\231\273\177\214\150\232\230\311\206\142\366\241\230\066  
\071\243\363\226\127\244\002\143\371\125\076\260\214\237\277\251  
\172\113\074\331\271\256\017\212\364\272\034\045\253\125\131\241  
\126\302\063\271\072\304\100\317\213\032\367\003\016\275\033\140  
\143\175\045\324\251\276\345

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SSL.com EV Root Certification Authority RSA"

# Issuer: CN=SSL.com EV Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US

# Serial Number: 1d:6c:11:eb:6f:da:39:9d

# Subject: CN=SSL.com EV Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US

# Not Valid Before: Fri Feb 12 17:50:48 2016

# Not Valid After: Tue Feb 12 17:50:48 2041

# Fingerprint (MD5): ad:b7:7b:b6:c4:5a:d9:dd:9f:eb:b3:ef:3f:c6:31:31

# Fingerprint (SHA1): 1c:b7:ed:e1:76:bc:df:ef:0c:86:6f:46:fb:f9:80:e9:01:e5:ce:35

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST



```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\034\267\355\341\166\274\337\357\014\206\157\106\373\371\200\351
\001\345\316\065
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\255\267\173\266\304\132\331\335\237\353\263\357\077\306\061\061
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122\123
\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\035\154\021\353\157\332\071\235
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "LuxTrust Global Root 2"
Issuer: CN=LuxTrust Global Root 2,O=LuxTrust S.A.,C=LU
Serial Number:0a:7e:a6:df:4b:44:9e:da:6a:24:85:9e:e6:b8:15:d3:16:7f:bb:b1
Subject: CN=LuxTrust Global Root 2,O=LuxTrust S.A.,C=LU
Not Valid Before: Thu Mar 05 13:21:57 2015
Not Valid After: Mon Mar 05 13:21:57 2035
Fingerprint (MD5): b2:e1:09:00:61:af:f7:f1:91:6f:c4:ad:8d:5e:3b:7c
Fingerprint (SHA1): 1e:0e:56:19:0a:d1:8b:25:98:b2:04:44:ff:66:8a:04:17:99:5f:3f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LuxTrust Global Root 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL

```

\060\106\061\013\060\011\006\003\125\004\006\023\002\114\125\061  
\026\060\024\006\003\125\004\012\014\015\114\165\170\124\162\165  
\163\164\040\123\056\101\056\061\037\060\035\006\003\125\004\003  
\014\026\114\165\170\124\162\165\163\164\040\107\154\157\142\141  
\154\040\122\157\157\164\040\062

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\106\061\013\060\011\006\003\125\004\006\023\002\114\125\061  
\026\060\024\006\003\125\004\012\014\015\114\165\170\124\162\165  
\163\164\040\123\056\101\056\061\037\060\035\006\003\125\004\003  
\014\026\114\165\170\124\162\165\163\164\040\107\154\157\142\141  
\154\040\122\157\157\164\040\062

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\024\012\176\246\337\113\104\236\332\152\044\205\236\346\270  
\025\323\026\177\273\261

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\303\060\202\003\253\240\003\002\001\002\002\024\012  
\176\246\337\113\104\236\332\152\044\205\236\346\270\025\323\026  
\177\273\261\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\060\106\061\013\060\011\006\003\125\004\006\023\002\114  
\125\061\026\060\024\006\003\125\004\012\014\015\114\165\170\124  
\162\165\163\164\040\123\056\101\056\061\037\060\035\006\003\125  
\004\003\014\026\114\165\170\124\162\165\163\164\040\107\154\157  
\142\141\154\040\122\157\157\164\040\062\060\036\027\015\061\065  
\060\063\060\065\061\063\062\061\065\067\132\027\015\063\065\060  
\063\060\065\061\063\062\061\065\067\132\060\106\061\013\060\011  
\006\003\125\004\006\023\002\114\125\061\026\060\024\006\003\125  
\004\012\014\015\114\165\170\124\162\165\163\164\040\123\056\101  
\056\061\037\060\035\006\003\125\004\003\014\026\114\165\170\124  
\162\165\163\164\040\107\154\157\142\141\154\040\122\157\157\164  
\040\062\060\202\002\042\060\015\006\011\052\206\110\206\367\015  
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202  
\002\001\000\327\205\227\277\021\230\351\360\142\203\114\074\207  
\371\123\152\067\013\362\017\074\207\316\157\334\046\051\275\305  
\211\272\311\203\075\367\356\312\133\306\155\111\163\264\311\106  
\243\033\064\023\077\301\211\105\127\364\331\261\373\066\145\113  
\373\010\342\110\161\021\310\156\073\236\235\337\211\145\067\246  
\205\366\073\104\030\266\306\067\060\142\104\222\227\151\175\102  
\060\044\344\015\014\211\153\143\336\305\341\337\116\251\024\154  
\123\340\141\316\366\027\057\035\074\275\346\042\114\035\223\365  
\020\304\241\166\354\152\336\305\154\337\226\264\126\100\102\300  
\142\222\060\241\055\025\224\240\322\040\006\011\156\152\155\345  
\353\267\276\324\360\361\025\174\213\346\116\272\023\314\113\047  
\136\231\074\027\135\217\201\177\063\075\117\323\077\033\354\134

\077\360\074\114\165\156\362\246\325\235\332\055\007\143\002\306  
\162\351\224\274\114\111\225\117\210\122\310\333\350\151\202\370  
\314\064\133\042\360\206\247\211\275\110\012\155\146\201\155\310  
\310\144\373\001\341\364\341\336\331\236\335\333\133\324\052\231  
\046\025\033\036\114\222\051\202\236\325\222\201\222\101\160\031  
\367\244\345\223\113\274\167\147\061\335\034\375\061\160\015\027  
\231\014\371\014\071\031\052\027\265\060\161\125\325\017\256\130  
\341\075\057\064\233\317\237\366\170\205\302\223\172\162\076\146  
\217\234\026\021\140\217\236\211\157\147\276\340\107\132\073\014  
\232\147\213\317\106\306\256\070\243\362\247\274\346\326\205\153  
\063\044\160\042\113\313\010\233\273\310\370\002\051\035\276\040  
\014\106\277\153\207\233\263\052\146\102\065\106\154\252\272\255  
\371\230\173\351\120\125\024\061\277\261\332\055\355\200\255\150  
\044\373\151\253\330\161\023\060\346\147\263\207\100\375\211\176  
\362\103\321\021\337\057\145\057\144\316\137\024\271\261\277\061  
\275\207\170\132\131\145\210\252\374\131\062\110\206\326\114\271  
\051\113\225\323\166\363\167\045\155\102\034\070\203\115\375\243  
\137\233\177\055\254\171\033\016\102\061\227\143\244\373\212\151  
\325\042\015\064\220\060\056\250\264\340\155\266\224\254\274\213  
\116\327\160\374\305\070\216\144\045\341\115\071\220\316\311\207  
\204\130\161\002\003\001\000\001\243\201\250\060\201\245\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\102\006\003\125\035\040\004\073\060\071\060\067\006\007\053\201  
\053\001\001\001\012\060\054\060\052\006\010\053\006\001\005\005  
\007\002\001\026\036\150\164\164\160\163\072\057\057\162\145\160  
\157\163\151\164\157\162\171\056\154\165\170\164\162\165\163\164  
\056\154\165\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\037\006\003\125\035\043\004\030\060\026\200\024  
\377\030\050\166\371\110\005\054\241\256\361\053\033\053\262\123  
\370\113\174\263\060\035\006\003\125\035\016\004\026\004\024\377  
\030\050\166\371\110\005\054\241\256\361\053\033\053\262\123\370  
\113\174\263\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\002\001\000\152\031\024\355\156\171\301\054\207  
\324\015\160\176\327\366\170\311\013\004\116\304\261\316\223\160  
\376\260\124\300\062\315\231\060\144\027\277\017\345\342\063\375  
\007\066\100\162\016\032\266\152\131\326\000\345\150\040\335\056  
\162\015\037\152\144\061\040\204\175\111\246\132\067\353\105\311  
\205\365\324\307\027\231\007\346\233\125\344\014\350\251\264\316  
\214\133\265\021\134\317\212\016\015\326\254\167\201\376\062\234  
\044\236\162\316\124\363\320\157\242\126\326\354\303\067\054\145  
\130\276\127\000\032\362\065\372\353\173\061\135\302\301\022\075  
\226\201\210\226\211\301\131\134\172\346\177\160\064\347\203\342  
\261\341\341\270\130\357\324\225\344\140\234\360\226\227\162\214  
\353\204\002\056\145\217\244\267\322\177\147\335\310\323\236\134  
\252\251\244\240\045\024\006\233\354\117\176\055\013\177\035\165  
\361\063\330\355\316\270\165\155\076\133\271\230\035\061\015\126  
\330\103\017\060\221\262\004\153\335\126\276\225\200\125\147\276  
\330\315\203\331\030\356\056\017\206\055\222\236\160\023\354\336

```
\121\311\103\170\002\245\115\310\371\137\304\221\130\106\026\167
\132\164\252\100\274\007\237\060\271\261\367\022\027\335\343\377
\044\100\035\172\152\321\117\030\012\252\220\035\353\100\036\337
\241\036\104\222\020\232\362\215\341\321\113\106\236\350\105\102
\227\352\105\231\363\354\146\325\002\372\362\246\112\044\252\336
\316\271\312\371\077\223\157\371\243\272\352\245\076\231\255\375
\377\173\231\365\145\356\360\131\050\147\327\220\225\244\023\204
\251\204\301\350\316\316\165\223\143\032\274\074\352\325\144\037
\055\052\022\071\306\303\132\062\355\107\221\026\016\274\070\301
\120\336\217\312\052\220\064\034\356\101\224\234\136\031\056\370
\105\111\231\164\221\260\004\157\343\004\132\261\253\052\253\376
\307\320\226\266\332\341\112\144\006\156\140\115\275\102\116\377
\170\332\044\312\033\264\327\226\071\154\256\361\016\252\247\175
\110\213\040\114\317\144\326\270\227\106\260\116\321\052\126\072
\240\223\275\257\200\044\340\012\176\347\312\325\312\350\205\125
\334\066\052\341\224\150\223\307\146\162\104\017\200\041\062\154
\045\307\043\200\203\012\353
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "LuxTrust Global Root 2"

# Issuer:

CN=LuxTrust Global Root 2,O=LuxTrust S.A.,C=LU

# Serial Number:0a:7e:a6:df:4b:44:9e:da:6a:24:85:9e:e6:b8:15:d3:16:7f:bb:b1

# Subject: CN=LuxTrust Global Root 2,O=LuxTrust S.A.,C=LU

# Not Valid Before: Thu Mar 05 13:21:57 2015

# Not Valid After: Mon Mar 05 13:21:57 2035

# Fingerprint (MD5): b2:e1:09:00:61:af:f7:f1:91:6f:c4:ad:8d:5e:3b:7c

# Fingerprint (SHA1): 1e:0e:56:19:0a:d1:8b:25:98:b2:04:44:ff:66:8a:04:17:99:5f:3f

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "LuxTrust Global Root 2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\036\016\126\031\012\321\213\045\230\262\004\104\377\146\212\004
\027\231\137\077
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\262\341\011\000\141\257\367\361\221\157\304\255\215\136\073\174
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\106\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\014\015\114\165\170\124\162\165
```

```
\163\164\040\123\056\101\056\061\037\060\035\006\003\125\004\003
\014\026\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164\040\062
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\024\012\176\246\337\113\104\236\332\152\044\205\236\346\270
\025\323\026\177\273\261
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "ACA ROOT"

# Issuer: CN=ACA ROOT,O=CONSEJO GENERAL DE LA ABOGACIA,2.5.4.5=Q2863006I,C=ES

# Serial Number:47:43:91:24:3f:ce:c3:0d:57:48:28:6b:ee:80:5d:ab

# Subject: CN=ACA ROOT,O=CONSEJO GENERAL DE LA ABOGACIA,2.5.4.5=Q2863006I,C=ES

# Not Valid Before: Fri May 27 10:58:51 2016

# Not Valid After: Mon May 27 10:58:51 2041

# Fingerprint (MD5): cc:49:10:f6:2f:f5:db:be:2f:8c:51:f3:8f:74:7c:12

# Fingerprint (SHA1): d4:96:59:2b:30:57:07:38:6c:c5:f3:cd:b2:59:ae:66:d7:66:1f:ca

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "ACA ROOT"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\022\060\020\006\003\125\004\005\023\011\121\062\070\066\063\060
\060\066\111\061\047\060\045\006\003\125\004\012\014\036\103\117
\116\123\105\112\117\040\107\105\116\105\122\101\114\040\104\105
\040\114\101\040\101\102\117\107\101\103\111\101\061\021\060\017
\006\003\125\004\003\014\010\101\103\101\040\122\117\117\124
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\022\060\020\006\003\125\004\005\023\011\121\062\070\066\063\060
\060\066\111\061\047\060\045\006\003\125\004\012\014\036\103\117
\116\123\105\112\117\040\107\105\116\105\122\101\114\040\104\105
\040\114\101\040\101\102\117\107\101\103\111\101\061\021\060\017
\006\003\125\004\003\014\010\101\103\101\040\122\117\117\124
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\107\103\221\044\077\316\303\015\127\110\050\153\356\200  
\135\253

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\310\060\202\003\260\240\003\002\001\002\002\020\107  
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\061\013\060\011\006\003\125\004\006\023\002\105\123\061\022\060  
\020\006\003\125\004\005\023\011\121\062\070\066\063\060\060\066  
\111\061\047\060\045\006\003\125\004\012\014\036\103\117\116\123  
\105\112\117\040\107\105\116\105\122\101\114\040\104\105\040\114  
\101\040\101\102\117\107\101\103\111\101\061\021\060\017\006\003  
\125\004\003\014\010\101\103\101\040\122\117\117\124\060\036\027  
\015\061\066\060\065\062\067\061\060\065\070\065\061\132\027\015  
\064\061\060\065\062\067\061\060\065\070\065\061\132\060\135\061  
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\040\101\102\117\107\101\103\111\101\061\021\060\017\006\003\125  
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\233\367\136\347\122\337\356\252\067\223\253\331\075\175\036\361  
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\150\102\350\034\276\162\201\360\306\147\175\176\164\074\325\125  
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\304\170\016\244\017\374\033\174\326\362\153\320\212\133\352\226  
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CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "ACA ROOT"
Issuer: CN=ACA ROOT,O=CONSEJO GENERAL DE LA ABOGACIA,2.5.4.5=Q2863006I,C=ES
Serial Number:47:43:91:24:3f:ce:c3:0d:57:48:28:6b:ee:80:5d:ab
Subject: CN=ACA ROOT,O=CONSEJO GENERAL DE LA ABOGACIA,2.5.4.5=Q2863006I,C=ES
Not Valid Before: Fri May 27 10:58:51 2016
Not Valid After: Mon May 27 10:58:51 2041
Fingerprint (MD5): cc:49:10:f6:2f:f5:db:be:2f:8c:51:f3:8f:74:7c:12
Fingerprint (SHA1): d4:96:59:2b:30:57:07:38:6c:c5:f3:cd:b2:59:ae:66:d7:66:1f:ca
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACA ROOT"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\324\226\131\053\060\127\007\070\154\305\363\315\262\131\256\146
\327\146\037\312
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\314\111\020\366\057\365\333\276\057\214\121\363\217\164\174\022
END
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\022\060\020\006\003\125\004\005\023\011\121\062\070\066\063\060
\060\066\111\061\047\060\045\006\003\125\004\012\014\036\103\117
\116\123\105\112\117\040\107\105\116\105\122\101\114\040\104\105
\040\114\101\040\101\102\117\107\101\103\111\101\061\021\060\017
\006\003\125\004\003\014\010\101\103\101\040\122\117\117\124
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\107\103\221\044\077\316\303\015\127\110\050\153\356\200
\135\253
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

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Microsoft Code Signing Only Certificate
Certificate "CHAMBERS OF COMMERCE ROOT - 2016"
Issuer: CN=CHAMBERS OF COMMERCE ROOT - 2016,O=AC CAMERFIRMA S.A.,2.5.4.97=VATES-
A82743287,2.5.4.5=A82743287,OU=CHAMBERS OF COMMERCE ROOT - 2016,OU=see current address at
www.camerfirma.com/address,L=MADRID,ST=MADRID,C=ES
Serial Number:34:9a:2d:a1:82:06:b2:b3
Subject: CN=CHAMBERS OF COMMERCE ROOT - 2016,O=AC CAMERFIRMA S.A.,2.5.4.97=VATES-
A82743287,2.5.4.5=A82743287,OU=CHAMBERS OF COMMERCE ROOT - 2016,OU=see current address at
www.camerfirma.com/address,L=MADRID,ST=MADRID,C=ES
Not Valid Before: Thu Apr 14 07:35:48 2016
Not Valid After: Sun Apr 08 07:35:48 2040
Fingerprint (MD5): d9:84:45:a4:8b:62:ec:c1:fc:51:54:8a:d1:58:8d:e8
Fingerprint (SHA1): 2d:e1:6a:56:77:ba:ca:39:e1:d6:8c:30:dc:b1:4a:be:22:a6:17:9b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "CHAMBERS OF COMMERCE ROOT - 2016"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\202\001\014\061\013\060\011\006\003\125\004\006\023\002\105
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\111\104\061\017\060\015\006\003\125\004\007\014\006\115\101\104
\122\111\104\061\072\060\070\006\003\125\004\013\014\061\163\145
\145\040\143\165\162\162\145\156\164\040\141\144\144\162\145\163
\163\040\141\164\040\167\167\167\056\143\141\155\145\162\146\151
\162\155\141\056\143\157\155\057\141\144\144\162\145\163\163\061
\051\060\047\006\003\125\004\013\014\040\103\110\101\115\102\105
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\125\004\005\023\011\101\070\062\067\064\063\062\070\067\061\030
\060\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101
\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125\004
\012\014\022\101\103\040\103\101\115\105\122\106\111\122\115\101
\040\123\056\101\056\061\051\060\047\006\003\125\004\003\014\040
\103\110\101\115\102\105\122\123\040\117\106\040\103\117\115\115
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END
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CKA_ISSUER MULTILINE_OCTAL
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\111\104\061\017\060\015\006\003\125\004\007\014\006\115\101\104
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END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\010\064\232\055\241\202\006\262\263

END

CKA\_VALUE MULTILINE\_OCTAL

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\007\014\006\115\101\104\122\111\104\061\072\060\070\006\003\125  
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\345\030\150\055\063\200\165\240\060\007\150\366\325\367\023\054  
\072\260\236\350\130\125\156\214\126\104\115\103\027\101\002\314  
\167\334\137\105\005\131\317\315\140\323\277\322\366\342\364\325  
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\270\113\377\136\310\145\231\053\246\062\362\133\206\250\235\350  
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\377\060\035\006\003\125\035\016\004\026\004\024\236\056\145\117  
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\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003  
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\054\322\117\133\321\135\104\046\332\157\151\053\265\173\236\320  
\364\112\056\110\307\354\177\237\312\131\172\271\104\367\076\275  
\367\120\153\121\237\164\377\220\032\100\320\223\171\222\017\212  
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\065\330\154\100\024\111\102\075\211\057\272\233\053\070\274\032  
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\325\302\174\342\130\004\300\354\304\275\242\074\176\306\043\201  
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\072\135\122\276\351\165\045\035\272\005\007\332\126\031\074\215  
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\343\034\332\373\345\233\043\126\040\133\351\320\134\306\112\044  
\073\274\343\266\042\026\052\204\222\377\250\376\227\277\243\235  
\333\141\136\356\031\052\054\327\353\015\166\126\070\165\176\111  
\000\223\127\311\374\043\132\374\364\361\337\052\235\260\214\151  
\364\020\243\125\235\160\074\042\377\007\326\053\266\231\300\227  
\320\364\052\240

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "CHAMBERS OF COMMERCE ROOT - 2016"

# Issuer: CN=CHAMBERS OF COMMERCE ROOT - 2016,O=AC CAMERFIRMA S.A.,2.5.4.97=VATES-A82743287,2.5.4.5=A82743287,OU=CHAMBERS

OF COMMERCE ROOT - 2016,OU=see current address at

www.camerfirma.com/address,L=MADRID,ST=MADRID,C=ES

# Serial Number:34:9a:2d:a1:82:06:b2:b3

# Subject: CN=CHAMBERS OF COMMERCE ROOT - 2016,O=AC CAMERFIRMA S.A.,2.5.4.97=VATES-A82743287,2.5.4.5=A82743287,OU=CHAMBERS OF COMMERCE ROOT - 2016,OU=see current address at

www.camerfirma.com/address,L=MADRID,ST=MADRID,C=ES

```
Not Valid Before: Thu Apr 14 07:35:48 2016
Not Valid After: Sun Apr 08 07:35:48 2040
Fingerprint (MD5): d9:84:45:a4:8b:62:ec:c1:fc:51:54:8a:d1:58:8d:e8
Fingerprint (SHA1): 2d:e1:6a:56:77:ba:ca:39:e1:d6:8c:30:dc:b1:4a:be:22:a6:17:9b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CHAMBERS OF COMMERCE ROOT - 2016"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\055\341\152\126\167\272\312\071\341\326\214\060\334\261\112\276
\042\246\027\233
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\331\204\105\244\213\142\354\301\374\121\124\212\321\130\215\350
END
CKA_ISSUER
MULTILINE_OCTAL
\060\202\001\014\061\013\060\011\006\003\125\004\006\023\002\105
\123\061\017\060\015\006\003\125\004\010\014\006\115\101\104\122
\111\104\061\017\060\015\006\003\125\004\007\014\006\115\101\104
\122\111\104\061\072\060\070\006\003\125\004\013\014\061\163\145
\145\040\143\165\162\162\145\156\164\040\141\144\144\162\145\163
\163\040\141\164\040\167\167\167\056\143\141\155\145\162\146\151
\162\155\141\056\143\157\155\057\141\144\144\162\145\163\163\061
\051\060\047\006\003\125\004\013\014\040\103\110\101\115\102\105
\122\123\040\117\106\040\103\117\115\115\105\122\103\105\040\122
\117\117\124\040\055\040\062\060\061\066\061\022\060\020\006\003
\125\004\005\023\011\101\070\062\067\064\063\062\070\067\061\030
\060\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101
\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125\004
\012\014\022\101\103\040\103\101\115\105\122\106\111\122\115\101
\040\123\056\101\056\061\051\060\047\006\003\125\004\003\014\040
\103\110\101\115\102\105\122\123\040\117\106\040\103\117\115\115
\105\122\103\105\040\122\117\117\124\040\055\040\062\060\061\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\064\232\055\241\202\006\262\263
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Network Solutions RSA Certificate Authority"
Issuer: CN=Network Solutions RSA Certificate Authority,O=Network Solutions
```

```
L.L.C.,L=Jacksonville,ST=FL,C=US
Serial Number:4c:03:4b:ac:67:18:4c:7f:af:44:08:4d:82:96:c7:b2
Subject: CN=Network Solutions RSA Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
Not Valid Before: Wed Nov 18 00:00:00 2015
Not Valid After: Mon Jan 18 23:59:59 2038
Fingerprint (MD5): 5a:2f:58:bc:83:2c:2d:99:b4:9b:78:24:d4:8f:f9:67
#
Fingerprint (SHA1): 8e:92:8c:0f:c2:7b:b7:ab:a3:4e:6b:c0:ca:12:50:cb:57:b6:0f:84
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions RSA Certificate Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\122\123\101\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\122\123\101\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\114\003\113\254\147\030\114\177\257\104\010\115\202\226
\307\262
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\342\060\202\003\312\240\003\002\001\002\002\020\114
\003\113\254\147\030\114\177\257\104\010\115\202\226\307\262\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\201
\212\061\013\060\011\006\003\125\004\006\023\002\125\123\061\013
```

\060\011\006\003\125\004\010\023\002\106\114\061\025\060\023\006  
\003\125\004\007\023\014\112\141\143\153\163\157\156\166\151\154  
\154\145\061\041\060\037\006\003\125\004\012\023\030\116\145\164  
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\114  
\056\114\056\103\056\061\064\060\062\006\003\125\004\003\023\053  
\116\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156  
\163\040\122\123\101\040\103\145\162\164\151\146\151\143\141\164  
\145\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061  
\065\061\061\061\070\060\060\060\060\060\060\132\027\015\063\070  
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\123\101\040\103\145\162\164\151\146\151\143\141\164\145\040\101  
\165\164\150\157\162\151\164\171\060\202\002\042\060\015\006\011  
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\060\202\002\012\002\202\002\001\000\204\337\250\246\243\214\013  
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\202\063\055\160\022\130\245\010\212\236\301\010\363\223\326\150  
\300\057\024\276\171\244\374\175\314\325\274\076\217\355\234\112  
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\152\164\107\232\057\340\322\367\017\367\303\335\077\245\277\301  
\372\175\102\151\140\000\200\354\074\346\273\201\067\244\036\006  
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\357\006\115\160\166\066\074\202\211\355\317\144\031\203\045\103  
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\212\142\352\017\145\267\217\117\227\100\316\317\356\301\152\050  
\240\161\251\231\047\321\075\311\065\163\172\200\231\370\175\206  
\271\235\171\072\355\323\052\372\176\246\270\377\127\052\163\262  
\246\277\332\211\272\006\033\332\145\240\346\276\140\224\210\366  
\337\146\341\047\152\033\376\320\136\251\215\040\213\012\304\037  
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\112\165\164\005\021\014\035\330\133\231\353\277\376\252\175\136  
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\013\346\305\270\361\266\352\350\130\113\064\255\167\171\054\065  
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\320\011\020\054\227\146\307\201\037\036\346\047\305\202\221\130  
\136\363\310\133\101\150\200\203\221\271\234\201\370\047\372\105  
\337\356\171\362\134\155\160\002\124\356\300\123\330\103\353\005  
\172\314\364\121\335\251\324\042\175\152\073\362\376\210\324\122  
\111\072\205\222\144\123\370\152\123\140\210\217\362\133\324\256  
\053\122\340\352\377\124\176\241\344\357\206\033\247\203\013\006  
\146\136\060\200\214\125\240\107\063\377\153\036\104\110\113\141  
\252\036\076\350\114\144\307\330\155\175\016\256\074\074\102\075  
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\144\004\010\342\233\325\336\010\122\034\142\034\123\026\107\065  
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\142\147\241\253\261\027\216\075\072\106\260\365\106\214\253\204  
\330\365\016\241\040\353\302\360\231\164\075\216\263\003\330\044  
\305\154\353\153\014\123\277\140\151\335\214\050\305\157\317\273  
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\001\165\102\172\277\013\337\121\120\270\123\262\341\356\164\220  
\313\274\252\320\161\203\242\253\116\311\020\266\075\034\357\100  
\327\117\103\220\063\271\001\226\124\135\052\325\006\133\222\206  
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\114\333\151\037\211\156\124\077\327\211\135\347\265\315\014\276  
\077\175\170\070\001\322\266\147\246\317\130\110\224\032\105\375  
\220\163\111\312\265\103\240\041\142\215\111\004\046\252\370\037  
\056\077\362\056\241\362\253\364\006\036\260\055\304\301\160\102  
\075\375\303\121\111\210\000\016\312\202\015\233\171\002\342\300  
\056\223\337\344\362\361

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE



```

Microsoft Code Signing
 Only Certificate
Trust for "Network Solutions RSA Certificate Authority"
Issuer: CN=Network Solutions RSA Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
Serial Number:4c:03:4b:ac:67:18:4c:7f:af:44:08:4d:82:96:c7:b2
Subject: CN=Network Solutions RSA Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
Not Valid Before: Wed Nov 18 00:00:00 2015
Not Valid After: Mon Jan 18 23:59:59 2038
Fingerprint (MD5): 5a:2f:58:bc:83:2c:2d:99:b4:9b:78:24:d4:8f:f9:67
Fingerprint (SHA1): 8e:92:8c:0f:c2:7b:b7:ab:a3:4e:6b:c0:ca:12:50:cb:57:b6:0f:84
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions RSA Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\216\222\214\017\302\173\267\253\243\116\153\300\312\022\120\313
\127\266\017\204
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\132\057\130\274\203\054\055\231\264\233\170\044\324\217\371\147
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\122\123\101\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\114\003\113\254\147\030\114\177\257\104\010\115\202\226
\307\262
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
#

```

```
Certificate "Network Solutions ECC Certificate Authority"
Issuer: CN=Network Solutions ECC Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
Serial Number:79:38:4b:b4:19:1a:8d:74:22:cc:ff:85:32:f2:e4:ba
Subject: CN=Network Solutions ECC Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
Not Valid Before: Wed Nov 18 00:00:00 2015
Not Valid After: Mon Jan 18 23:59:59 2038
Fingerprint (MD5): a5:a8:cc:e3:1c:41:11:8c:6a:8c:38:bd:a2:47:fe:b2
Fingerprint (SHA1): 80:f9:5b:74:1c:38:39:94:95:c3:4f:20:c2:3e:73:36:31:4d:3c:6b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions ECC Certificate Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\105\103\103\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\105\103\103\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\171\070\113\264\031\032\215\164\042\314\377\205\062\362
\344\272
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\224\060\202\002\031\240\003\002\001\002\002\020\171
\070\113\264\031\032\215\164\042\314\377\205\062\362\344\272\060
```

\012\006\010\052\206\110\316\075\004\003\003\060\201\212\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\013\060\011\006  
\003\125\004\010\023\002\106\114\061\025\060\023\006\003\125\004  
\007\023\014\112\141\143\153\163\157\156\166\151\154\154\145\061  
\041\060\037\006\003\125\004\012\023\030\116\145\164\167\157\162  
\153\040\123\157\154\165\164\151\157\156\163\040\114\056\114\056  
\103\056\061\064\060\062\006\003\125\004\003\023\053\116\145\164  
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\105  
\103\103\040\103\145\162\164\151\146\151\143\141\164\145\040\101  
\165\164\150\157\162\151\164\171\060\036\027\015\061\065\061\061  
\061\070\060\060\060\060\060\060\132\027\015\063\070\060\061\061  
\070\062\063\065\071\065\071\132\060\201\212\061\013\060\011\006  
\003\125\004\006\023\002\125\123\061\013\060\011\006\003\125\004  
\010\023\002\106\114\061\025\060\023\006\003\125\004\007\023\014  
\112\141\143\153\163\157\156\166\151\154\154\145\061\041\060\037  
\006\003\125\004\012\023\030\116\145\164\167\157\162\153\040\123  
\157\154\165\164\151\157\156\163\040\114\056\114\056\103\056\061  
\064\060\062\006\003\125\004\003\023\053\116\145\164\167\157\162  
\153\040\123\157\154\165\164\151\157\156\163\040\105\103\103\040  
\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150  
\157\162\151\164\171\060\166\060\020\006\007\052\206\110\316\075  
\002\001\006\005\053\201\004\000\042\003\142\000\004\024\341\003  
\013\145\157\255\131\326\036\356\311\277\264\114\305\306\134\057  
\060\307\237\122\333\150\141\300\151\020\342\222\172\032\303\277  
\222\250\211\071\212\373\347\240\273\161\244\240\303\337\167\326  
\224\067\023\137\176\123\135\120\272\343\114\010\307\145\342\101  
\260\346\131\362\234\370\300\262\167\301\012\221\046\167\362\151  
\266\273\320\101\074\052\210\032\224\221\026\306\076\243\102\060  
\100\060\035\006\003\125\035\016\004\026\004\024\233\173\353\310  
\377\203\362\122\230\107\060\012\126\370\070\276\343\353\000\316  
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206  
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001  
\377\060\012\006\010\052\206\110\316\075\004\003\003\003\151\000  
\060\146\002\061\000\251\144\130\367\234\271\023\146\042\111\177  
\262\321\002\351\023\374\034\373\244\064\222\344\312\007\015\267  
\261\122\170\050\064\313\362\041\126\221\206\206\310\212\013\257  
\062\204\124\145\211\002\061\000\354\171\015\235\211\360\014\030  
\352\173\127\122\255\013\346\324\171\133\313\233\342\006\105\165  
\030\275\320\374\247\335\307\341\307\042\266\343\101\044\135\043  
\346\250\237\000\152\120\062\045

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

```

Trust for "Network Solutions ECC Certificate Authority"
Issuer: CN=Network Solutions ECC Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
Serial Number:79:38:4b:b4:19:1a:8d:74:22:cc:ff:85:32:f2:e4:ba
Subject: CN=Network Solutions ECC Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
Not Valid Before: Wed Nov 18 00:00:00 2015
Not Valid After: Mon Jan 18 23:59:59 2038
Fingerprint (MD5): a5:a8:cc:e3:1c:41:11:8c:6a:8c:38:bd:a2:47:fe:b2
Fingerprint (SHA1): 80:f9:5b:74:1c:38:39:94:95:c3:4f:20:c2:3e:73:36:31:4d:3c:6b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions ECC Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\200\371\133\164\034\070\071\224\225\303\117\040\302\076\163\066
\061\115\074\153
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\245\250\314\343\034\101\021\214\152\214\070\275\242\107\376\262
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\105\103\103\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\171\070\113\264\031\032\215\164\042\314\377\205\062\362
\344\272
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Australian Defence Public Root CA"
Issuer: CN=Australian Defence Public Root CA,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
Serial Number:29:eb:92:33:46:4f:32:41:ff:83:19:00:a9:ad:c4:d9:f8:e3:e2:7f

```

```
Subject: CN=Australian Defence Public Root CA,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
Not Valid Before: Mon Nov 28 22:25:28 2016
Not Valid After: Fri Nov 28 22:13:48 2036
Fingerprint (MD5): a2:6b:fb:f8:f3:14:59:bf:16:d7:3c:ce:f3:20:0a:97
Fingerprint (SHA1): a9:ca:fe:9d:fd:67:f4:14:5a:d3:97:d0:e2:f3:05:0d:19:8d:e6:ee
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Australian Defence Public Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\052\060\050\006\003\125\004\003
\023\041\101\165\163\164\162\141\154\151\141\156\040\104\145\146
\145\156\143\145\040\120\165\142\154\151\143\040\122\157\157\164
\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\052\060\050\006\003\125\004\003
\023\041\101\165\163\164\162\141\154\151\141\156\040\104\145\146
\145\156\143\145\040\120\165\142\154\151\143\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\051\353\222\063\106\117\062\101\377\203\031\000\251\255
\304\331\370\343\342\177
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\042\060\202\003\012\240\003\002\001\002\002\024\051
\353\222\063\106\117\062\101\377\203\031\000\251\255\304\331\370
\343\342\177\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\161\061\013\060\011\006\003\125\004\006\023\002\101
\125\061\014\060\012\006\003\125\004\012\023\003\107\117\126\061
\014\060\012\006\003\125\004\013\023\003\104\157\104\061\014\060
\012\006\003\125\004\013\023\003\120\113\111\061\014\060\012\006
\003\125\004\013\023\003\103\101\163\061\052\060\050\006\003\125
\004\003\023\041\101\165\163\164\162\141\154\151\141\156\040\104
\145\146\145\156\143\145\040\120\165\142\154\151\143\040\122\157
```

\157\164\040\103\101\060\036\027\015\061\066\061\061\062\070\062  
\062\062\065\062\070\132\027\015\063\066\061\061\062\070\062\062  
\061\063\064\070\132\060\161\061\013\060\011\006\003\125\004\006  
\023\002\101\125\061\014\060\012\006\003\125\004\012\023\003\107  
\117\126\061\014\060\012\006\003\125\004\013\023\003\104\157\104  
\061\014\060\012\006\003\125\004\013\023\003\120\113\111\061\014  
\060\012\006\003\125\004\013\023\003\103\101\163\061\052\060\050  
\006\003\125\004\003\023\041\101\165\163\164\162\141\154\151\141  
\156\040\104\145\146\145\156\143\145\040\120\165\142\154\151\143  
\040\122\157\157\164\040\103\101\060\202\001\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000  
\060\202\001\012\002\202\001\001\000\323\116\124\004\033\320\364  
\233\235\270\043\207\340\040\307\236\230\261\161\172\006\220\056  
\342\255\110\376\223\005\154\354\206\277\050\100\205\263\114\171  
\357\107\123\230\020\036\124\356\175\170\270\030\023\014\104\122  
\375\320\201\252\223\010\043\071\276\137\017\153\335\045\227\363  
\001\102\337\324\201\000\304\120\276\172\211\055\031\257\163\112  
\077\314\072\300\277\242\250\305\025\367\076\174\101\164\202\153  
\056\167\146\342\152\245\221\210\156\006\061\247\257\013\346\132  
\340\256\175\132\257\057\107\320\362\373\204\163\234\106\241\036  
\204\104\121\304\137\056\332\220\002\137\201\337\021\016\322\373  
\273\072\027\163\243\362\215\143\252\117\377\162\172\145\142\203  
\132\052\074\362\315\054\043\215\317\353\041\037\277\324\003\127  
\365\067\026\014\136\345\127\021\302\250\372\377\154\071\362\075  
\122\346\265\171\300\133\342\262\352\143\040\014\016\245\052\136  
\022\341\346\257\137\213\174\240\255\071\065\065\230\137\361\257  
\070\320\046\323\115\275\142\167\165\075\257\153\024\206\173\132  
\366\041\217\326\352\342\247\016\255\002\003\001\000\001\243\201  
\261\060\201\256\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\113\006\003\125\035\040\004\104\060\102  
\060\006\006\004\125\035\040\000\060\070\006\011\052\044\001\202  
\116\001\001\001\007\060\053\060\051\006\010\053\006\001\005\005  
\007\002\001\026\035\150\164\164\160\072\057\057\143\162\154\056  
\144\145\146\145\156\143\145\056\147\157\166\056\141\165\057\160  
\153\151\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\306\060\037\006\003\125\035\043\004\030\060\026\200\024\254  
\231\341\002\057\350\134\113\101\267\064\270\036\351\233\203\066  
\015\224\264\060\035\006\003\125\035\016\004\026\004\024\254\231  
\341\002\057\350\134\113\101\267\064\270\036\351\233\203\066\015  
\224\264\060\015\006\011\052\206\110\206\367\015\001\001\013\005  
\000\003\202\001\001\000\170\274\201\112\330\072\127\273\275\046  
\277\352\052\050\360\210\212\362\120\114\220\147\332\113\365\270  
\024\010\272\333\177\162\250\232\131\274\361\034\211\250\364\072  
\003\020\124\023\172\135\306\332\272\076\017\210\325\152\323\033  
\227\055\142\141\072\157\371\000\257\162\006\163\354\020\300\141  
\036\314\134\117\031\062\106\070\301\335\077\322\067\032\245\216  
\206\240\360\011\314\065\326\031\002\174\315\071\374\367\371\037  
\347\224\171\116\075\267\370\227\116\073\104\152\315\224\260\271

```
\367\176\342\343\371\231\177\305\323\246\120\264\111\373\026\176
\116\101\054\317\076\307\171\100\272\201\030\046\010\371\305\235
\343\330\361\157\034\150\077\152\133\167\027\122\243\006\336\031
\302\113\156\242\225\374\325\010\277\054\265\151\065\121\343\343
\337\117\032\051\155\203\170\075\070\044\312\002\077\124\020\341
\263\144\341\325\232\336\363\067\366\063\020\265\166\263\253\327
\311\037\123\072\255\125\101\034\110\311\066\236\207\377\165\334
\151\320\257\331\172\127\306\312\261\103\374\071\201\374\334\172
\243\232\245\230\120\124
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Australian Defence Public Root CA"

# Issuer: CN=Australian Defence Public Root CA,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU

# Serial Number:29:eb:92:33:46:4f:32:41:ff:83:19:00:a9:ad:c4:d9:f8:e3:e2:7f

# Subject: CN=Australian Defence Public Root CA,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU

# Not Valid Before: Mon Nov 28 22:25:28 2016

# Not Valid After: Fri Nov 28 22:13:48 2036

# Fingerprint (MD5): a2:6b:fb:f8:f3:14:59:bf:16:d7:3c:ce:f3:20:0a:97

# Fingerprint (SHA1): a9:ca:fe:9d:fd:67:f4:14:5a:d3:97:d0:e2:f3:05:0d:19:8d:e6:ee

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Australian Defence Public Root CA"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\251\312\376\235\375\147\364\024\132\323\227\320\342\363\005\015
\031\215\346\356
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\242\153\373\370\363\024\131\277\026\327\074\316\363\040\012\227
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\161\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\052\060\050\006\003\125\004\003
\023\041\101\165\163\164\162\141\154\151\141\156\040\104\145\146
\145\156\143\145\040\120\165\142\154\151\143\040\122\157\157\164
\040\103\101
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\024\051\353\222\063\106\117\062\101\377\203\031\000\251\255  
\304\331\370\343\342\177

END

CKA\_TRUST\_SERVER\_AUTH

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "SI-TRUST Root"

# Issuer: CN=SI-TRUST Root,2.5.4.97=VATSI-17659957,O=Republika Slovenija,C=SI

# Serial Number:90:ae:77:76:00:00:00:00:57:1d:d0:6f

# Subject: CN=SI-TRUST Root,2.5.4.97=VATSI-17659957,O=Republika Slovenija,C=SI

# Not Valid Before: Mon Apr 25 07:38:17 2016

# Not Valid After: Fri Dec 25 08:08:17 2037

# Fingerprint (MD5): 3a:ba:c6:f3:c7:d1:b7:8a:86:22:7d:ee:99:81:fc:90

# Fingerprint (SHA1): 3a:49:79:b4:0f:a8:41:48:82:00:b5:82:fb:ee:b6:3a:ab:99:19:ae

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SI-TRUST Root"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT

MULTILINE\_OCTAL

\060\134\061\013\060\011\006\003\125\004\006\023\002\123\111\061  
\034\060\032\006\003\125\004\012\023\023\122\145\160\165\142\154  
\151\153\141\040\123\154\157\166\145\156\151\152\141\061\027\060  
\025\006\003\125\004\141\023\016\126\101\124\123\111\055\061\067  
\066\065\071\071\065\067\061\026\060\024\006\003\125\004\003\023  
\015\123\111\055\124\122\125\123\124\040\122\157\157\164

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\134\061\013\060\011\006\003\125\004\006\023\002\123\111\061  
\034\060\032\006\003\125\004\012\023\023\122\145\160\165\142\154  
\151\153\141\040\123\154\157\166\145\156\151\152\141\061\027\060  
\025\006\003\125\004\141\023\016\126\101\124\123\111\055\061\067  
\066\065\071\071\065\067\061\026\060\024\006\003\125\004\003\023  
\015\123\111\055\124\122\125\123\124\040\122\157\157\164

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\015\000\220\256\167\166\000\000\000\000\127\035\320\157

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\004\212\060\202\002\362\240\003\002\001\002\002\015\000  
\220\256\167\166\000\000\000\000\127\035\320\157\060\015\006\011



\052\206\110\206\367\015\001\001\013\005\000\060\134\061\013\060  
\011\006\003\125\004\006\023\002\123\111\061\034\060\032\006\003  
\125\004\012\023\023\122\145\160\165\142\154\151\153\141\040\123  
\154\157\166\145\156\151\152\141\061\027\060\025\006\003\125\004  
\141\023\016\126\101\124\123\111\055\061\067\066\065\071\071\065  
\067\061\026\060\024\006\003\125\004\003\023\015\123\111\055\124  
\122\125\123\124\040\122\157\157\164\060\036\027\015\061\066\060  
\064\062\065\060\067\063\070\061\067\132\027\015\063\067\061\062  
\062\065\060\070\060\070\061\067\132\060\134\061\013\060\011\006  
\003\125\004\006\023\002\123\111\061\034\060\032\006\003\125\004  
\012\023\023\122\145\160\165\142\154\151\153\141\040\123\154\157  
\166\145\156\151\152\141\061\027\060\025\006\003\125\004\141\023  
\016\126\101\124\123\111\055\061\067\066\065\071\071\065\067\061  
\026\060\024\006\003\125\004\003\023\015\123\111\055\124\122\125  
\123\124\040\122\157\157\164\060\202\001\242\060\015\006\011\052  
\206\110\206\367\015\001\001\001\005\000\003\202\001\217\000\060  
\202\001\212\002\202\001\201\000\323\313\234\055\302\340\060\103  
\145\061\044\377\113\260\070\331\251\123\327\065\321\333\267\113  
\223\264\162\215\361\313\225\322\123\053\164\233\062\232\244\057  
\076\002\006\335\257\160\025\241\252\317\021\207\212\146\173\313  
\314\035\160\104\134\217\254\312\346\303\133\047\264\215\243\216  
\020\277\156\124\164\010\160\212\043\350\312\307\164\304\146\221  
\040\335\113\350\245\204\165\245\230\225\202\213\033\341\040\044  
\007\106\253\014\145\066\100\147\213\165\356\251\331\221\051\033  
\355\157\055\105\302\326\342\140\001\261\363\116\071\053\073\157  
\077\205\276\010\366\123\053\173\242\311\105\241\104\201\200\146  
\232\140\072\033\304\276\014\314\060\020\177\021\066\070\112\346  
\233\241\226\123\234\224\314\021\306\004\114\242\125\113\377\200  
\341\257\214\034\065\374\271\223\067\337\371\135\075\334\353\015  
\047\154\104\311\131\146\053\126\157\377\004\033\367\365\151\303  
\135\303\030\376\275\247\331\144\057\242\237\140\331\162\154\075  
\074\165\362\045\047\230\056\072\270\311\335\115\165\275\253\260  
\042\141\130\001\067\050\246\040\235\056\140\134\373\220\274\106  
\103\270\376\155\330\300\146\042\044\153\064\170\042\345\271\342  
\130\351\110\070\356\114\275\001\173\156\076\100\352\321\302\012  
\102\223\147\303\046\057\077\007\133\317\257\343\035\350\072\342  
\145\341\204\221\077\365\146\000\375\252\063\106\102\354\026\076  
\322\023\145\057\016\011\123\366\344\052\165\024\234\031\063\026  
\232\105\341\333\127\317\317\070\324\247\367\355\130\103\344\016  
\230\134\304\340\061\077\224\244\157\113\112\242\325\112\215\046  
\251\035\144\045\010\065\015\347\002\003\001\000\001\243\113\060  
\111\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\006\060\023\006\003\125\035\043\004\014\060\012\200\010\114  
\243\303\150\136\010\002\143\060\021\006\003\125\035\016\004\012  
\004\010\114\243\303\150\136\010\002\143\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\003\202\001\201\000\046\043  
\205\273\135\101\031\156\222\203\212\356\001\213\004\065\031\177

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\253\217\334\326\063\301\371\171\226\136\043\365\360\316\335\352
\333\141\073\132\257\335\130\351\102\211\100\357\371\331\147\021
\177\115\361\355\351\021\173\261\101\017\355\244\322\026\266\357
\301\375\213\366\021\053\054\357\374\007\006\106\014\317\002\013
\355\073\336\217\011\271\063\253\046\200\124\104\102\145\327\347
\257\315\120\016\312\310\210\241\022\234\052\225\073\076\124\074
\110\163\366\174\170\324\233\377\223\367\105\344\051\204\143\374
\372\176\032\347\134\340\162\127\260\057\170\035\060\306\023\375
\210\137\261\145\210\332\136\227\023\201\173\376\036\317\173\277
\127\060\301\160\222\103\246\231\360\125\237\230\305\043\102\275
\164\034\061\216\022\245\331\105\152\052\132\310\130\315\275\326
\335\076\065\013\031\177\003\034\316\007\017\207\105\223\025\241
\153\275\064\034\340\336\365\324\270\345\221\034\113\005\265\047
\046\274\317\321\011\230\026\306\341\361\125\113\072\173\155\336
\306\147\266\301\067\055\237\250\216\131\307\267\246\305\357\337
\026\342\355\336\262\267\363\242\066\244\050\062\072\012\224\313
\077\136\376\156\131\355\272\066\262\223\326\306\303\031\376\365
\231\170\353\107\107\345\255\102\172\354\274\173\311\056\101\116
\115\017\004\016\212\113\063\207\334\361\166\174\132\030\214\234
\012\022\327\242\263\302\205\207\256\155\061\120\142\062\041\240
\150\026\137\224\065\164\125\051\322\161\201\010\112\341\327\135
\252\124\001\263\033\174\131\256\276\254\014\312\270\100\144\147
\133\235\352\006\006\021\326\320\060\163\036\343\274\053
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "SI-TRUST Root"

# Issuer: CN=SI-TRUST Root,2.5.4.97=VATSI-17659957,O=Republika Slovenija,C=SI

# Serial

Number:90:ae:77:76:00:00:00:00:57:1d:d0:6f

# Subject: CN=SI-TRUST Root,2.5.4.97=VATSI-17659957,O=Republika Slovenija,C=SI

# Not Valid Before: Mon Apr 25 07:38:17 2016

# Not Valid After: Fri Dec 25 08:08:17 2037

# Fingerprint (MD5): 3a:ba:c6:f3:c7:d1:b7:8a:86:22:7d:ee:99:81:fc:90

# Fingerprint (SHA1): 3a:49:79:b4:0f:a8:41:48:82:00:b5:82:fb:ee:b6:3a:ab:99:19:ae

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SI-TRUST Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\072\111\171\264\017\250\101\110\202\000\265\202\373\356\266\072
```

```
\253\231\031\256
```

END

```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\072\272\306\363\307\321\267\212\206\042\175\356\231\201\374\220
END
CKA_ISSUER MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\034\060\032\006\003\125\004\012\023\023\122\145\160\165\142\154
\151\153\141\040\123\154\157\166\145\156\151\152\141\061\027\060
\025\006\003\125\004\141\023\016\126\101\124\123\111\055\061\067
\066\065\071\071\065\067\061\026\060\024\006\003\125\004\003\023
\015\123\111\055\124\122\125\123\124\040\122\157\157\164
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\000\220\256\167\166\000\000\000\000\127\035\320\157
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Swiss Government Root CA III"
Issuer: CN=Swiss Government Root CA III,OU=www.pki.admin.ch,O=Swiss Government PKI,C=CH
Serial Number:fb:1f:0b:42:2b:a8:41:3e:57:d1:ee:2a:6e:5a:4f:bb
Subject: CN=Swiss Government Root CA III,OU=www.pki.admin.ch,O=Swiss Government PKI,C=CH
Not Valid Before: Fri Apr 15 07:00:00 2016
Not Valid After: Mon Apr 15 06:59:59 2041
Fingerprint (MD5): 56:83:cb:f2:76:2c:93:dc:11:3b:ea:c2:09:19:17:46
Fingerprint (SHA1): cc:ea:e3:24:45:cd:42:18:dd:18:8e:ad:ce:b3:13:3c:7f:b3:40:ad
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swiss Government Root CA III"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\035\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040
\107\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031
\060\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151
\056\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125
\004\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061

```

\035\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040  
\107\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031  
\060\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151  
\056\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125  
\004\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156  
\155\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\021\000\373\037\013\102\053\250\101\076\127\321\356\052\156  
\132\117\273

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\126\060\202\004\076\240\003\002\001\002\002\021\000  
\373\037\013\102\053\250\101\076\127\321\356\052\156\132\117\273  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061\035  
\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040\107  
\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031\060  
\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151\056  
\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125\004  
\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156\155  
\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111\060  
\036\027\015\061\066\060\064\061\065\060\066\065\071\065\071\132\060  
\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061\035  
\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040\107  
\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031\060  
\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151\056  
\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125\004  
\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156\155  
\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111\060  
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001  
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000  
\341\103\206\216\117\030\224\272\323\302\071\160\155\135\151\121  
\204\131\274\273\310\177\057\375\027\243\170\234\275\330\222\343  
\330\170\041\076\273\232\137\373\262\145\120\162\266\247\354\245  
\347\301\305\000\004\343\314\263\002\112\371\000\333\157\155\273  
\223\027\104\371\043\302\126\072\060\037\201\171\373\144\277\365  
\124\205\277\073\053\157\225\004\006\135\150\012\303\217\270\053  
\146\022\276\242\330\132\224\005\175\257\301\023\006\246\221\072  
\077\031\013\205\203\300\226\135\363\201\310\023\212\365\020\113  
\240\165\072\133\243\100\007\275\241\146\030\145\204\124\171\221  
\232\323\162\204\146\325\015\346\073\132\352\372\333\241\124\375  
\000\043\131\350\127\352\234\267\364\217\101\013\151\261\107\260  
\232\057\142\332\232\031\255\240\225\060\315\056\255\147\273\155  
\371\066\103\267\224\171\311\220\011\000\151\137\227\246\323\157  
\045\350\357\142\207\167\327\246\331\116\034\137\141\146\320\261

\160\325\340\142\040\066\330\226\100\370\136\061\336\101\231\151  
\020\326\240\356\075\255\023\056\322\224\112\215\200\035\334\214  
\106\041\126\213\111\133\336\241\330\003\312\316\330\145\264\260  
\005\075\046\151\112\155\245\214\171\057\244\217\022\170\020\351  
\262\011\010\103\303\306\004\273\063\076\107\065\245\134\040\040  
\012\342\066\370\143\206\344\015\364\076\024\171\276\105\007\264  
\213\011\223\365\366\052\046\241\275\104\307\363\120\015\015\141  
\233\073\021\337\250\203\352\042\054\225\104\015\071\101\143\115  
\250\053\155\150\245\113\237\100\207\152\074\105\012\276\162\247  
\210\276\360\071\052\133\357\131\244\040\357\264\334\303\332\101  
\333\101\245\272\042\137\227\243\310\143\241\044\055\116\045\240  
\303\027\050\305\210\101\223\226\144\146\067\103\005\233\025\174  
\266\276\236\373\033\310\146\030\272\024\357\271\030\317\204\151  
\233\237\275\202\007\022\155\033\031\277\060\176\361\222\016\300  
\114\026\377\321\076\157\370\253\262\141\232\150\103\342\012\124  
\307\001\243\127\216\363\104\006\042\303\160\246\273\245\263\314  
\202\030\330\100\216\275\352\160\101\157\224\127\014\276\007\164  
\156\216\223\172\031\217\306\150\374\033\245\105\263\271\205\251  
\002\003\001\000\001\243\201\356\060\201\353\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003  
\125\035\016\004\026\004\024\007\353\216\252\161\313\047\245\273  
\307\061\140\276\355\037\317\240\063\304\346\060\201\250\006\003  
\125\035\043\004\201\240\060\201\235\200\024\007\353\216\252\161  
\313\047\245\273\307\061\140\276\355\037\317\240\063\304\346\241  
\162\244\160\060\156\061\013\060\011\006\003\125\004\006\023\002  
\103\110\061\035\060\033\006\003\125\004\012\023\024\123\167\151  
\163\163\040\107\157\166\145\162\156\155\145\156\164\040\120\113  
\111\061\031\060\027\006\003\125\004\013\023\020\167\167\167\056  
\160\153\151\056\141\144\155\151\156\056\143\150\061\045\060\043  
\006\003\125\004\003\023\034\123\167\151\163\163\040\107\157\166  
\145\162\156\155\145\156\164\040\122\157\157\164\040\103\101\040  
\111\111\111\202\021\000\373\037\013\102\053\250\101\076\127\321  
\356\052\156\132\117\273\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015  
\001\001\013\005\000\003\202\002\001\000\263\117\146\274\336\351  
\214\145\374\267\123\020\056\374\374\335\211\032\021\100\160\224  
\061\211\225\166\306\326\052\314\075\247\243\301\270\316\022\153  
\064\120\301\165\052\057\347\141\046\357\113\077\336\215\043\237  
\015\230\076\037\073\326\152\316\074\361\337\321\113\167\214\250  
\117\362\120\345\050\251\301\152\352\126\157\107\264\202\053\246  
\047\262\045\360\335\043\012\077\351\075\214\045\354\303\265\117  
\067\372\123\012\351\070\230\153\051\354\123\065\327\206\220\232  
\372\143\272\166\124\343\120\117\312\326\347\300\161\320\322\347  
\352\150\124\255\223\344\062\374\172\161\100\207\005\050\270\352  
\270\302\074\215\000\136\301\116\050\126\345\303\154\265\365\252  
\215\357\147\026\007\320\216\305\362\132\031\073\273\301\213\263  
\104\237\014\245\307\313\336\323\104\140\247\275\033\151\332\016  
\232\377\227\105\206\155\372\261\144\212\037\354\337\121\130\122

\115\326\352\272\006\366\123\161\133\336\351\125\365\054\023\162  
\006\114\123\226\372\312\133\364\077\034\247\337\122\375\313\116  
\175\237\020\100\224\247\241\125\272\163\076\164\164\060\370\243  
\340\237\252\137\037\135\300\337\101\317\001\201\041\333\250\256  
\263\063\255\106\023\167\233\073\060\264\244\340\027\202\300\212  
\265\064\024\034\005\213\256\340\075\332\305\174\253\046\010\114  
\275\112\140\351\160\354\250\130\210\165\147\361\030\227\166\015  
\154\013\175\031\055\002\265\202\231\167\317\142\372\235\022\001  
\053\331\365\264\127\261\072\353\325\051\360\214\323\102\247\065  
\110\214\142\203\076\012\076\141\335\261\363\007\241\307\163\260  
\211\360\266\131\173\243\043\330\067\003\065\210\253\105\167\143  
\114\377\160\353\216\152\007\321\042\340\062\221\313\025\161\132  
\053\305\204\076\221\315\335\264\231\147\215\264\252\214\145\027  
\246\254\234\136\126\230\247\364\342\100\022\325\101\227\265\063  
\361\355\027\241\245\002\020\341\144\265\100\332\036\255\321\246  
\356\254\036\307\021\333\027\161\172\331\232\036\306\116\233\364  
\250\263\224\237\011\212\177\114\233\376\010\013\054\253\120\320  
\067\262\111\065\032\267\036\051\041\166\341\233\360\241\252\130  
\147\044\003\341\031\244\321\023\152\361

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Swiss Government Root CA III"

# Issuer: CN=Swiss Government Root CA III,OU=www.pki.admin.ch,O=Swiss Government PKI,C=CH

# Serial Number:fb:1f:0b:42:2b:a8:41:3e:57:d1:ee:2a:6e:5a:4f:bb

# Subject: CN=Swiss Government Root CA III,OU=www.pki.admin.ch,O=Swiss Government PKI,C=CH

# Not Valid Before: Fri Apr 15 07:00:00 2016

# Not Valid After: Mon Apr 15 06:59:59 2041

# Fingerprint (MD5): 56:83:cb:f2:76:2c:93:dc:11:3b:ea:c2:09:19:17:46

# Fingerprint (SHA1): cc:ea:e3:24:45:cd:42:18:dd:18:8e:ad:ce:b3:13:3c:7f:b3:40:ad

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Swiss Government Root CA III"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\314\352\343\044\105\315\102\030\335\030\216\255\316\263\023\074  
\177\263\100\255

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

\126\203\313\362\166\054\223\334\021\073\352\302\011\031\027\106

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\035\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040
\107\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031
\060\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151
\056\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125
\004\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111
END
```

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\021\000\373\037\013\102\053\250\101\076\127\321\356\052\156
\132\117\273
```

END

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

# Microsoft Code Signing Only Certificate

#

Certificate "Application CA G4 Root"

# Issuer: CN=Application CA G4 Root,O=LGPKI,C=JP

# Serial Number:31:a5:f3:ca:90:ea:23:ac:d2:9e:bd

# Subject: CN=Application CA G4 Root,O=LGPKI,C=JP

# Not Valid Before: Wed Feb 15 15:00:00 2017

# Not Valid After: Sun Feb 15 14:59:59 2037

# Fingerprint (MD5): 80:88:87:a3:29:65:03:a4:53:f1:23:08:41:e6:6b:66

# Fingerprint (SHA1): 21:da:ce:4c:2c:34:e6:64:68:ee:06:31:4d:b0:55:a0:a8:9d:4c:1d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Application CA G4 Root"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\064\040\122\157\157\164
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\064\040\122\157\157\164
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\013\061\245\363\312\220\352\043\254\322\236\275

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\144\060\202\002\114\240\003\002\001\002\002\013\061  
\245\363\312\220\352\043\254\322\236\275\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\060\076\061\013\060\011\006  
\003\125\004\006\023\002\112\120\061\016\060\014\006\003\125\004  
\012\023\005\114\107\120\113\111\061\037\060\035\006\003\125\004  
\003\023\026\101\160\160\154\151\143\141\164\151\157\156\040\103  
\101\040\107\064\040\122\157\157\164\060\036\027\015\061\067\060  
\062\061\065\061\065\060\060\060\060\132\027\015\063\067\060\062  
\061\065\061\064\065\071\065\071\132\060\076\061\013\060\011\006  
\003\125\004\006\023\002\112\120\061\016\060\014\006\003\125\004  
\012\023\005\114\107\120\113\111\061\037\060\035\006\003\125\004  
\003\023\026\101\160\160\154\151\143\141\164\151\157\156\040\103  
\101\040\107\064\040\122\157\157\164\060\202\001\042\060\015\006  
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017  
\000\060\202\001\012\002\202\001\001\000\257\253\307\345\214\246  
\130\236\057\326\005\311\221\167\060\276\336\032\324\016\143\142  
\321\314\055\261\321\206\070\215\035\205\146\123\237\252\101\145  
\340\130\322\345\051\276\224\250\225\223\074\137\152\305\233\237  
\064\350\155\301\306\323\247\345\103\240\022\060\300\071\064\140  
\014\213\364\150\365\110\337\351\216\034\256\110\247\273\252\075  
\170\267\342\111\273\301\043\004\132\033\220\001\305\175\253\112  
\001\241\302\223\152\322\205\263\266\347\166\353\153\157\070\353  
\040\122\060\225\010\365\371\054\356\310\300\165\271\001\355\301  
\067\126\060\134\235\177\144\302\312\100\040\271\225\205\274\245  
\007\175\014\276\056\241\335\306\046\351\052\051\154\237\050\230  
\051\121\350\166\023\033\357\056\013\067\132\063\236\300\045\147  
\252\017\055\250\324\222\046\070\001\247\320\142\030\056\042\070  
\070\170\013\272\122\231\241\174\046\002\261\342\305\342\336\316  
\212\002\104\204\242\243\351\213\210\143\061\311\057\070\000\351  
\304\002\115\036\043\047\022\110\334\021\261\360\322\342\016\060  
\031\257\003\241\007\263\065\224\042\245\002\003\001\000\001\243  
\143\060\141\060\035\006\003\125\035\016\004\026\004\024\156\334  
\012\065\037\040\302\350\241\323\175\005\116\117\114\140\345\244  
\304\147\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003  
\001\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024  
\156\334\012\065\037\040\302\350\241\323\175\005\116\117\114\140  
\345\244\304\147\060\015\006\011\052\206\110\206\367\015\001\001  
\013\005\000\003\202\001\001\000\125\063\325\100\267\032\176\117  
\334\164\203\016\104\272\077\275\122\225\310\223\226\043\362\001  
\271\024\353\312\022\164\315\141\210\064\257\115\136\364\131\212  
\253\036\330\343\131\301\036\370\060\265\100\306\273\270\257\321  
\355\077\154\252\163\230\202\344\230\064\256\222\101\016\131\066  
\032\272\120\034\026\364\027\072\054\033\342\227\157\262\257\321



```
\332\336\024\122\337\200\074\307\117\075\207\236\272\225\275\170
\274\125\074\211\366\056\046\325\025\345\320\100\022\305\263\161
\077\154\146\037\243\374\113\265\116\342\156\334\200\007\303\371
\050\024\173\367\136\026\152\103\247\256\221\001\037\117\145\251
\110\263\316\156\032\006\041\244\323\061\210\210\245\111\021\202
\153\353\271\235\140\376\237\376\305\367\370\177\253\067\356\257
\347\130\106\272\011\344\135\071\247\113\004\330\003\002\311\140
\052\136\125\151\021\013\140\170\201\172\364\161\365\217\106\256
\217\004\250\227\034\200\211\043\143\333\376\353\246\027\016\131
\266\056\271\206\353\137\136\154\335\201\347\253\060\201\043\220
\047\261\367\053\220\071\013\270
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Application CA G4 Root"

# Issuer: CN=Application CA G4 Root,O=LGPKI,C=JP

# Serial Number:31:a5:f3:ca:90:ea:23:ac:d2:9e:bd

# Subject: CN=Application CA G4 Root,O=LGPKI,C=JP

# Not Valid Before: Wed Feb 15 15:00:00 2017

# Not Valid After: Sun Feb 15 14:59:59 2037

# Fingerprint (MD5): 80:88:87:a3:29:65:03:a4:53:f1:23:08:41:e6:6b:66

# Fingerprint (SHA1): 21:da:ce:4c:2c:34:e6:64:68:ee:06:31:4d:b0:55:a0:a8:9d:4c:1d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Application CA G4 Root"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\041\332\316\114\054\064\346\144\150\356\006\061\115\260\125\240
\250\235\114\035
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\200\210\207\243\051\145\003\244\123\361\043\010\101\346\153\146
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\064\040\122\157\157\164
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\013\061\245\363\312\220\352\043\254\322\236\275
```

```

END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "SSC GDL CA Root A"
Issuer: CN=SSC GDL CA Root A,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
Serial Number:50:96:6e:72:bd:10:d6:8c:4f:6b:c7:62:3f:9c:70:38
Subject: CN=SSC GDL CA Root A,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
Not Valid Before: Tue Jun 04 13:00:47 2013
Not Valid After: Sat Jun 04 13:00:47 2033
Fingerprint (MD5): 59:3f:bc:3d:18:77:a4:ae:1c:d8:a2:25:cd:c3:44:3e
#
Fingerprint (SHA1): 0c:20:09:a4:a8:8d:8b:42:02:18:52:50:54:0c:c4:2b:df:b5:b0:89
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC GDL CA Root A"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\120\226\156\162\275\020\326\214\117\153\307\142\077\234
\160\070
END

```

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\256\060\202\003\226\240\003\002\001\002\002\020\120  
\226\156\162\275\020\326\214\117\153\307\142\077\234\160\070\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\161  
\061\013\060\011\006\003\125\004\006\023\002\114\124\061\053\060  
\051\006\003\125\004\012\023\042\123\153\141\151\164\155\145\156  
\151\156\151\157\040\163\145\162\164\151\146\151\153\141\166\151  
\155\157\040\143\145\156\164\162\141\163\061\031\060\027\006\003  
\125\004\013\023\020\103\101\040\122\117\117\124\040\123\145\162  
\166\151\143\145\163\061\032\060\030\006\003\125\004\003\023\021  
\123\123\103\040\107\104\114\040\103\101\040\122\157\157\164\040  
\101\060\036\027\015\061\063\060\066\060\064\061\063\060\060\064  
\067\132\027\015\063\063\060\066\060\064\061\063\060\060\064\067  
\132\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124  
\061\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164  
\155\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153  
\141\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060  
\027\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040  
\123\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004  
\003\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157  
\157\164\040\101\060\202\002\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012  
\002\202\002\001\000\237\134\112\374\034\153\267\031\227\331\001  
\067\076\012\351\030\206\323\005\352\242\332\337\011\202\127\356  
\155\053\215\232\026\075\125\076\211\327\311\276\341\001\243\200  
\065\243\106\354\341\021\355\250\074\225\345\072\122\201\312\116  
\230\010\052\017\204\334\273\351\244\371\171\266\111\302\025\236  
\240\225\350\017\110\367\120\327\371\246\103\324\007\013\060\101  
\311\066\022\142\267\154\170\013\006\077\056\263\236\352\060\375  
\101\143\117\204\054\067\316\007\246\071\144\173\161\025\133\053  
\001\362\327\175\230\015\030\076\333\205\232\340\001\120\041\044  
\270\033\243\143\103\323\201\133\115\014\201\116\070\153\316\140  
\305\352\007\342\047\342\353\366\303\124\232\310\311\263\321\053  
\062\067\002\274\155\173\236\220\167\043\215\223\023\046\073\207  
\127\243\145\117\046\130\024\152\143\045\232\345\141\372\034\127  
\375\015\054\151\017\306\012\360\046\071\027\002\243\326\163\201  
\102\303\102\061\203\213\340\372\113\116\130\141\061\050\222\074  
\306\311\020\010\311\014\133\104\254\143\302\327\142\031\362\161  
\356\040\267\111\203\031\236\107\332\126\305\034\254\244\071\150  
\027\137\021\032\154\252\245\222\217\275\033\313\305\340\002\200  
\125\323\160\123\345\213\052\376\102\352\275\073\134\343\122\000  
\175\170\077\046\314\021\256\064\321\062\014\370\173\240\321\175  
\075\343\212\274\276\036\036\222\077\070\262\137\062\136\065\304  
\176\302\222\015\235\266\313\131\325\353\022\152\335\162\041\121  
\021\260\163\345\062\351\326\314\016\335\263\071\132\042\357\344  
\365\351\006\151\206\052\174\163\257\030\042\163\054\066\045\334  
\125\251\122\061\263\212\216\025\175\262\116\020\173\120\212\000  
\114\272\207\342\105\123\167\176\115\145\002\153\214\223\266\153

\165\355\357\226\267\110\216\250\340\272\271\202\262\122\155\041  
\377\222\272\321\076\260\134\261\253\031\016\031\163\106\053\323  
\122\110\145\064\332\004\065\322\170\076\317\143\065\244\123\346  
\113\343\120\203\275\363\233\207\262\041\332\110\241\172\113\354  
\262\342\361\324\045\005\224\123\026\114\053\146\044\020\310\340  
\327\234\022\244\224\302\001\043\223\241\000\246\340\156\273\071  
\342\365\172\150\251\002\003\001\000\001\243\102\060\100\060\016  
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017  
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060  
\035\006\003\125\035\016\004\026\004\024\240\021\176\037\344\224  
\144\121\073\022\071\172\154\335\111\223\371\375\300\134\060\015  
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002  
\001\000\014\361\113\214\341\117\026\026\322\352\142\222\266\255  
\324\122\216\013\031\144\113\071\360\230\071\163\112\122\352\116  
\315\216\144\107\260\060\217\074\017\055\332\042\145\363\031\130  
\062\074\177\203\217\012\014\345\124\346\251\276\270\256\227\126  
\346\267\015\031\174\275\227\054\152\052\245\126\163\202\336\116  
\230\213\075\034\304\320\053\053\273\305\014\370\116\376\055\256  
\277\251\147\177\127\263\157\355\377\213\323\126\014\357\060\214  
\301\136\246\351\131\212\074\056\334\107\317\314\224\136\203\254  
\024\166\372\176\274\014\243\016\134\033\210\354\053\033\065\150  
\210\261\365\173\305\363\263\305\032\274\373\357\265\136\337\360  
\071\036\165\150\355\104\302\113\042\160\076\134\153\224\311\020  
\254\360\375\310\057\176\043\342\201\247\033\316\014\272\105\062  
\047\120\105\071\254\340\376\000\264\052\165\007\014\147\033\273  
\161\300\202\343\227\126\227\320\344\167\131\271\377\174\147\134  
\204\145\273\010\066\250\113\116\221\302\151\376\035\354\232\023  
\037\165\063\054\051\306\351\260\150\220\043\377\043\137\177\306  
\073\247\050\020\270\037\242\210\315\144\026\045\117\343\200\267  
\300\112\200\127\360\220\333\072\262\002\062\040\325\153\310\330  
\024\100\311\331\070\031\124\070\353\350\145\073\157\134\325\105  
\172\257\333\331\330\225\236\266\247\225\315\034\011\035\002\036  
\001\351\004\225\135\205\227\070\025\275\250\307\231\336\323\104  
\102\135\206\203\101\044\174\121\211\252\103\011\047\064\350\361  
\012\265\226\113\264\363\240\376\362\000\215\152\073\164\271\103  
\271\146\271\317\352\353\067\316\377\233\351\043\370\154\323\043  
\375\350\351\340\156\370\373\015\122\100\212\254\200\153\040\020  
\135\320\250\375\252\075\071\021\053\057\377\122\221\072\240\334  
\212\307\166\066\021\131\205\273\060\212\244\110\060\234\141\103  
\253\324\257\166\355\300\277\027\224\170\065\333\110\067\010\324  
\216\152\000\351\042\335\312\360\323\022\070\074\230\237\140\114  
\155\077\102\375\357\214\232\267\036\161\172\032\111\324\140\311  
\353\217\364\351\306\277\160\124\210\322\307\127\073\126\315\327  
\156\334\355\015\164\176\345\165\101\221\127\223\064\175\251\365  
\275\207

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

```

CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "SSC GDL CA Root A"
Issuer: CN=SSC GDL CA Root A,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
Serial Number:50:96:6e:72:bd:10:d6:8c:4f:6b:c7:62:3f:9c:70:38
Subject: CN=SSC GDL CA Root A,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
Not Valid Before: Tue Jun 04 13:00:47 2013
Not Valid After: Sat Jun 04 13:00:47 2033
Fingerprint (MD5): 59:3f:bc:3d:18:77:a4:ae:1c:d8:a2:25:cd:c3:44:3e
#
Fingerprint (SHA1): 0c:20:09:a4:a8:8d:8b:42:02:18:52:50:54:0c:c4:2b:df:b5:b0:89
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC GDL CA Root A"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\014\040\011\244\250\215\213\102\002\030\122\120\124\014\304\053
\337\265\260\211
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\131\077\274\075\030\167\244\256\034\330\242\045\315\303\104\076
END
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\120\226\156\162\275\020\326\214\117\153\307\142\077\234
\160\070
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Halcom Root Certificate Authority"

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Issuer: CN=Halcom Root Certificate Authority,2.5.4.97=VATSI-43353126,O=Halcom d.d.,C=SI
Serial Number: 843675 (0xcd9b)
Subject: CN=Halcom Root Certificate Authority,2.5.4.97=VATSI-43353126,O=Halcom d.d.,C=SI
Not Valid Before: Fri Jun 10 07:07:50 2016
Not Valid After: Tue Jun 10 07:07:50 2036
Fingerprint (MD5): 69:16:83:a1:f7:27:b9:ec:7c:d2:c6:b3:79:b2:a3:61
Fingerprint (SHA1): 23:d7:31:fe:dc:5c:8b:b9:7d:e6:dc:8e:13:b4:11:bd:4f:24:00:4f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "Halcom Root Certificate Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\024\060\022\006\003\125\004\012\023\013\110\141\154\143\157\155
\040\144\056\144\056\061\027\060\025\006\003\125\004\141\023\016
\126\101\124\123\111\055\064\063\063\065\063\061\062\066\061\052
\060\050\006\003\125\004\003\023\041\110\141\154\143\157\155\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\145
\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\024\060\022\006\003\125\004\012\023\013\110\141\154\143\157\155
\040\144\056\144\056\061\027\060\025\006\003\125\004\141\023\016
\126\101\124\123\111\055\064\063\063\065\063\061\062\066\061\052
\060\050\006\003\125\004\003\023\041\110\141\154\143\157\155\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\145
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\014\337\233
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\200\060\202\002\150\240\003\002\001\002\002\003\014
\337\233\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\150\061\013\060\011\006\003\125\004\006\023\002\123\111
\061\024\060\022\006\003\125\004\012\023\013\110\141\154\143\157
\155\040\144\056\144\056\061\027\060\025\006\003\125\004\141\023
\016\126\101\124\123\111\055\064\063\063\065\063\061\062\066\061
\052\060\050\006\003\125\004\003\023\041\110\141\154\143\157\155
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\145\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\066\060\066\061\060\060\067\060\067\065\060\132\027\015\063\066

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\060\066\061\060\060\067\060\067\065\060\132\060\150\061\013\060  
\011\006\003\125\004\006\023\002\123\111\061\024\060\022\006\003  
\125\004\012\023\013\110\141\154\143\157\155\040\144\056\144\056  
\061\027\060\025\006\003\125\004\141\023\016\126\101\124\123\111  
\055\064\063\063\065\063\061\062\066\061\052\060\050\006\003\125  
\004\003\023\041\110\141\154\143\157\155\040\122\157\157\164\040  
\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150  
\157\162\151\164\171\060\202\001\042\060\015\006\011\052\206\110  
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001  
\012\002\202\001\001\000\351\122\246\306\032\357\143\273\255\201  
\364\220\262\132\217\015\325\026\063\264\034\030\373\313\211\052  
\060\273\145\201\304\341\373\002\251\224\007\166\345\327\025\344  
\172\144\020\200\352\074\320\263\242\255\256\034\037\352\273\201  
\141\230\324\371\215\151\225\304\105\056\003\011\312\206\372\134  
\132\021\027\100\060\076\360\306\143\011\311\361\215\101\245\126  
\015\005\144\151\113\130\254\052\051\226\273\100\063\026\064\113  
\147\154\327\361\264\106\245\352\131\250\103\150\017\214\070\052  
\252\074\366\104\003\206\370\212\333\105\041\053\051\036\022\267  
\372\245\145\101\336\006\010\130\160\225\076\364\114\331\353\017  
\051\251\221\212\236\255\312\022\365\345\225\346\070\331\032\246  
\213\234\117\246\110\023\020\245\171\104\275\152\073\051\365\026  
\167\100\313\176\233\134\337\276\213\353\347\240\031\157\237\025  
\077\047\236\051\261\365\015\374\137\107\242\074\335\056\013\002  
\373\364\215\352\354\014\261\371\264\005\254\371\217\251\075\156  
\054\035\071\237\320\116\237\116\310\152\236\200\003\141\334\317  
\370\155\224\313\017\317\002\003\001\000\001\243\063\060\061\060  
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377  
\060\021\006\003\125\035\016\004\012\004\010\102\256\246\103\307  
\230\050\260\060\013\006\003\125\035\017\004\004\003\002\001\006  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003  
\202\001\001\000\122\271\171\320\333\143\376\031\201\373\014\371  
\301\345\120\131\312\235\262\373\134\063\320\070\250\253\265\032  
\116\123\045\165\042\323\111\277\312\201\317\323\341\173\243\221  
\106\165\312\032\353\331\365\135\274\173\206\065\375\201\227\234  
\204\327\046\230\042\374\261\065\320\251\225\266\174\377\344\227  
\264\100\176\111\135\150\310\342\324\071\165\047\117\003\221\262  
\061\127\277\206\327\155\312\161\000\042\067\320\073\130\044\120  
\240\234\214\232\211\216\365\050\106\154\347\026\355\260\201\253  
\364\106\046\257\246\350\032\105\167\160\026\222\262\173\161\161  
\334\367\337\111\147\300\063\010\016\056\123\301\167\253\307\112  
\221\114\022\357\347\016\011\345\165\061\040\256\156\374\132\212  
\200\234\020\260\333\250\112\314\363\053\334\066\064\246\367\251  
\013\147\235\220\313\075\046\237\165\315\114\311\035\006\012\165  
\213\122\300\201\360\321\046\254\314\222\246\024\234\134\074\026  
\102\373\223\314\002\250\023\363\332\256\012\303\270\025\364\260  
\320\324\340\026\040\117\254\120\230\170\046\224\036\150\353\224  
\162\376\367\213

END

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CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "Halcom Root Certificate
 Authority"
Issuer: CN=Halcom Root Certificate Authority,2.5.4.97=VATSI-43353126,O=Halcom d.d.,C=SI
Serial Number: 843675 (0xcd9b)
Subject: CN=Halcom Root Certificate Authority,2.5.4.97=VATSI-43353126,O=Halcom d.d.,C=SI
Not Valid Before: Fri Jun 10 07:07:50 2016
Not Valid After: Tue Jun 10 07:07:50 2036
Fingerprint (MD5): 69:16:83:a1:f7:27:b9:ec:7c:d2:c6:b3:79:b2:a3:61
Fingerprint (SHA1): 23:d7:31:fe:dc:5c:8b:b9:7d:e6:dc:8e:13:b4:11:bd:4f:24:00:4f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom Root Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\043\327\061\376\334\134\213\271\175\346\334\216\023\264\021\275
\117\044\000\117
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\151\026\203\241\367\047\271\354\174\322\306\263\171\262\243\141
END
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\024\060\022\006\003\125\004\012\023\013\110\141\154\143\157\155
\040\144\056\144\056\061\027\060\025\006\003\125\004\141\023\016
\126\101\124\123\111\055\064\063\063\065\063\061\062\066\061\052
\060\050\006\003\125\004\003\023\041\110\141\154\143\157\155\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\145
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\014\337\233
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Application CA G3 Root"
Issuer: CN=Application CA G3 Root,O=LGPKI,C=JP

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```
Serial Number: 49 (0x31)
Subject: CN=Application CA G3 Root,O=LGPKI,C=JP
Not Valid Before: Tue Jun 03 15:00:00 2014
Not Valid After: Sat Jun 03 14:59:59 2034
Fingerprint (MD5): 47:5e:d1:73:5a:e8:95:77:04:01:a3:3f:33:02:5c:20
Fingerprint (SHA1):
 6f:38:84:56:8e:99:c8:c6:ac:0e:5d:de:2d:b2:02:dd:00:2e:36:63
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Application CA G3 Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\061
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\132\060\202\002\102\240\003\002\001\002\002\001\061
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061\016
\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061\037
\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143\141
\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164\060
\036\027\015\061\064\060\066\060\063\061\065\060\060\060\060\132
\027\015\063\064\060\066\060\063\061\064\065\071\065\071\132\060
\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061\016
\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061\037
\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143\141
\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164\060
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000
\315\105\076\367\321\226\042\134\221\057\076\012\000\003\314\266
\367\154\124\374\050\067\324\004\030\354\255\230\311\257\323\245
\271\347\331\277\116\346\243\231\074\231\156\241\040\036\106\033
\342\165\125\274\322\354\366\210\032\354\064\105\113\203\235\323
```

\262\346\335\007\211\301\010\331\370\073\213\222\144\162\135\232  
\073\314\255\067\211\307\334\140\171\010\340\160\254\367\053\355  
\237\003\111\037\216\076\203\250\156\342\222\134\124\321\171\337  
\354\030\072\175\270\155\217\326\243\045\115\255\037\100\246\137  
\324\252\116\261\160\030\131\231\362\013\124\151\076\171\050\104  
\210\367\161\227\315\177\005\334\312\334\166\112\220\114\153\140  
\350\372\046\061\330\265\370\347\374\155\213\044\152\266\357\102  
\327\043\124\305\032\143\212\073\307\374\252\155\074\217\313\154  
\332\040\260\362\274\145\034\001\114\042\225\015\034\043\037\254  
\325\371\316\165\133\352\060\275\114\001\044\037\165\324\141\111  
\303\033\231\145\216\010\134\071\070\315\051\303\070\105\315\144  
\171\267\233\115\107\352\130\062\372\246\366\222\360\301\267\137  
\002\003\001\000\001\243\143\060\141\060\035\006\003\125\035\016  
\004\026\004\024\251\065\052\110\276\054\067\355\206\333\174\125  
\207\000\046\276\030\055\134\056\060\016\006\003\125\035\017\001  
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001  
\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043  
\004\030\060\026\200\024\251\065\052\110\276\054\067\355\206\333  
\174\125\207\000\046\276\030\055\134\056\060\015\006\011\052\206  
\110\206\367\015\001\001\013\005\000\003\202\001\001\000\266\202  
\275\305\106\320\161\213\245\221\075\176\055\132\371\234\204\175  
\007\047\225\035\347\115\310\174\354\346\223\350\126\032\172\060  
\110\073\014\372\116\365\011\262\257\210\255\224\354\375\262\255  
\057\346\005\164\041\033\204\213\070\052\303\355\357\106\150\265  
\335\122\372\160\302\165\117\377\243\101\056\074\027\224\114\011  
\042\264\216\301\177\304\246\254\355\203\150\317\145\136\354\172  
\275\305\146\356\320\243\177\362\127\261\010\302\171\160\353\162  
\177\101\131\011\171\165\361\274\261\041\376\203\263\104\075\211  
\243\276\261\172\330\235\303\037\346\304\124\341\215\345\330\120  
\334\344\126\067\173\276\050\000\363\054\167\332\043\177\140\230  
\075\005\026\362\170\151\255\231\303\072\164\154\076\232\262\224  
\355\217\252\366\123\153\347\310\267\350\074\214\373\307\174\117  
\031\135\244\146\025\351\177\207\240\320\325\255\040\244\106\011  
\105\254\345\310\145\207\273\006\337\374\327\150\126\103\163\242  
\000\231\062\222\302\016\240\034\016\221\275\225\130\274\223\237  
\204\302\245\146\347\145\315\051\342\142\362\005\222\140

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Application CA G3 Root"

# Issuer: CN=Application CA G3 Root,O=LGPKI,C=JP

# Serial Number: 49 (0x31)

# Subject: CN=Application CA G3 Root,O=LGPKI,C=JP

# Not Valid Before: Tue Jun 03 15:00:00 2014

```

Not Valid After: Sat Jun 03 14:59:59 2034
Fingerprint (MD5): 47:5e:d1:73:5a:e8:95:77:04:01:a3:3f:33:02:5c:20
Fingerprint (SHA1): 6f:38:84:56:8e:99:c8:c6:ac:0e:5d:de:2d:b2:02:dd:00:2e:36:63
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Application CA G3 Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\157\070\204\126\216\231\310\306\254\016\135\336\055\262\002\335
\000\056\066\143
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\107\136\321\163\132\350\225\167\004\001\243\077\063\002\134\040
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\061
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "GLOBALTRUST 2015"
Issuer: CN=GLOBALTRUST 2015,OU=GLOBALTRUST Certification Service,O=e-commerce monitoring
GmbH,L=Wien,ST=Wien,C=AT
Serial Number: 0 (0x0)
Subject: CN=GLOBALTRUST 2015,OU=GLOBALTRUST Certification Service,O=e-commerce monitoring
GmbH,L=Wien,ST=Wien,C=AT
Not Valid Before: Thu Jun 11 00:00:00 2015
Not Valid After: Sun Jun 10 00:00:00 2040
Fingerprint (MD5): da:5a:b9:da:8e:0a:38:d4:82:63:03:9d:6c:96:6c:ed
Fingerprint (SHA1): 46:5b:26:be:be:71:06:dd:85:44:c1:13:9d:9f:a2:57:00:c1:d7:bd
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST 2015"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

```

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\227\061\013\060\011\006\003\125\004\006\023\002\101\124  
\061\015\060\013\006\003\125\004\010\023\004\127\151\145\156\061  
\015\060\013\006\003\125\004\007\023\004\127\151\145\156\061\043  
\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155\145  
\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040\107  
\155\142\110\061\052\060\050\006\003\125\004\013\023\041\107\114  
\117\102\101\114\124\122\125\123\124\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145\061  
\031\060\027\006\003\125\004\003\023\020\107\114\117\102\101\114  
\124\122\125\123\124\040\062\060\061\065

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\227\061\013\060\011\006\003\125\004\006\023\002\101\124  
\061\015\060\013\006\003\125\004\010\023\004\127\151\145\156\061  
\015\060\013\006\003\125\004\007\023\004\127\151\145\156\061\043  
\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155\145  
\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040\107  
\155\142\110\061\052\060\050\006\003\125\004\013\023\041\107\114  
\117\102\101\114\124\122\125\123\124\040\103\145\162\164\151\146  
\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145\061  
\031\060\027\006\003\125\004\003\023\020\107\114\117\102\101\114  
\124\122\125\123\124\040\062\060\061\065

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\001\000

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\006\014\060\202\003\364\240\003\002\001\002\002\001\000  
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060  
\201\227\061\013\060\011\006\003\125\004\006\023\002\101\124\061  
\015\060\013\006\003\125\004\010\023\004\127\151\145\156\061\015  
\060\013\006\003\125\004\007\023\004\127\151\145\156\061\043\060  
\041\006\003\125\004\012\023\032\145\055\143\157\155\155\145\162  
\143\145\040\155\157\156\151\164\157\162\151\156\147\040\107\155  
\142\110\061\052\060\050\006\003\125\004\013\023\041\107\114\117  
\102\101\114\124\122\125\123\124\040\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\123\145\162\166\151\143\145\061\031  
\060\027\006\003\125\004\003\023\020\107\114\117\102\101\114\124  
\122\125\123\124\040\062\060\061\065\060\036\027\015\061\065\060  
\066\061\061\060\060\060\060\060\132\027\015\064\060\060\066  
\061\060\060\060\060\060\060\060\132\060\201\227\061\013\060\011  
\006\003\125\004\006\023\002\101\124\061\015\060\013\006\003\125  
\004\010\023\004\127\151\145\156\061\015\060\013\006\003\125\004  
\007\023\004\127\151\145\156\061\043\060\041\006\003\125\004\012

\023\032\145\055\143\157\155\155\145\162\143\145\040\155\157\156  
\151\164\157\162\151\156\147\040\107\155\142\110\061\052\060\050  
\006\003\125\004\013\023\041\107\114\117\102\101\114\124\122\125  
\123\124\040\103\145\162\164\151\146\151\143\141\164\151\157\156  
\040\123\145\162\166\151\143\145\061\031\060\027\006\003\125\004  
\003\023\020\107\114\117\102\101\114\124\122\125\123\124\040\062  
\060\061\065\060\202\002\040\060\015\006\011\052\206\110\206\367  
\015\001\001\001\005\000\003\202\002\015\000\060\202\002\010\002  
\202\002\001\000\324\246\227\250\362\364\220\021\103\255\264\202  
\106\101\361\057\221\157\143\242\315\015\040\334\275\014\070\212  
\145\112\012\053\072\250\164\251\167\241\213\216\362\057\201\367  
\204\030\315\255\353\142\266\222\175\340\101\345\116\124\070\067  
\202\357\313\340\355\317\273\312\314\243\113\367\133\376\270\174  
\247\010\155\313\103\304\114\042\024\146\343\235\003\271\167\041  
\253\104\153\041\107\043\310\040\372\052\313\221\166\035\165\154  
\370\233\351\017\046\351\103\057\232\040\005\150\030\307\216\231  
\205\055\101\007\246\144\216\130\341\215\225\200\244\115\137\365  
\002\330\201\171\333\325\347\337\242\042\375\024\247\147\026\354  
\331\130\114\312\251\335\352\032\216\251\010\144\117\121\041\266  
\162\242\116\377\120\161\275\073\145\344\275\177\123\021\256\337  
\020\071\173\135\366\107\160\027\367\103\221\003\172\141\045\137  
\054\374\370\211\021\074\354\071\124\026\111\304\041\232\161\340  
\171\213\166\035\166\075\007\131\270\007\261\214\334\307\315\116  
\341\373\255\103\115\077\100\357\041\142\057\061\104\116\151\307  
\157\042\313\253\124\113\350\302\372\021\150\254\310\156\016\336  
\154\305\047\226\011\121\002\115\001\266\127\277\062\050\325\011  
\103\226\367\304\210\265\371\124\376\032\072\152\267\054\265\044  
\144\373\112\170\162\303\374\331\117\310\116\043\271\051\330\015  
\241\110\101\223\002\155\277\022\205\233\306\305\140\055\360\221  
\374\231\375\040\224\236\161\143\253\325\111\253\220\354\207\071  
\205\177\215\205\314\013\350\333\113\073\016\374\302\166\175\106  
\347\071\046\236\337\125\337\036\204\371\101\066\046\154\002\131  
\053\216\373\274\351\037\047\044\142\004\147\204\341\077\330\235  
\030\116\226\240\045\356\312\050\003\117\002\121\317\367\065\067  
\151\244\264\326\326\325\036\031\103\047\026\037\107\121\356\112  
\011\114\021\132\266\133\075\141\350\073\020\276\326\106\346\364  
\034\375\270\105\275\174\372\165\132\354\341\122\043\015\216\037  
\206\227\123\221\134\233\233\050\326\216\345\156\047\255\040\214  
\247\301\101\251\227\067\213\054\352\156\030\005\227\366\316\003  
\122\361\275\171\064\233\100\307\043\222\164\363\157\355\243\351  
\131\360\125\113\002\001\003\243\143\060\141\060\017\006\003\125  
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003  
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003  
\125\035\016\004\026\004\024\313\260\335\075\214\074\337\142\054  
\053\146\074\236\074\351\025\155\161\264\327\060\037\006\003\125  
\035\043\004\030\060\026\200\024\313\260\335\075\214\074\337\142  
\054\053\146\074\236\074\351\025\155\161\264\327\060\015\006\011  
\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000

\242\175\125\004\146\356\026\024\274\202\201\207\045\031\071\142  
\364\376\073\037\341\300\163\000\161\312\165\251\342\163\361\305  
\015\101\243\135\216\301\055\331\145\133\331\211\342\360\216\305  
\240\175\275\313\314\106\123\037\137\355\040\266\002\052\326\023  
\362\235\175\121\112\100\125\161\255\236\354\166\352\105\040\216  
\252\372\172\103\232\160\147\176\023\336\230\350\313\215\335\037  
\254\064\322\241\265\355\376\270\347\026\317\370\321\070\060\215  
\064\211\322\316\175\201\322\036\377\121\030\123\066\223\334\011  
\313\010\026\270\010\327\132\060\220\212\012\371\057\265\317\304  
\315\124\162\052\306\275\001\347\130\013\156\006\100\264\011\316  
\264\216\263\232\351\211\221\224\254\172\124\341\373\343\204\054  
\203\240\117\376\353\350\301\364\353\266\046\323\070\304\055\255  
\254\105\200\064\155\041\075\135\205\072\342\173\376\124\267\335  
\350\205\124\313\244\361\253\051\120\170\327\044\265\243\057\236  
\257\021\146\256\030\270\375\135\050\317\100\327\125\340\054\353  
\122\061\150\103\146\005\227\222\273\305\361\041\054\375\022\144  
\061\231\103\157\213\235\113\140\376\024\136\122\263\043\250\341  
\230\172\356\024\311\241\342\314\077\166\041\142\375\153\015\331  
\264\112\225\346\156\133\172\044\303\323\306\326\037\242\353\067  
\153\116\243\337\142\353\353\016\112\010\277\353\030\210\373\107  
\032\255\302\121\303\325\174\367\037\053\263\310\112\120\016\151  
\130\040\142\001\112\133\312\143\226\046\042\256\366\351\234\100  
\254\147\003\235\235\151\025\302\300\370\135\247\044\261\047\074  
\277\005\342\253\242\312\311\260\055\176\243\301\061\040\106\041  
\145\222\335\312\336\337\223\033\274\155\057\137\251\026\244\127  
\207\054\162\232\132\202\147\321\104\342\075\011\012\201\214\036  
\020\375\306\064\150\354\377\167\141\166\177\046\367\333\374\022  
\106\022\252\300\321\370\171\205\242\002\314\213\252\244\255\154  
\024\300\275\374\150\256\104\175\042\371\012\105\135\354\004\346  
\372\343\244\305\346\371\262\031\303\331\214\250\223\173\072\212  
\151\073\122\023\074\035\063\002\116\226\100\237\271\225\375\223  
\027\063\301\311\013\366\375\275\151\020\365\255\051\373\343\332

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GLOBALTRUST 2015"

# Issuer: CN=GLOBALTRUST 2015,OU=GLOBALTRUST Certification Service,O=e-commerce monitoring  
GmbH,L=Wien,ST=Wien,C=AT

# Serial Number: 0 (0x0)

# Subject: CN=GLOBALTRUST 2015,OU=GLOBALTRUST Certification Service,O=e-commerce monitoring  
GmbH,L=Wien,ST=Wien,C=AT

# Not Valid

Before: Thu Jun 11 00:00:00 2015

# Not Valid After: Sun Jun 10 00:00:00 2040

```

Fingerprint (MD5): da:5a:b9:da:8e:0a:38:d4:82:63:03:9d:6c:96:6c:ed
Fingerprint (SHA1): 46:5b:26:be:be:71:06:dd:85:44:c1:13:9d:9f:a2:57:00:c1:d7:bd
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST 2015"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\106\133\046\276\276\161\006\335\205\104\301\023\235\237\242\127
\000\301\327\275
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\332\132\271\332\216\012\070\324\202\143\003\235\154\226\154\355
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\015\060\013\006\003\125\004\010\023\004\127\151\145\156\061
\015\060\013\006\003\125\004\007\023\004\127\151\145\156\061\043
\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155\145
\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040\107
\155\142\110\061\052\060\050\006\003\125\004\013\023\041\107\114
\117\102\101\114\124\122\125\123\124\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145\061
\031\060\027\006\003\125\004\003\023\020\107\114\117\102\101\114
\124\122\125\123\124\040\062\060\061\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Microsoft ECC Product Root Certificate Authority 2018"
Issuer: CN=Microsoft ECC Product Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
Serial Number: 14:98:26:66:dc:7c:cd:8f:40:53:67:7b:b9:99:ec:85
Subject: CN=Microsoft ECC Product Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
Not Valid Before: Tue Feb 27 20:42:08
2018
Not Valid After: Fri Feb 27 20:50:46 2043
Fingerprint (MD5): 1f:12:4e:de:13:e0:6a:02:3c:d7:c0:9a:4f:48:c3:d6
Fingerprint (SHA1): 06:f1:aa:33:0b:92:7b:75:3a:40:e6:8c:df:22:e3:4b:cb:ef:33:52
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

```

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC Product Root Certificate Authority 2018"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\076\060\074\006\003\125\004\003
\023\065\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\120\162\157\144\165\143\164\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\070
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\076\060\074\006\003\125\004\003
\023\065\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\120\162\157\144\165\143\164\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\070
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\024\230\046\146\334\174\315\217\100\123\147\173\271\231
\354\205
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\043\060\202\002\250\240\003\002\001\002\002\020\024
\230\046\146\334\174\315\217\100\123\147\173\271\231\354\205\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\224\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\023\060\021\006
\003\125\004\010\023\012\127\141\163\150\151\156\147\164\157\156
\061\020\060\016\006\003\125\004\007\023\007\122\145\144\155\157
\156\144\061\036\060\034\006\003\125\004\012\023\025\115\151\143
\162\157\163\157\146\164\040\103\157\162\160\157\162\141\164\151
\157\156\061\076\060\074\006\003\125\004\003\023\065\115\151\143
\162\157\163\157\146\164\040\105\103\103\040\120\162\157\144\165
\143\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
```



\061\070\060\036\027\015\061\070\060\062\062\067\062\060\064\062  
\060\070\132\027\015\064\063\060\062\062\067\062\060\065\060\064  
\066\132\060\201\224\061\013\060\011\006\003\125\004\006\023\002  
\125\123\061\023\060\021\006\003\125\004\010\023\012\127\141\163  
\150\151\156\147\164\157\156\061\020\060\016\006\003\125\004\007  
\023\007\122\145\144\155\157\156\144\061\036\060\034\006\003\125  
\004\012\023\025\115\151\143\162\157\163\157\146\164\040\103\157  
\162\160\157\162\141\164\151\157\156\061\076\060\074\006\003\125  
\004\003\023\065\115\151\143\162\157\163\157\146\164\040\105\103  
\103\040\120\162\157\144\165\143\164\040\122\157\157\164\040\103  
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157  
\162\151\164\171\040\062\060\061\070\060\166\060\020\006\007\052  
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000  
\004\307\021\026\052\166\035\126\216\276\271\142\145\324\303\316  
\264\360\303\060\354\217\155\327\156\071\274\310\111\253\253\270  
\343\103\170\325\201\006\135\357\307\175\237\316\326\263\220\165  
\336\014\260\220\336\043\272\310\321\076\147\340\031\251\033\206  
\061\036\137\064\055\356\027\375\025\373\176\047\212\062\241\352  
\311\217\311\176\030\313\057\073\054\110\172\175\246\364\001\007  
\254\243\201\274\060\201\271\060\016\006\003\125\035\017\001\001  
\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001  
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004  
\026\004\024\103\357\160\207\270\235\277\354\210\031\334\306\304  
\153\165\015\165\064\063\010\060\020\006\011\053\006\001\004\001  
\202\067\025\001\004\003\002\001\000\060\145\006\003\125\035\040  
\004\136\060\134\060\006\006\004\125\035\040\000\060\122\006\014  
\053\006\001\004\001\202\067\114\203\175\001\001\060\102\060\100  
\006\010\053\006\001\005\005\007\002\001\026\064\150\164\164\160  
\072\057\057\167\167\167\056\155\151\143\162\157\163\157\146\164  
\056\143\157\155\057\160\153\151\157\160\163\057\104\157\143\163  
\057\122\145\160\157\163\151\164\157\162\171\056\150\164\155\000  
\060\012\006\010\052\206\110\316\075\004\003\003\003\151\000\060  
\146\002\061\000\241\300\111\104\135\062\125\047\314\076\220\156  
\045\042\235\044\133\233\121\065\307\221\111\111\052\243\371\157  
\117\034\315\335\234\341\265\127\311\236\302\042\105\233\006\025  
\160\034\105\277\002\061\000\305\323\050\353\162\307\076\260\254  
\047\011\177\142\075\140\171\345\222\361\105\052\271\245\002\344  
\140\273\376\172\053\234\140\247\265\231\024\362\260\276\360\273  
\005\226\126\126\217\301\150

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Microsoft ECC Product Root Certificate Authority 2018"

# Issuer: CN=Microsoft ECC Product Root Certificate Authority 2018,O=Microsoft

```

Corporation,L=Redmond,ST=Washington,C=US
Serial Number:14:98:26:66:dc:7c:cd:8f:40:53:67:7b:b9:99:ec:85
Subject: CN=Microsoft ECC Product Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
Not Valid Before: Tue Feb 27 20:42:08 2018
Not Valid After: Fri Feb 27 20:50:46 2043
Fingerprint (MD5): 1f:12:4e:de:13:e0:6a:02:3c:d7:c0:9a:4f:48:c3:d6
Fingerprint (SHA1): 06:f1:aa:33:0b:92:7b:75:3a:40:e6:8c:df:22:e3:4b:cb:ef:33:52
CKA_CLASS CK_OBJECT_CLASS
CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC Product Root Certificate Authority 2018"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\006\361\252\063\013\222\173\165\072\100\346\214\337\042\343\113
\313\357\063\122
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\037\022\116\336\023\340\152\002\074\327\300\232\117\110\303\326
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\076\060\074\006\003\125\004\003
\023\065\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\120\162\157\144\165\143\164\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\024\230\046\146\334\174\315\217\100\123\147\173\271\231
\354\205
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "emSign Root CA - G2"
Issuer: CN=emSign Root CA - G2,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
Serial Number:86:4d:bf:0f:e3:5e:d7:7d:8e:d8
Subject: CN=emSign Root CA - G2,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN

```

```
Not Valid Before: Sun Feb 18 18:30:00 2018
Not Valid After: Wed Feb 18 18:30:00 2043
Fingerprint (MD5): 63:ac:61:e5:f7:da:aa:05:80:53:bd:e4:ab:fd:bb:30
Fingerprint (SHA1): 1e:65:77:b9:cf:70:d0:17:ca:e1:bd:a1:35:1d:47:25:a9:73:c0:6d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\000\206\115\277\017\343\136\327\175\216\330
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\225\060\202\003\175\240\003\002\001\002\002\013\000
\206\115\277\017\343\136\327\175\216\330\060\015\006\011\052\206
\110\206\367\015\001\001\014\005\000\060\147\061\013\060\011\006
\003\125\004\006\023\002\111\116\061\023\060\021\006\003\125\004
\013\023\012\145\155\123\151\147\156\040\120\113\111\061\045\060
\043\006\003\125\004\012\023\034\145\115\165\144\150\162\141\040
\124\145\143\150\156\157\154\157\147\151\145\163\040\114\151\155
\151\164\145\144\061\034\060\032\006\003\125\004\003\023\023\145
\155\123\151\147\156\040\122\157\157\164\040\103\101\040\055\040
\107\062\060\036\027\015\061\070\060\062\061\070\061\070\063\060
\060\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060
\060\132\060\147\061\013\060\011\006\003\125\004\006\023\002\111
\116\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151
```

\147\156\040\120\113\111\061\045\060\043\006\003\125\004\012\023  
\034\145\115\165\144\150\162\141\040\124\145\143\150\156\157\154  
\157\147\151\145\163\040\114\151\155\151\164\145\144\061\034\060  
\032\006\003\125\004\003\023\023\145\155\123\151\147\156\040\122  
\157\157\164\040\103\101\040\055\040\107\062\060\202\002\042\060  
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202  
\002\017\000\060\202\002\012\002\202\002\001\000\303\160\030\205  
\226\332\101\337\034\257\254\135\063\160\304\135\073\053\342\025  
\311\044\356\310\123\066\257\133\364\323\154\024\175\307\123\373  
\073\071\070\316\120\154\306\005\026\167\235\135\002\072\200\041  
\113\262\062\253\161\247\243\343\306\155\337\263\262\021\275\342  
\150\373\073\012\303\370\220\014\223\303\062\207\365\246\136\352  
\005\330\036\262\152\343\117\331\124\303\134\101\122\066\075\302  
\051\343\100\177\110\003\166\201\106\176\145\245\055\040\353\325  
\214\114\166\353\367\233\065\245\321\042\313\141\226\103\206\375  
\306\201\371\004\160\017\015\155\227\275\367\361\231\157\320\315  
\250\114\025\062\340\035\336\355\321\217\346\230\027\037\275\114  
\216\241\317\012\203\150\373\033\375\177\103\123\005\077\241\120  
\066\274\207\314\024\265\301\220\253\320\203\170\224\351\215\147  
\003\331\263\366\000\307\125\033\252\025\244\300\024\171\114\350  
\160\054\240\226\373\105\165\103\043\202\014\101\157\016\052\205  
\253\265\035\163\306\360\353\175\207\002\373\144\310\274\266\104  
\363\256\365\010\307\026\374\033\322\305\377\271\012\170\041\073  
\264\146\132\127\060\323\235\173\242\176\135\346\261\036\004\254  
\173\020\340\376\345\126\355\200\042\062\000\206\260\027\241\347  
\103\211\326\373\244\307\037\355\060\001\166\266\024\117\122\150  
\033\360\042\053\342\175\214\356\206\116\067\200\014\076\013\060  
\064\201\146\021\314\270\022\277\074\237\340\322\101\201\267\357  
\302\324\277\277\035\104\163\102\022\144\062\124\147\063\244\157  
\136\200\255\174\252\051\112\131\354\346\332\331\231\070\275\357  
\125\243\156\177\074\101\163\372\326\121\251\004\045\017\300\050  
\354\356\272\116\142\364\224\046\322\076\225\306\305\373\176\352  
\220\212\216\135\211\025\117\167\056\244\064\251\303\341\374\366  
\101\155\217\221\212\143\345\347\313\202\361\143\355\310\274\062  
\021\213\047\172\223\055\103\076\076\365\334\062\064\312\253\336  
\022\233\010\257\160\064\075\334\056\311\102\073\011\055\143\203  
\103\147\030\124\372\137\034\253\323\020\176\124\073\174\334\122  
\130\133\313\365\352\115\251\155\244\070\221\134\100\335\245\335  
\137\327\131\143\045\121\325\056\175\050\316\371\002\003\001\000  
\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024  
\355\354\115\105\141\030\050\347\263\043\050\021\034\115\245\047  
\015\136\354\364\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001  
\001\014\005\000\003\202\002\001\000\010\120\277\212\124\040\360  
\244\302\124\034\105\045\157\354\153\072\046\221\055\044\065\206  
\304\041\230\070\007\172\033\253\013\011\355\045\375\363\077\031  
\201\374\301\247\075\047\140\051\160\300\230\326\154\123\165\107

\154\330\362\220\204\242\336\277\166\011\200\361\126\352\320\154  
\141\300\363\071\140\337\322\146\253\215\311\022\061\073\167\024  
\166\120\034\301\377\257\111\354\335\124\047\375\300\354\357\110  
\001\167\253\106\271\226\073\333\165\263\111\066\227\322\161\005  
\151\355\105\035\346\300\154\146\117\043\134\355\112\103\370\050  
\375\127\377\030\063\347\254\201\146\306\220\010\030\115\354\202  
\163\274\224\013\375\027\065\032\001\353\257\354\165\236\343\274  
\115\364\236\376\155\014\305\367\174\207\270\205\300\010\364\313  
\245\001\341\203\154\314\277\220\273\004\006\356\014\167\333\217  
\120\256\333\336\031\363\175\262\205\047\301\163\070\226\032\311  
\016\276\135\336\263\141\034\037\053\133\113\327\075\077\355\063  
\062\231\032\357\061\202\324\121\353\274\266\377\026\207\156\037  
\316\223\171\233\164\102\066\172\245\312\145\067\072\032\304\071  
\303\277\064\311\350\040\266\022\174\276\250\177\300\074\120\256  
\125\113\371\377\010\360\027\341\317\233\303\356\247\140\021\217  
\327\004\247\335\276\322\247\036\255\361\332\160\332\271\204\307  
\206\145\326\300\375\334\335\121\037\371\317\234\327\167\020\044  
\236\137\046\161\361\233\321\343\015\111\065\320\232\140\177\213  
\200\036\160\331\353\357\153\230\217\071\132\135\101\230\067\263  
\153\157\245\350\270\155\051\236\035\077\004\033\126\132\235\024  
\112\022\017\245\141\000\252\316\321\044\030\372\373\126\124\141  
\166\170\071\272\302\303\336\266\017\030\115\332\235\175\037\034  
\075\056\333\224\121\302\352\251\063\353\025\166\057\300\356\055  
\242\350\373\050\231\300\221\244\324\175\161\235\021\241\125\264  
\130\240\324\100\067\321\154\311\143\145\365\274\004\073\205\131  
\347\210\050\340\151\160\006\252\073\024\352\311\045\064\317\147  
\304\074\171\254\120\202\010\113\143\364\250\174\120\170\306\053  
\144\052\200\376\144\302\013\155\214\340\051\100\306\202\241\354  
\314\174\256\012\017\265\251\071\165

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRUST\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "emSign Root CA - G2"

# Issuer: CN=emSign Root CA - G2,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN

# Serial Number:86:4d:bf:0f:e3:5e:d7:7d:8e:d8

# Subject: CN=emSign Root CA - G2,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN

# Not Valid Before: Sun Feb 18 18:30:00 2018

# Not Valid After: Wed Feb 18 18:30:00 2043

# Fingerprint (MD5): 63:ac:61:e5:f7:da:aa:05:80:53:bd:e4:ab:fd:bb:30

# Fingerprint (SHA1): 1e:65:77:b9:cf:70:d0:17:ca:e1:bd:a1:35:1d:47:25:a9:73:c0:6d

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

```
CKA_LABEL UTF8 "emSign Root CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\036\145\167\271\317\160\320\027\312\341\275\241\065\035\107\045
\251\163\300\155
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\143\254\141\345\367\332\252\005\200\123\275\344\253\375\273\060
END
CKA_ISSUER
MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\000\206\115\277\017\343\136\327\175\216\330
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "emSign Root CA - C2"
Issuer: CN=emSign Root CA - C2,O=eMudhra Inc,OU=emSign PKI,C=US
Serial
Number:2f:0a:b7:6b:0d:cb:4a:af:27:58
Subject: CN=emSign Root CA - C2,O=eMudhra Inc,OU=emSign PKI,C=US
Not Valid Before: Sun Feb 18 18:30:00 2018
Not Valid After: Wed Feb 18 18:30:00 2043
Fingerprint (MD5): eb:24:3b:fa:70:63:c8:e1:cd:5f:0e:ea:c8:97:2f:21
Fingerprint (SHA1): bc:a2:18:80:74:c3:14:7e:16:f4:c4:8c:59:10:a8:9e:f7:52:f4:79
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - C2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
```

\040\103\101\040\055\040\103\062  
END  
CKA\_ID UTF8 "0"  
CKA\_ISSUER MULTILINE\_OCTAL  
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156  
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145  
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003  
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164  
\040\103\101\040\055\040\103\062  
END  
CKA\_SERIAL\_NUMBER  
MULTILINE\_OCTAL  
\002\012\057\012\267\153\015\313\112\257\047\130  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\005\162\060\202\003\132\240\003\002\001\002\002\012\057  
\012\267\153\015\313\112\257\047\130\060\015\006\011\052\206\110  
\206\367\015\001\001\014\005\000\060\126\061\013\060\011\006\003  
\125\004\006\023\002\125\123\061\023\060\021\006\003\125\004\013  
\023\012\145\155\123\151\147\156\040\120\113\111\061\024\060\022  
\006\003\125\004\012\023\013\145\115\165\144\150\162\141\040\111  
\156\143\061\034\060\032\006\003\125\004\003\023\023\145\155\123  
\151\147\156\040\122\157\157\164\040\103\101\040\055\040\103\062  
\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060\060  
\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060\132  
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156  
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145  
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003  
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164  
\040\103\101\040\055\040\103\062\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\214\175\175\145\003\344\333  
\232\037\130\042\171\221\200\345\275\354\205\161\340\265\011\177  
\140\321\145\373\074\337\262\153\232\137\251\313\256\032\126\166  
\040\130\356\055\350\056\374\176\010\337\113\270\327\371\316\023  
\212\162\063\022\253\226\160\217\263\213\107\335\341\047\074\064  
\067\373\044\343\151\333\265\126\137\112\260\121\212\263\054\064  
\102\267\353\073\316\222\334\177\035\144\313\114\325\040\230\372  
\057\116\256\077\042\267\220\212\375\371\200\054\255\130\376\337  
\333\255\233\247\266\060\024\054\104\333\055\110\215\337\011\006  
\000\032\372\020\115\017\037\120\266\256\116\243\126\151\200\044  
\065\201\136\350\165\007\035\003\351\332\355\124\153\115\050\164  
\305\342\017\232\021\027\022\334\016\161\200\160\115\110\377\321  
\075\230\260\235\222\010\027\212\066\024\232\047\050\357\345\360  
\145\341\150\076\033\332\351\342\011\346\235\067\056\335\303\273  
\225\267\021\301\321\321\302\146\231\215\151\311\340\067\350\226

\227\051\144\115\063\322\021\215\203\025\064\047\051\342\070\101  
\332\322\030\211\237\213\126\117\033\301\017\177\325\315\267\267  
\031\257\336\357\173\265\246\145\127\155\215\027\213\155\113\132  
\252\334\237\214\072\235\050\031\102\301\316\222\237\107\035\052  
\031\132\233\076\351\020\064\140\043\070\262\015\360\240\315\100  
\334\333\107\130\200\227\147\174\037\343\022\242\047\001\243\200  
\042\167\304\343\055\147\015\277\217\050\011\142\371\335\232\305  
\004\304\303\215\242\000\351\372\306\326\336\010\245\271\307\151  
\320\073\250\042\111\173\152\251\044\336\247\331\344\012\001\111  
\372\122\044\003\034\373\022\250\320\145\161\110\120\341\217\364  
\143\111\224\346\270\041\233\143\201\366\265\320\113\121\133\324  
\224\102\174\223\015\234\222\046\344\005\001\333\355\221\133\072  
\271\116\014\373\111\264\241\243\303\154\146\115\024\155\011\305  
\305\310\252\103\333\250\125\060\054\053\136\022\223\332\006\361  
\015\363\176\303\064\361\307\117\241\026\364\132\122\031\222\124  
\172\230\240\373\057\311\307\377\067\306\273\303\310\046\377\170  
\030\140\175\105\237\124\340\016\275\257\167\217\233\057\014\276  
\274\337\067\021\312\264\176\254\277\002\003\001\000\001\243\102  
\060\100\060\035\006\003\125\035\016\004\026\004\024\263\367\212  
\244\326\017\210\000\131\350\121\027\117\325\176\354\206\042\201  
\235\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\015\006\011\052\206\110\206\367\015\001\001\014\005  
\000\003\202\002\001\000\064\045\246\045\214\321\313\366\235\235  
\007\346\065\154\006\255\061\332\256\266\103\102\360\250\004\354  
\010\133\362\271\276\340\304\320\262\265\033\250\003\313\055\230  
\363\204\273\371\140\360\210\061\217\201\110\216\214\241\042\265  
\224\127\034\242\055\116\315\243\203\376\132\061\024\073\005\023  
\304\212\144\020\353\157\031\104\075\176\043\245\160\141\355\041  
\220\315\006\126\152\355\152\144\265\160\061\171\136\171\104\363  
\354\242\275\272\247\141\115\000\304\105\175\224\041\322\302\327  
\204\250\044\362\053\245\111\050\040\253\037\036\316\003\362\173  
\255\305\152\046\004\213\207\077\167\064\143\334\163\202\236\306  
\142\301\226\124\323\147\137\345\212\115\026\074\122\301\233\304  
\343\127\043\032\233\053\245\143\037\100\122\066\263\235\321\155  
\345\351\343\271\122\003\026\004\340\334\343\004\123\036\370\114  
\005\270\113\336\004\042\101\020\001\371\256\366\056\336\230\266  
\242\273\011\343\156\023\251\141\020\127\133\102\260\051\020\317  
\346\052\374\351\032\227\274\207\002\102\203\170\345\334\077\272  
\015\340\017\223\165\167\066\245\332\261\271\120\247\004\355\021  
\231\154\366\046\221\222\111\342\143\211\071\077\070\374\021\260  
\363\126\267\001\277\051\162\364\342\215\255\153\170\342\076\222  
\156\040\045\155\130\060\034\365\035\332\270\021\040\046\136\153  
\112\024\146\005\333\063\033\102\346\316\301\356\144\360\205\111  
\200\265\345\020\103\010\340\154\153\306\303\104\237\051\004\125  
\066\132\057\302\125\160\200\010\113\232\276\012\057\170\016\005  
\153\226\355\337\312\064\075\154\154\004\377\214\246\207\002\165  
\133\103\062\254\320\207\034\275\042\210\112\271\165\200\032\267



```
\254\240\213\312\016\015\361\026\116\253\004\352\343\175\134\011
\172\134\042\377\020\042\262\210\307\074\225\120\277\325\265\315
\122\050\036\237\204\102\017\370\061\000\266\324\326\310\137\144
\150\212\200\176\127\170\112\343\177\133\377\016\335\171\117\061
\330\317\034\227\123\206\322\163\337\156\160\021\227\221\217\063
\273\311\202\056\073\322\073\150\341\047\214\203\241\314\001\155
\304\201\276\172\265\007\015\057\002\075\123\311\231\234\333\321
\201\103\053\220\010\013
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "emSign Root CA - C2"

# Issuer: CN=emSign Root CA - C2,O=eMudhra Inc,OU=emSign PKI,C=US

# Serial Number:2f:0a:b7:6b:0d:cb:4a:af:27:58

# Subject: CN=emSign Root CA - C2,O=eMudhra Inc,OU=emSign PKI,C=US

# Not Valid Before: Sun Feb 18 18:30:00 2018

# Not Valid After: Wed Feb 18 18:30:00 2043

# Fingerprint (MD5): eb:24:3b:fa:70:63:c8:e1:cd:5f:0e:ea:c8:97:2f:21

# Fingerprint (SHA1): bc:a2:18:80:74:c3:14:7e:16:f4:c4:8c:59:10:a8:9e:f7:52:f4:79

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "emSign Root CA - C2"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\274\242\030\200\164\303\024\176\026\364\304\214\131\020\250\236
\367\122\364\171
```

END

CKA\_CERT\_MD5\_HASH

MULTILINE\_OCTAL

```
\353\044\073\372\160\143\310\341\315\137\016\352\310\227\057\041
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\062
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\012\057\012\267\153\015\313\112\257\047\130
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

```
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
```

```
Certificate "Microsoft ECC TS Root Certificate Authority 2018"
```

```
Issuer:
```

```
 CN=Microsoft ECC TS Root Certificate Authority 2018,O=Microsoft
 Corporation,L=Redmond,ST=Washington,C=US
```

```
Serial Number:15:38:75:e1:64:7e:d1:b0:47:b4:ef:af:41:12:82:45
```

```
Subject: CN=Microsoft ECC TS Root Certificate Authority 2018,O=Microsoft
 Corporation,L=Redmond,ST=Washington,C=US
```

```
Not Valid Before: Tue Feb 27 20:51:34 2018
```

```
Not Valid After: Fri Feb 27 21:00:12 2043
```

```
Fingerprint (MD5): 37:94:29:58:86:2a:06:e6:bb:cf:d7:ab:59:c7:f2:3c
```

```
Fingerprint (SHA1): 31:f9:fc:8b:a3:80:59:86:b7:21:ea:72:95:c6:5b:3a:44:53:42:74
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

```
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

```
CKA_LABEL UTF8 "Microsoft ECC TS Root Certificate Authority 2018"
```

```
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

```
CKA_SUBJECT MULTILINE_OCTAL
```

```
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\071\060\067\006\003\125\004\003
\023\060\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\124\123\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
\061\070
```

```
END
```

```
CKA_ID
```

```
 UTF8 "0"
```

```
CKA_ISSUER MULTILINE_OCTAL
```

```
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\071\060\067\006\003\125\004\003
\023\060\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\124\123\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
\061\070
```

```
END
```

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\025\070\165\341\144\176\321\260\107\264\357\257\101\022  
\202\105

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\003\027\060\202\002\236\240\003\002\001\002\002\020\025  
\070\165\341\144\176\321\260\107\264\357\257\101\022\202\105\060  
\012\006\010\052\206\110\316\075\004\003\003\060\201\217\061\013  
\060\011\006\003\125\004\006\023\002\125\123\061\023\060\021\006  
\003\125\004\010\023\012\127\141\163\150\151\156\147\164\157\156  
\061\020\060\016\006\003\125\004\007\023\007\122\145\144\155\157  
\156\144\061\036\060\034\006\003\125\004\012\023\025\115\151\143  
\162\157\163\157\146\164\040\103\157\162\160\157\162\141\164\151  
\157\156\061\071\060\067\006\003\125\004\003\023\060\115\151\143  
\162\157\163\157\146\164\040\105\103\103\040\124\123\040\122\157  
\157\164\040\103\145\162\164\151\146\151\143\141\164\145\040\101  
\165\164\150\157\162\151\164\171\040\062\060\061\070\060\036\027  
\015\061\070\060\062\062\067\062\060\065\061\063\064\132\027\015  
\064\063\060\062\062\067\062\061\060\060\061\062\132\060\201\217  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\023\060  
\021\006\003\125\004\010\023\012\127\141\163\150\151\156\147\164  
\157\156\061\020\060\016\006\003\125\004\007\023\007\122\145\144  
\155\157\156\144\061\036\060\034\006\003\125\004\012\023\025\115  
\151\143\162\157\163\157\146\164\040\103\157\162\160\157\162\141  
\164\151\157\156\061\071\060\067\006\003\125\004\003\023\060\115  
\151\143\162\157\163\157\146\164\040\105\103\103\040\124\123\040  
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\145  
\040\101\165\164\150\157\162\151\164\171\040\062\060\061\070\060  
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201  
\004\000\042\003\142\000\004\336\315\273\160\040\361\045\040\264  
\224\350\327\264\073\017\156\207\335\253\254\317\115\100\057\201  
\063\153\131\011\030\326\207\015\046\043\234\264\215\225\235\166  
\237\245\271\006\102\346\255\066\262\304\263\256\172\074\010\325  
\313\235\072\136\105\041\154\013\343\040\365\233\302\335\104\063  
\343\102\271\352\362\050\102\222\252\376\014\007\312\212\023\231  
\073\142\000\355\332\363\065\243\201\274\060\201\271\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035  
\006\003\125\035\016\004\026\004\024\350\107\310\102\232\260\235  
\256\157\013\050\073\230\025\217\343\261\350\200\262\060\020\006  
\011\053\006\001\004\001\202\067\025\001\004\003\002\001\000\060  
\145\006\003\125\035\040\004\136\060\134\060\006\006\004\125\035  
\040\000\060\122\006\014\053\006\001\004\001\202\067\114\203\175  
\001\001\060\102\060\100\006\010\053\006\001\005\005\007\002\001  
\026\064\150\164\164\160\072\057\057\167\167\167\056\155\151\143  
\162\157\163\157\146\164\056\143\157\155\057\160\153\151\157\160  
\163\057\104\157\143\163\057\122\145\160\157\163\151\164\157\162

```
\171\056\150\164\155\000\060\012\006\010\052\206\110\316\075\004
\003\003\003\147\000\060\144\002\060\024\206\120\300\046\032\353
\352\241\024\167\072\133\337\143\071\245\063\307\120\100\325\153
\065\153\017\264\337\175\126\271\341\245\235\170\031\202\241\103
\156\032\327\130\243\125\003\102\333\002\060\030\224\264\036\072
\215\144\372\014\047\033\207\023\112\322\267\072\000\224\306\362
\345\143\277\257\343\372\334\223\325\347\106\232\153\201\151\076
\002\337\121\015\217\050\161\101\211\221\057
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Microsoft ECC TS Root Certificate Authority 2018"

# Issuer: CN=Microsoft ECC TS Root Certificate Authority 2018,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US

# Serial Number: 15:38:75:e1:64:7e:d1:b0:47:b4:ef:af:41:12:82:45

# Subject: CN=Microsoft ECC TS Root Certificate Authority 2018,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US

# Not Valid Before: Tue Feb 27 20:51:34 2018

#

Not Valid After: Fri Feb 27 21:00:12 2043

# Fingerprint (MD5): 37:94:29:58:86:2a:06:e6:bb:cf:d7:ab:59:c7:f2:3c

# Fingerprint (SHA1): 31:f9:fc:8b:a3:80:59:86:b7:21:ea:72:95:c6:5b:3a:44:53:42:74

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Microsoft ECC TS Root Certificate Authority 2018"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\061\371\374\213\243\200\131\206\267\041\352\162\225\306\133\072
\104\123\102\164
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\067\224\051\130\206\052\006\346\273\317\327\253\131\307\362\074
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\071\060\067\006\003\125\004\003
\023\060\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\124\123\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
```

```
\061\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\025\070\165\341\144\176\321\260\107\264\357\257\101\022
\202\105
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "GlobalSign Code Signing Root E45"
Issuer: CN=GlobalSign Code Signing Root E45,O=GlobalSign nv-sa,C=BE
Serial Number:76:53:fe:ae:18:26:43:6f:69:f5:1c:c2:77:16:f2:5e
Subject: CN=GlobalSign Code Signing Root E45,O=GlobalSign nv-sa,C=BE
Not Valid Before: Wed Mar 18 00:00:00 2020
Not Valid After: Sat Mar 18 00:00:00 2045
Fingerprint (MD5): 1c:65:05:d0:f3:fb:48:c5:29:e4:c4:3e:4d:f8:8d:22
#
```

```
Fingerprint (SHA1): 79:aa:50:5e:dd:09:b3:21:e3:6d:57:91:0a:5d:f5:a9:fb:85:cc:57
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Code Signing Root E45"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\105\064\065
END
```

```
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\105\064\065
END
```

```
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\166\123\376\256\030\046\103\157\151\365\034\302\167\026
```

\362\136

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\042\060\202\001\251\240\003\002\001\002\002\020\166  
\123\376\256\030\046\103\157\151\365\034\302\167\026\362\136\060  
\012\006\010\052\206\110\316\075\004\003\003\060\123\061\013\060  
\011\006\003\125\004\006\023\002\102\105\061\031\060\027\006\003  
\125\004\012\023\020\107\154\157\142\141\154\123\151\147\156\040  
\156\166\055\163\141\061\051\060\047\006\003\125\004\003\023\040  
\107\154\157\142\141\154\123\151\147\156\040\103\157\144\145\040  
\123\151\147\156\151\156\147\040\122\157\157\164\040\105\064\065  
\060\036\027\015\062\060\060\063\061\070\060\060\060\060\060  
\132\027\015\064\065\060\063\061\070\060\060\060\060\060\132  
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061  
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154  
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003  
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040  
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157  
\164\040\105\064\065\060\166\060\020\006\007\052\206\110\316\075  
\002\001\006\005\053\201\004\000\042\003\142\000\004\166\031\155  
\003\265\365\204\043\253\062\152\056\141\335\204\045\057\357\350  
\171\047\211\203\303\203\165\363\266\170\152\010\155\242\255\041  
\052\002\220\006\354\232\100\234\172\206\221\271\130\205\310\050  
\232\056\013\367\342\166\251\337\262\275\251\303\351\051\031\171  
\010\262\120\320\302\305\235\012\141\014\343\135\067\006\112\134  
\376\204\275\300\200\204\372\113\125\043\340\342\076\243\102\060  
\100\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001  
\206\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\035\006\003\125\035\016\004\026\004\024\247\237\335  
\323\124\315\333\370\154\277\046\154\016\344\327\133\157\200\314  
\102\060\012\006\010\052\206\110\316\075\004\003\003\003\147\000  
\060\144\002\060\154\214\126\266\305\067\256\055\220\053\170\355  
\261\036\106\010\322\303\112\050\357\170\031\010\216\044\064\106  
\117\207\161\141\137\251\021\112\157\062\253\034\321\122\173\252  
\072\352\345\232\002\060\125\053\167\057\316\370\077\233\150\112  
\332\327\250\113\105\015\176\262\153\366\154\332\261\025\342\274  
\110\031\167\213\127\301\135\024\327\101\000\314\046\122\320\040  
\270\031\117\226\347\232

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GlobalSign Code Signing Root E45"

# Issuer: CN=GlobalSign Code Signing Root E45,O=GlobalSign nv-sa,C=BE

# Serial Number:76:53:fe:ae:18:26:43:6f:69:f5:1c:c2:77:16:f2:5e

```
Subject: CN=GlobalSign Code Signing Root E45,O=GlobalSign nv-sa,C=BE
Not Valid Before: Wed Mar 18 00:00:00 2020
Not Valid After: Sat Mar 18 00:00:00
2045
Fingerprint (MD5): 1c:65:05:d0:f3:fb:48:c5:29:e4:c4:3e:4d:f8:8d:22
Fingerprint (SHA1): 79:aa:50:5e:dd:09:b3:21:e3:6d:57:91:0a:5d:f5:a9:fb:85:cc:57
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Code Signing Root E45"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\171\252\120\136\335\011\263\041\343\155\127\221\012\135\365\251
\373\205\314\127
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\034\145\005\320\363\373\110\305\051\344\304\076\115\370\215\042
END
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\105\064\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\123\376\256\030\046\103\157\151\365\034\302\167\026
\362\136
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "GlobalSign Code Signing Root R45"
Issuer: CN=GlobalSign Code Signing Root R45,O=GlobalSign nv-sa,C=BE
Serial Number:76:53:fe:ac:75:46:48:93:f5:e5:d7:4a:48:3a:4e:f8
Subject: CN=GlobalSign Code Signing Root R45,O=GlobalSign nv-sa,C=BE
Not Valid Before: Wed Mar 18 00:00:00 2020
Not Valid After: Sat Mar 18 00:00:00 2045
Fingerprint (MD5): e9:4f:b5:48:71:20:8c:00:df:70:f7:08:ac:47:08:5b
Fingerprint (SHA1): 4e:fc:31:46:0c:61:9e:ca:e5:9c:1b:ce:2c:00:80:36:d9:4c:84:b8
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Code Signing Root R45"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\122\064\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\122\064\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\123\376\254\165\106\110\223\365\345\327\112\110\072
\116\370
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\162\060\202\003\132\240\003\002\001\002\002\020\166
\123\376\254\165\106\110\223\365\345\327\112\110\072\116\370\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\123
\061\013\060\011\006\003\125\004\006\023\002\102\105\061\031\060
\027\006\003\125\004\012\023\020\107\154\157\142\141\154\123\151
\147\156\040\156\166\055\163\141\061\051\060\047\006\003\125\004
\003\023\040\107\154\157\142\141\154\123\151\147\156\040\103\157
\144\145\040\123\151\147\156\151\156\147\040\122\157\157\164\040
\122\064\065\060\036\027\015\062\060\060\063\061\070\060\060\060
\060\060\060\132\027\015\064\065\060\063\061\070\060\060\060\060
\060\060\132\060\123\061\013\060\011\006\003\125\004\006\023\002
\102\105\061\031\060\027\006\003\125\004\012\023\020\107\154\157
\142\141\154\123\151\147\156\040\156\166\055\163\141\061\051\060
\047\006\003\125\004\003\023\040\107\154\157\142\141\154\123\151
\147\156\040\103\157\144\145\040\123\151\147\156\151\156\147\040
\122\157\157\164\040\122\064\065\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\266\055\305\060\335\172\350
\253\220\075\003\162\260\072\113\231\026\141\262\345\377\245\147
\035\067\034\345\176\354\223\203\252\204\365\243\103\233\230\105
\212\270\143\127\135\233\000\210\004\045\351\370\150\222\113\202
\330\113\311\112\003\363\250\177\152\217\212\141\047\275\241\104
```



\320\375\365\077\042\302\243\117\221\215\263\005\262\050\202\221  
\135\373\131\210\005\013\227\006\302\230\370\054\247\063\044\356  
\120\072\101\314\360\240\260\173\035\115\322\250\130\070\226\351  
\337\371\033\221\273\213\020\054\322\307\103\035\242\011\164\241  
\200\257\173\346\063\012\014\131\153\216\274\364\253\132\227\173  
\177\256\125\373\204\360\200\376\204\114\327\342\272\275\304\165  
\241\157\275\141\020\164\104\262\230\007\342\164\253\377\150\334  
\154\046\076\351\037\345\340\004\207\255\060\323\014\215\003\174  
\125\270\026\160\134\044\170\040\045\353\147\147\210\253\272\116  
\064\230\153\160\021\336\070\312\324\276\241\300\234\341\337\036  
\002\001\330\073\341\147\103\204\266\317\374\164\267\057\204\243  
\277\272\011\067\075\147\154\261\105\134\031\141\253\101\203\365  
\254\035\353\167\015\106\107\163\316\277\275\225\225\355\235\053  
\210\020\376\372\130\350\247\127\341\263\317\250\132\351\007\045  
\233\022\304\236\200\162\075\223\334\214\224\337\073\104\346\046  
\200\374\322\303\003\360\214\014\322\105\326\056\347\217\230\236  
\346\004\356\102\156\147\176\102\026\161\142\347\004\371\140\306  
\144\241\266\234\201\041\116\053\306\155\150\224\206\306\231\164  
\163\147\061\172\221\362\324\214\171\156\174\246\273\176\106\157  
\115\305\205\022\053\317\232\042\104\010\250\205\067\316\007\141  
\127\006\027\022\044\300\304\061\163\241\230\065\127\107\176\020  
\072\105\331\055\244\121\220\230\251\240\007\067\304\145\032\252  
\034\153\026\167\367\247\227\354\077\031\060\231\157\061\373\352  
\100\262\347\322\304\372\311\320\360\120\166\164\131\372\215\155  
\027\062\276\370\351\176\003\364\347\207\165\232\324\112\221\054  
\205\003\023\002\053\102\200\362\211\152\066\317\310\114\240\316  
\236\370\313\215\255\026\247\323\336\325\233\030\247\306\222\072  
\361\202\143\361\056\016\044\144\337\002\003\001\000\001\243\102  
\060\100\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\206\060\017\006\003\125\035\023\001\001\377\004\005\060\003  
\001\001\377\060\035\006\003\125\035\016\004\026\004\024\037\000  
\277\106\200\012\374\170\071\267\245\264\103\331\126\120\273\316  
\226\073\060\015\006\011\052\206\110\206\367\015\001\001\014\005  
\000\003\202\002\001\000\136\053\272\164\227\064\104\137\166\110  
\050\100\204\223\356\001\156\351\241\263\326\200\045\346\173\344  
\274\011\221\075\017\374\166\255\327\324\060\040\273\217\140\320  
\221\326\034\362\234\357\170\032\053\224\062\002\301\044\226\122  
\122\002\320\363\321\374\362\233\071\156\231\341\037\216\103\101  
\175\232\036\133\311\135\232\204\374\046\346\207\363\164\162\046  
\255\244\033\331\075\073\152\122\240\074\011\036\057\036\173\263  
\063\264\105\307\367\254\261\257\223\140\255\166\256\270\262\025  
\170\353\203\152\353\377\333\106\253\044\345\356\002\372\220\037  
\131\300\057\135\326\267\135\244\134\020\267\162\123\370\101\116  
\314\372\170\032\045\112\312\376\205\142\103\141\303\264\067\252  
\201\322\364\326\072\017\275\215\131\176\060\107\336\053\153\347  
\041\120\063\137\324\147\233\324\270\147\237\074\047\231\003\377  
\205\103\216\163\022\312\040\315\350\141\325\261\146\334\027\326  
\071\155\017\333\317\043\067\241\202\211\116\034\153\077\326\240

```
\315\252\007\235\076\102\046\252\327\014\356\372\107\277\032\122
\176\321\165\201\323\311\212\142\027\155\117\210\240\041\240\046
\076\257\155\331\142\060\037\351\230\050\256\156\215\325\216\114
\162\146\223\200\215\052\343\125\307\140\147\220\102\126\134\042
\121\017\263\334\116\071\356\115\335\331\035\170\020\124\073\156
\320\227\157\003\265\036\262\043\163\306\022\262\232\144\320\374
\225\205\044\250\377\337\241\260\334\221\100\256\337\011\063\253
\271\335\222\267\361\314\221\164\073\151\353\147\227\033\220\277
\347\307\240\157\161\273\127\277\267\217\132\355\172\100\152\026
\315\200\204\055\057\341\002\324\044\224\103\263\025\374\014\053
\033\375\161\157\374\313\274\165\027\072\136\203\322\311\263\057
\033\325\234\215\177\124\376\176\176\344\126\243\207\247\235\341
\131\122\224\101\217\155\133\276\206\225\232\377\032\166\335\100
\322\121\112\160\264\037\063\143\043\167\077\354\047\036\131\344
\010\207\355\064\202\112\017\077\376\240\035\301\365\147\163\105
\206\170\364\252\051\351\047\207\306\031\333\306\023\024\303\071
\111\207\115\240\227\340\145\023\365\235\167\126\351\332\263\130
\307\072\362\300\315\202
```

END

CKA\_NSS\_Mozilla\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "GlobalSign Code Signing Root R45"

# Issuer: CN=GlobalSign Code Signing Root R45,O=GlobalSign nv-sa,C=BE

# Serial Number:76:53:fe:ac:75:46:48:93:f5:e5:d7:4a:48:3a:4e:f8

#

Subject: CN=GlobalSign Code Signing Root R45,O=GlobalSign nv-sa,C=BE

# Not Valid Before: Wed Mar 18 00:00:00 2020

# Not Valid After: Sat Mar 18 00:00:00 2045

# Fingerprint (MD5): e9:4f:b5:48:71:20:8c:00:df:70:f7:08:ac:47:08:5b

# Fingerprint (SHA1): 4e:fc:31:46:0c:61:9e:ca:e5:9c:1b:ce:2c:00:80:36:d9:4c:84:b8

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "GlobalSign Code Signing Root R45"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\116\374\061\106\014\141\236\312\345\234\033\316\054\000\200\066
\331\114\204\270
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\351\117\265\110\161\040\214\000\337\160\367\010\254\107\010\133
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
```

```
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\122\064\065
```

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

```
\002\020\166\123\376\254\165\106\110\223\365\345\327\112\110\072
\116\370
```

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "DigiCert CS ECC P384 Root G5"

# Issuer: CN=DigiCert CS ECC P384 Root G5,O=DigiCert\, Inc.,C=US

# Serial Number:03:69:8f:e7:12:d5:19:f3:ce:d0:fd:b7:b1:64:30:11

# Subject: CN=DigiCert CS ECC P384 Root G5,O=DigiCert\, Inc.,C=US

# Not Valid Before: Fri Jan 15 00:00:00 2021

# Not Valid After: Sun Jan 14 23:59:59 2046

# Fingerprint (MD5): dd:b4:30:09:e8:67:1f:45:a0:80:ec:9d:d9:b1:a1:54

# Fingerprint (SHA1): 84:35:73:11:2a:3b:31:93:44:e5:e4:ec:ab:c9:f2:6c:7c:d5:4d:07

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert CS ECC P384 Root G5"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\103\123\040\105
\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\103\123\040\105
\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\020\003\151\217\347\022\325\031\363\316\320\375\267\261\144  
\060\021

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\002\026\060\202\001\235\240\003\002\001\002\002\020\003  
\151\217\347\022\325\031\363\316\320\375\267\261\144\060\021\060  
\012\006\010\052\206\110\316\075\004\003\003\060\115\061\013\060  
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003  
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111  
\156\143\056\061\045\060\043\006\003\125\004\003\023\034\104\151  
\147\151\103\145\162\164\040\103\123\040\105\103\103\040\120\063  
\070\064\040\122\157\157\164\040\107\065\060\036\027\015\062\061  
\060\061\061\065\060\060\060\060\060\060\132\027\015\064\066\060  
\061\061\064\062\063\065\071\065\071\132\060\115\061\013\060\011  
\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003\125  
\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111\156  
\143\056\061\045\060\043\006\003\125\004\003\023\034\104\151\147  
\151\103\145\162\164\040\103\123\040\105\103\103\040\120\063\070  
\064\040\122\157\157\164\040\107\065\060\166\060\020\006\007\052  
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000  
\004\177\024\255\205\266\227\375\002\041\065\115\140\350\070\223  
\223\233\075\005\020\155\257\323\376\357\372\273\373\163\231\363  
\354\062\022\215\307\150\270\213\336\211\242\210\124\167\215\273  
\041\176\063\225\126\226\011\350\325\214\241\004\270\233\156\031  
\000\142\350\102\050\246\130\067\204\031\125\046\173\063\067\147  
\362\232\162\255\241\256\256\000\102\074\034\176\270\172\236\041  
\234\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024  
\360\214\230\161\071\070\145\302\072\033\246\027\146\035\310\355  
\145\336\222\066\060\016\006\003\125\035\017\001\001\377\004\004  
\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005  
\060\003\001\001\377\060\012\006\010\052\206\110\316\075\004\003  
\003\003\147\000\060\144\002\060\043\157\341\000\031\046\120\344  
\106\040\145\213\067\247\317\353\006\341\314\062\311\052\241\354  
\062\015\163\242\036\002\034\065\141\052\116\151\253\071\167\355  
\227\210\300\175\153\352\211\335\002\060\103\361\321\130\243\165  
\076\206\233\266\125\021\213\027\367\075\376\012\151\305\177\116  
\306\165\033\132\224\313\352\021\021\306\010\042\210\336\320\172  
\242\245\171\350\343\041\247\315\023\263

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "DigiCert CS ECC P384 Root G5"

# Issuer: CN=DigiCert CS ECC P384 Root G5,O=DigiCert, Inc.,C=US

```

Serial Number:03:69:8f:e7:12:d5:19:f3:ce:d0:fd:b7:b1:64:30:11
Subject: CN=DigiCert CS ECC P384 Root G5,O=DigiCert\, Inc.,C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After: Sun Jan 14 23:59:59 2046
Fingerprint (MD5): dd:b4:30:09:e8:67:1f:45:a0:80:ec:9d:d9:b1:a1:54
Fingerprint (SHA1): 84:35:73:11:2a:3b:31:93:44:e5:e4:ec:ab:c9:f2:6c:7c:d5:4d:07
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert CS ECC P384 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\204\065\163\021\052\073\061\223\104\345\344\354\253\311\362\154
\174\325\115\007
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\335\264\060\011\350\147\037\105\240\200\354\235\331\261\241\124
END
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\103\123\040\105
\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\003\151\217\347\022\325\031\363\316\320\375\267\261\144
\060\021
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing
 Only Certificate
Certificate "DigiCert CS RSA4096 Root G5"
Issuer: CN=DigiCert CS RSA4096 Root G5,O=DigiCert\, Inc.,C=US
Serial Number:06:ce:e1:31:be:6d:55:c8:07:f7:c0:c7:fb:44:e6:20
Subject: CN=DigiCert CS RSA4096 Root G5,O=DigiCert\, Inc.,C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After: Sun Jan 14 23:59:59 2046
Fingerprint (MD5): a7:33:ed:bf:1b:5d:e1:19:c4:91:c9:4a:ea:f7:6d:c7
Fingerprint (SHA1): 5e:ee:d8:6f:a3:7c:67:52:30:64:2f:55:c8:4d:db:f6:7c:d3:3c:80
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert CS RSA4096 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\044\060\042\006\003\125\004
\003\023\033\104\151\147\151\103\145\162\164\040\103\123\040\122
\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\044\060\042\006\003\125\004
\003\023\033\104\151\147\151\103\145\162\164\040\103\123\040\122
\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\006\316\341\061\276\155\125\310\007\367\300\307\373\104
\346\040
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\144\060\202\003\114\240\003\002\001\002\002\020\006
\316\341\061\276\155\125\310\007\367\300\307\373\104\346\040\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\114
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\023
\033\104\151\147\151\103\145\162\164\040\103\123\040\122\123\101
\064\060\071\066\040\122\157\157\164\040\107\065\060\036\027\015
\062\061\060\061\061\065\060\060\060\060\060\060\132\027\015\064
\066\060\061\061\064\062\063\065\071\065\071\132\060\114\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006
\003\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040
\111\156\143\056\061\044\060\042\006\003\125\004\003\023\033\104
\151\147\151\103\145\162\164\040\103\123\040\122\123\101\064\060
\071\066\040\122\157\157\164\040\107\065\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\266\063\163\200\330
\142\003\160\024\054\021\034\071\136\174\256\174\203\206\035\376
\046\057\114\044\255\213\352\203\137\251\274\075\133\374\013\230
\114\002\107\060\354\342\376\354\350\064\133\146\136\277\073\327
\054\246\045\377\214\131\263\337\352\332\174\051\331\106\120\162
\010\035\156\321\033\012\335\037\315\231\211\372\017\017\163\304
\341\234\035\165\062\315\157\227\332\052\152\225\262\154\311\011
\320\352\013\173\175\027\006\111\231\357\326\336\340\310\123\324
```

\256\306\167\361\206\273\043\034\270\300\337\131\367\216\175\321  
\357\202\346\046\213\132\070\265\377\165\325\262\331\117\011\363  
\067\210\120\332\021\244\212\024\024\321\123\004\000\175\363\152  
\104\030\376\120\160\062\007\034\250\232\016\072\035\305\012\037  
\156\013\046\151\267\074\242\127\160\054\206\372\114\156\225\251  
\130\103\271\254\022\326\377\077\355\327\103\027\153\114\316\236  
\304\220\253\377\372\020\120\232\243\220\127\326\347\214\020\256  
\237\026\032\317\065\035\177\327\166\355\212\234\065\247\050\270  
\247\135\041\374\060\067\335\336\010\031\117\025\306\347\246\332  
\220\107\216\367\224\123\114\216\123\002\276\375\231\345\352\206  
\320\257\003\002\323\233\252\223\361\253\050\216\040\001\377\114  
\373\314\267\051\100\365\207\244\022\023\005\037\103\156\327\121  
\120\237\070\264\040\355\027\011\022\217\314\271\031\257\237\315  
\276\151\021\323\257\125\020\155\027\206\171\226\122\306\262\000  
\235\345\257\070\260\065\364\210\153\217\016\004\075\174\356\257  
\315\323\152\020\112\306\315\206\312\042\075\241\112\134\373\016  
\377\210\337\134\142\247\300\271\036\331\254\154\176\070\067\376  
\167\223\045\302\205\212\117\265\067\006\132\006\201\024\361\316  
\224\235\231\221\352\062\132\316\147\075\156\004\146\255\014\117  
\055\243\056\367\236\365\170\235\367\012\375\176\217\343\102\212  
\125\226\274\361\237\067\055\374\236\137\225\376\214\030\033\374  
\216\375\113\220\257\327\003\150\022\143\254\342\223\247\242\313  
\004\345\117\144\316\003\372\306\024\237\331\213\350\314\324\142  
\214\153\344\000\054\031\237\032\006\306\061\201\124\373\123\044  
\232\257\125\231\272\235\165\256\270\302\335\002\003\001\000\001  
\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024\150  
\001\223\261\322\112\100\102\151\224\106\054\034\132\210\251\045  
\264\107\117\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005\060  
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001  
\014\005\000\003\202\002\001\000\222\374\356\270\002\171\027\002  
\121\175\041\305\111\147\247\244\361\250\044\070\353\014\150\352  
\132\102\153\234\364\163\301\151\112\055\263\067\005\120\102\230  
\222\236\006\171\054\056\006\231\366\357\337\053\240\315\263\222  
\001\203\265\240\313\047\265\074\043\032\230\111\242\354\055\231  
\245\131\103\254\322\261\223\326\127\327\034\274\223\326\306\100  
\341\263\157\031\125\267\023\327\345\103\063\244\265\253\313\332  
\301\061\144\015\164\326\054\355\303\215\156\353\273\257\031\107  
\141\141\055\300\364\005\271\157\170\334\072\367\102\100\145\123  
\221\275\231\015\223\222\124\246\251\067\131\053\233\313\231\306  
\274\075\367\004\204\360\224\063\035\017\202\132\071\313\056\105  
\303\050\031\243\262\233\230\310\374\061\153\140\217\366\351\206  
\050\274\340\074\175\164\135\026\211\133\151\044\307\020\213\304  
\113\273\066\117\324\131\077\303\260\244\221\231\370\056\321\112  
\001\235\365\210\022\357\277\132\021\152\131\117\131\153\132\147  
\363\217\264\023\017\300\330\057\075\050\162\252\031\177\021\175  
\152\133\237\225\347\137\267\224\117\361\076\241\132\377\055\314  
\235\337\047\167\217\062\163\034\147\012\166\363\372\134\261\277

```
\274\035\275\014\050\233\262\307\027\147\013\063\017\303\275\066
\334\373\272\102\013\253\355\204\303\142\326\204\026\251\261\007
\153\251\156\356\306\317\346\260\104\051\302\360\263\141\200\052
\213\157\322\024\134\045\207\124\144\363\244\114\301\241\370\247
\153\352\376\352\072\374\171\333\016\217\334\306\363\311\324\154
\336\351\203\241\216\035\042\354\311\072\262\000\173\334\073\247
\102\032\177\334\213\251\021\075\216\247\300\040\157\135\011\135
\103\104\346\217\146\314\251\133\007\361\357\233\172\016\263\124
\341\224\375\016\054\306\223\327\125\375\161\230\065\270\011\112
\377\306\051\050\054\366\122\055\333\024\030\222\047\342\026\176
\214\312\324\141\276\202\207\221\353\230\067\077\277\137\135\167
\077\064\254\033\070\103\253\150\162\231\062\036\072\032\031\245
\243\070\114\043\327\243\347\314\325\052\222\027\220\013\132\113
\275\026\275\373\206\152\342\211\231\354\344\240\125\030\311\243
\010\037\023\340\062\010\162\320
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "DigiCert CS RSA4096 Root G5"

# Issuer: CN=DigiCert CS RSA4096 Root G5,O=DigiCert, Inc.,C=US

# Serial Number:06:ce:e1:31:be:6d:55:c8:07:f7:c0:c7:fb:44:e6:20

# Subject: CN=DigiCert CS RSA4096 Root G5,O=DigiCert, Inc.,C=US

# Not Valid Before: Fri Jan 15 00:00:00 2021

# Not Valid After: Sun Jan 14 23:59:59 2046

# Fingerprint (MD5): a7:33:ed:bf:1b:5d:e1:19:c4:91:c9:4a:ea:f7:6d:c7

# Fingerprint (SHA1): 5e:ee:d8:6f:a3:7c:67:52:30:64:2f:55:c8:4d:db:f6:7c:d3:3c:80

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL

UTF8 "DigiCert CS RSA4096 Root G5"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\136\356\330\157\243\174\147\122\060\144\057\125\310\115\333\366
\174\323\074\200
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\247\063\355\277\033\135\341\031\304\221\311\112\352\367\155\307
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\114\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\044\060\042\006\003\125\004
\003\023\033\104\151\147\151\103\145\162\164\040\103\123\040\122
```



```

\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\006\316\341\061\276\155\125\310\007\367\300\307\373\104
\346\040
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "DigiCert
 RSA4096 Root G5"
Issuer: CN=DigiCert RSA4096 Root G5,O=DigiCert\, Inc.,C=US
Serial Number:08:bf:a2:6f:9a:3f:33:65:a2:ac:f0:a6:38:c4:01:70
Subject: CN=DigiCert RSA4096 Root G5,O=DigiCert\, Inc.,C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After: Sun Jan 14 23:59:59 2046
Fingerprint (MD5): 26:18:9c:6e:60:22:79:b6:8d:0f:65:4c:99:17:56:12
Fingerprint (SHA1): 87:b8:e6:d3:8f:1a:39:cd:97:f0:4a:9e:17:4b:3c:9e:e7:ee:11:15
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert RSA4096 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\041\060\037\006\003\125\004
\003\023\030\104\151\147\151\103\145\162\164\040\122\123\101\064
\060\071\066\040\122\157\157\164\040\107\065
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\041\060\037\006\003\125\004
\003\023\030\104\151\147\151\103\145\162\164\040\122\123\101\064
\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\277\242\157\232\077\063\145\242\254\360\246\070\304
\001\160
END
CKA_VALUE MULTILINE_OCTAL

```

\060\202\005\136\060\202\003\106\240\003\002\001\002\002\020\010  
\277\242\157\232\077\063\145\242\254\360\246\070\304\001\160\060  
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\111  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060  
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164  
\054\040\111\156\143\056\061\041\060\037\006\003\125\004\003\023  
\030\104\151\147\151\103\145\162\164\040\122\123\101\064\060\071  
\066\040\122\157\157\164\040\107\065\060\036\027\015\062\061\060  
\061\061\065\060\060\060\060\060\060\132\027\015\064\066\060\061  
\061\064\062\063\065\071\065\071\132\060\111\061\013\060\011\006  
\003\125\004\006\023\002\125\123\061\027\060\025\006\003\125\004  
\012\023\016\104\151\147\151\103\145\162\164\054\040\111\156\143  
\056\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151  
\103\145\162\164\040\122\123\101\064\060\071\066\040\122\157\157  
\164\040\107\065\060\202\002\042\060\015\006\011\052\206\110\206  
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012  
\002\202\002\001\000\252\276\015\262\006\175\046\371\107\352\344  
\033\347\102\151\270\231\302\271\356\044\261\106\220\313\131\044  
\122\124\065\246\044\302\137\221\031\310\266\102\326\363\107\145  
\225\144\347\205\145\147\251\256\174\000\117\340\170\003\120\255  
\363\177\216\270\021\347\201\142\261\213\337\362\111\046\011\336  
\017\026\274\332\050\233\241\310\227\057\223\220\332\040\052\343  
\204\324\377\251\236\260\055\277\264\000\336\233\037\310\240\143  
\123\150\205\157\115\205\306\252\143\371\215\262\065\166\142\164  
\003\334\223\230\150\005\236\315\220\145\335\322\172\061\253\044  
\055\155\100\056\220\077\143\154\054\353\372\036\200\124\215\171  
\002\220\024\263\265\117\116\365\210\004\103\200\303\110\263\046  
\057\254\121\225\062\125\045\057\101\226\260\126\241\010\073\334  
\230\037\162\205\054\167\312\230\314\070\373\216\162\311\155\354  
\005\354\355\115\267\074\133\024\120\205\335\227\373\131\367\220  
\022\364\023\277\203\115\200\262\025\145\021\227\140\345\326\134  
\346\004\265\120\346\161\063\266\040\223\251\150\000\070\316\111  
\333\264\134\073\162\327\105\134\124\277\315\074\001\043\036\174  
\326\370\151\054\245\000\012\154\062\110\264\336\160\055\072\023  
\027\301\177\144\313\363\060\355\241\075\226\147\361\224\265\140  
\154\133\151\150\365\202\063\011\242\266\331\363\205\262\156\240  
\224\360\302\304\175\241\054\312\163\365\256\340\122\234\242\146  
\346\003\316\352\337\355\030\324\271\143\213\367\350\377\373\263  
\133\217\103\305\257\267\164\224\120\065\145\256\326\057\361\205  
\217\123\241\160\364\215\062\135\274\226\303\036\302\004\004\234  
\004\017\263\135\176\211\040\312\136\047\015\211\112\022\043\264  
\366\304\335\330\037\370\150\263\066\370\036\274\306\367\204\266  
\350\212\116\210\060\070\300\046\330\160\012\011\072\064\016\153  
\202\022\226\034\057\346\236\255\330\161\065\201\261\214\006\156  
\364\156\146\377\113\112\256\275\360\376\327\134\137\123\273\062  
\074\315\142\321\024\240\051\037\020\336\251\162\117\261\255\144  
\345\203\052\217\213\352\204\225\356\230\045\230\232\263\161\074  
\301\247\120\362\254\102\142\061\302\241\220\306\356\342\267\212

\250\265\266\033\073\002\003\001\000\001\243\102\060\100\060\035  
\006\003\125\035\016\004\026\004\024\142\155\267\221\117\304\352  
\243\142\140\217\240\320\276\265\217\006\174\150\000\060\016\006  
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017\006  
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\015  
\006\011\052\206\110\206\367\015\001\001\014\005\000\003\202\002  
\001\000\141\350\373\047\155\326\342\270\263\011\257\252\360\261  
\202\114\376\075\027\211\115\055\025\235\373\356\320\273\204\354  
\204\165\333\103\023\336\214\237\307\051\357\207\164\313\023\160  
\201\126\000\164\374\256\364\331\072\336\042\010\121\245\240\134  
\202\146\266\173\114\251\332\217\253\254\034\101\226\146\326\235  
\336\126\346\277\116\261\262\136\137\300\303\156\324\302\204\220  
\365\175\261\272\026\321\051\212\310\235\351\317\320\307\031\073  
\077\317\356\367\341\063\256\102\310\230\300\010\236\363\132\363  
\337\324\053\073\216\250\050\126\031\307\116\167\074\045\124\334  
\270\110\110\321\371\047\152\076\354\023\257\262\005\211\375\125  
\137\363\175\216\015\234\011\135\054\212\176\205\316\370\341\277  
\021\075\062\214\132\327\176\075\364\063\130\317\242\005\230\243  
\263\373\316\211\277\375\302\026\335\156\334\210\111\015\013\240  
\003\377\347\105\351\004\301\351\375\252\235\165\370\270\037\207  
\203\331\353\071\323\132\247\313\230\254\023\211\000\374\157\225  
\116\341\175\021\106\155\366\070\106\243\023\240\054\001\365\142  
\317\277\034\120\221\047\164\135\267\354\107\174\320\321\165\313  
\173\356\321\115\043\012\303\140\245\167\055\200\332\147\017\216  
\153\166\007\360\246\017\352\204\256\036\171\277\010\212\332\011  
\363\364\356\265\066\363\324\172\103\272\224\065\341\372\301\073  
\033\226\231\244\127\143\353\265\250\202\367\255\370\167\327\166  
\206\363\166\123\126\133\374\046\102\204\316\237\203\221\221\257  
\364\276\160\025\200\245\330\350\151\261\330\221\124\270\031\262  
\142\371\242\372\125\355\004\277\271\104\206\344\317\361\233\000  
\277\021\017\276\265\164\044\121\377\167\064\143\354\110\043\016  
\350\021\353\167\155\332\312\202\221\276\244\204\223\114\332\241  
\376\314\006\204\350\041\350\124\272\346\323\035\143\075\302\132  
\374\346\311\203\236\162\144\251\206\131\000\214\302\367\023\203  
\266\320\244\061\306\254\221\216\173\244\042\126\023\306\165\307  
\043\274\213\133\374\106\075\376\135\122\051\257\257\350\311\303  
\166\113\350\253\107\002\362\232\015\323\054\210\200\007\206\300  
\143\017\002\114\216\004\123\166\271\130\102\157\174\051\160\135  
\277\047

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "DigiCert RSA4096 Root G5"

# Issuer: CN=DigiCert RSA4096 Root G5,O=DigiCert, Inc.,C=US

```
Serial Number:08:bf:a2:6f:9a:3f:33:65:a2:ac:f0:a6:38:c4:01:70
Subject: CN=DigiCert RSA4096 Root G5,O=DigiCert\, Inc.,C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After: Sun Jan 14 23:59:59 2046
Fingerprint (MD5): 26:18:9c:6e:60:22:79:b6:8d:0f:65:4c:99:17:56:12
Fingerprint (SHA1): 87:b8:e6:d3:8f:1a:39:cd:97:f0:4a:9e:17:4b:3c:9e:e7:ee:11:15
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert RSA4096 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\207\270\346\323\217\032\071\315\227\360\112\236\027\113\074\236
\347\356\021\025
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\046\030\234\156\140\042\171\266\215\017\145\114\231\027\126\022
END
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\041\060\037\006\003\125\004
\003\023\030\104\151\147\151\103\145\162\164\040\122\123\101\064
\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\277\242\157\232\077\063\145\242\254\360\246\070\304
\001\160
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
Microsoft Code Signing Only Certificate
Certificate "DigiCert ECC P384 Root G5"
Issuer: CN=DigiCert ECC P384 Root G5,O=DigiCert\, Inc.,C=US
Serial Number:0d:f3:d9:37:65:a3:79:c5:95:66:ea:92:e2:24:4f:34
#
Subject: CN=DigiCert ECC P384 Root G5,O=DigiCert\, Inc.,C=US
Not Valid Before: Fri Jan 15 00:00:00 2021
Not Valid After: Sun Jan 14 23:59:59 2046
Fingerprint (MD5): 11:7f:85:ae:47:1f:51:61:6e:06:94:1e:6a:43:08:0b
Fingerprint (SHA1): d1:ee:b1:e8:c0:90:20:ba:b8:5d:3d:e2:7f:78:ee:33:a0:6c:ae:db
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert ECC P384 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\042\060\040\006\003\125\004
\003\023\031\104\151\147\151\103\145\162\164\040\105\103\103\040
\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\042\060\040\006\003\125\004
\003\023\031\104\151\147\151\103\145\162\164\040\105\103\103\040
\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\015\363\331\067\145\243\171\305\225\146\352\222\342\044
\117\064
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\021\060\202\001\227\240\003\002\001\002\002\020\015
\363\331\067\145\243\171\305\225\146\352\222\342\044\117\064\060
\012\006\010\052\206\110\316\075\004\003\003\060\112\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111
\156\143\056\061\042\060\040\006\003\125\004\003\023\031\104\151
\147\151\103\145\162\164\040\105\103\103\040\120\063\070\064\040
\122\157\157\164\040\107\065\060\036\027\015\062\061\060\061\061
\065\060\060\060\060\060\060\132\027\015\064\066\060\061\061\064
\062\063\065\071\065\071\132\060\112\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\027\060\025\006\003\125\004\012\023
\016\104\151\147\151\103\145\162\164\054\040\111\156\143\056\061
\042\060\040\006\003\125\004\003\023\031\104\151\147\151\103\145
\162\164\040\105\103\103\040\120\063\070\064\040\122\157\157\164
\040\107\065\060\166\060\020\006\007\052\206\110\316\075\002\001
\006\005\053\201\004\000\042\003\142\000\004\374\131\037\316\231
\154\177\233\016\266\051\143\157\306\205\363\012\323\326\233\256
\127\025\114\016\355\135\343\011\176\155\052\243\206\252\272\170
\240\247\161\275\104\372\010\300\112\006\326\157\335\054\112\070
\164\345\320\275\377\172\377\345\071\116\275\275\027\036\037\103
\255\325\274\047\330\113\277\166\214\060\062\244\373\371\123\345
\330\252\070\123\135\250\240\067\240\147\012\243\102\060\100\060
\035\006\003\125\035\016\004\026\004\024\222\226\367\346\272\325
\021\272\371\042\056\173\176\132\331\360\045\345\005\033\060\016
```

```
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060\145
\002\061\000\375\300\115\361\244\247\333\247\014\046\021\364\111
\275\007\070\143\053\104\142\006\171\010\307\303\324\317\233\076
\253\072\047\252\220\307\375\131\242\270\062\122\333\312\216\027
\013\012\220\002\060\135\032\354\121\211\324\144\334\371\345\036
\070\275\133\056\343\345\104\344\073\030\172\327\360\225\100\217
\362\353\317\364\371\320\145\242\101\362\260\346\174\301\066\054
\217\136\071\335\067
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "DigiCert ECC P384 Root G5"

# Issuer: CN=DigiCert ECC P384 Root G5,O=DigiCert, Inc.,C=US

# Serial Number:0d:f3:d9:37:65:a3:79:c5:95:66:ea:92:e2:24:4f:34

# Subject: CN=DigiCert ECC P384 Root G5,O=DigiCert, Inc.,C=US

# Not Valid Before: Fri

Jan 15 00:00:00 2021

# Not Valid After: Sun Jan 14 23:59:59 2046

# Fingerprint (MD5): 11:7f:85:ae:47:1f:51:61:6e:06:94:1e:6a:43:08:0b

# Fingerprint (SHA1): d1:ee:b1:e8:c0:90:20:ba:b8:5d:3d:e2:7f:78:ee:33:a0:6c:ae:db

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "DigiCert ECC P384 Root G5"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\321\356\261\350\300\220\040\272\270\135\075\342\177\170\356\063
\240\154\256\333
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\021\177\205\256\107\037\121\141\156\006\224\036\152\103\010\013
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\042\060\040\006\003\125\004
\003\023\031\104\151\147\151\103\145\162\164\040\105\103\103\040
\120\063\070\064\040\122\157\157\164\040\107\065
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\020\015\363\331\067\145\243\171\305\225\146\352\222\342\044
\117\064
```

```

END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "HARICA Code Signing RSA Root CA 2021"
Issuer: CN=HARICA Code Signing RSA Root CA 2021,O=Hellenic Academic and Research Institutions
CA,C=GR
Serial Number:15:c2:ae:2a:4d:99:9a:63:8c:d3:ba:13:19:76:08:f5
Subject: CN=HARICA Code Signing RSA Root CA 2021,O=Hellenic Academic and Research Institutions
CA,C=GR
Not Valid Before: Fri Feb 19 10:59:54 2021
Not Valid After: Mon Feb 13 10:59:53 2045
Fingerprint (MD5): 00:5d:c9:e3:b2:c0:90:e0:61:9a:42:c0:29:a1:6b:ba
Fingerprint (SHA1): 8d:de:b8:20:46:b6:22:7c:79:24:6a:3e:ad:7b:32:c3:e8:8f:fc:ac
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Code Signing RSA Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\123\101\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\123\101\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER

```

MULTILINE\_OCTAL

\002\020\025\302\256\052\115\231\232\143\214\323\272\023\031\166  
\010\365

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\005\266\060\202\003\236\240\003\002\001\002\002\020\025  
\302\256\052\115\231\232\143\214\323\272\023\031\166\010\365\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\165  
\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067\060  
\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151\143  
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145  
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151  
\157\156\163\040\103\101\061\055\060\053\006\003\125\004\003\014  
\044\110\101\122\111\103\101\040\103\157\144\145\040\123\151\147  
\156\151\156\147\040\122\123\101\040\122\157\157\164\040\103\101  
\040\062\060\062\061\060\036\027\015\062\061\060\062\061\071\061  
\060\065\071\065\064\132\027\015\064\065\060\062\061\063\061\060  
\065\071\065\063\132\060\165\061\013\060\011\006\003\125\004\006  
\023\002\107\122\061\067\060\065\006\003\125\004\012\014\056\110  
\145\154\154\145\156\151\143\040\101\143\141\144\145\155\151\143  
\040\141\156\144\040\122\145\163\145\141\162\143\150\040\111\156  
\163\164\151\164\165\164\151\157\156\163\040\103\101\061\055\060  
\053\006\003\125\004\003\014\044\110\101\122\111\103\101\040\103  
\157\144\145\040\123\151\147\156\151\156\147\040\122\123\101\040  
\122\157\157\164\040\103\101\040\062\060\062\061\060\202\002\042  
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003  
\202\002\017\000\060\202\002\012\002\202\002\001\000\212\152\356  
\252\012\043\125\014\213\006\102\343\225\133\124\170\137\305\216  
\006\054\174\074\061\276\257\015\251\241\354\112\040\130\005\235  
\342\150\262\273\353\137\177\052\063\271\362\125\234\157\252\244  
\036\355\020\276\203\051\021\066\346\236\077\372\155\173\121\341  
\325\167\245\275\313\151\016\073\042\040\224\014\061\145\100\015  
\011\257\020\065\172\233\352\171\010\104\244\213\147\251\053\115  
\301\347\320\327\247\366\265\072\215\331\243\251\171\270\244\145  
\134\274\363\076\367\237\231\366\270\303\145\150\055\253\203\056  
\335\205\231\004\251\365\321\134\325\121\102\001\271\237\101\265  
\113\042\262\000\364\313\147\020\357\151\304\020\255\372\224\006  
\166\120\022\127\202\256\305\024\255\074\175\273\235\361\163\341  
\174\360\256\161\336\133\367\022\335\367\200\361\334\076\361\140  
\272\311\031\227\157\165\164\205\114\375\071\103\303\144\156\064  
\254\023\301\034\145\266\122\102\361\106\353\057\372\135\246\317  
\016\111\235\367\164\174\170\015\006\072\054\022\373\342\113\046  
\344\157\213\041\201\063\102\071\023\350\102\253\133\125\324\033  
\273\067\266\022\221\367\363\175\274\322\377\354\261\303\325\240  
\314\262\053\307\217\135\176\114\122\102\110\373\217\375\132\220  
\163\020\325\251\162\124\215\111\333\070\122\252\106\110\016\057  
\372\000\054\314\163\014\066\113\044\316\023\154\246\244\244\243  
\326\174\233\351\070\013\306\044\333\115\254\147\041\111\133\101



\067\144\346\140\153\037\355\052\057\140\031\060\036\330\074\234  
\031\103\207\337\300\012\364\344\312\140\210\172\326\243\271\344  
\045\056\171\342\376\301\313\074\267\367\317\116\130\114\373\303  
\255\253\175\252\312\210\373\016\070\015\037\236\134\071\353\270  
\007\304\120\042\115\370\205\177\156\354\214\372\266\161\115\336  
\175\226\151\304\335\076\036\336\046\220\012\054\115\025\225\251  
\242\076\334\075\016\167\174\215\101\050\117\270\203\121\276\076  
\267\217\220\072\160\061\211\132\372\223\123\374\140\311\215\165  
\220\356\132\057\035\204\237\000\251\346\303\206\043\242\036\335  
\022\343\241\106\140\033\147\277\120\025\042\222\174\112\264\214  
\217\156\234\225\302\054\334\073\072\040\266\274\213\002\003\001  
\000\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377  
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026  
\004\024\264\144\026\110\350\374\132\113\063\051\211\353\231\100  
\271\040\264\366\141\032\060\016\006\003\125\035\017\001\001\377  
\004\004\003\002\001\206\060\015\006\011\052\206\110\206\367\015  
\001\001\013\005\000\003\202\002\001\000\053\254\131\213\346\071  
\104\334\373\255\112\210\340\144\377\253\303\362\322\316\160\057  
\003\345\157\262\304\365\066\326\123\153\207\253\035\213\231\007  
\310\060\216\107\162\375\241\270\165\326\027\241\026\275\144\163  
\221\060\127\255\175\375\005\100\206\223\321\111\226\262\013\324  
\174\144\023\213\323\041\111\070\273\373\350\314\076\061\361\256  
\173\114\052\337\202\006\243\216\005\204\234\177\160\316\300\273  
\105\027\337\135\145\014\344\120\110\007\104\213\244\057\126\332  
\306\172\366\140\215\244\070\361\235\207\026\060\262\360\137\172  
\102\125\040\161\317\314\356\000\261\022\107\277\102\271\344\263  
\265\035\031\204\271\230\155\340\151\264\025\101\265\342\120\110  
\307\037\352\232\267\171\221\335\325\325\123\031\374\256\030\154  
\151\333\255\131\050\233\144\230\247\074\307\125\216\321\060\000  
\317\324\062\236\142\261\303\052\356\065\042\306\273\360\174\273  
\203\270\000\211\365\334\032\227\331\070\232\051\123\141\031\246  
\247\364\073\107\375\335\147\225\017\216\244\146\054\202\232\267  
\055\161\346\337\256\370\370\150\301\273\017\352\120\240\105\227  
\267\032\225\022\157\310\263\266\005\150\332\152\036\016\065\205  
\204\254\164\014\212\264\364\165\237\042\257\260\124\273\266\236  
\042\371\331\353\325\212\015\307\334\370\230\061\137\236\372\306  
\227\364\101\020\165\323\201\266\061\137\172\335\210\205\010\257  
\160\107\002\067\173\342\112\354\135\362\335\051\022\104\310\212  
\252\335\322\125\170\027\165\257\161\151\015\167\160\112\260\037  
\177\102\333\307\161\334\130\326\030\275\120\305\271\162\004\307  
\147\173\174\123\140\312\111\030\025\274\100\163\256\053\250\053  
\254\157\021\104\071\354\202\110\176\021\312\373\326\077\266\300  
\271\270\006\223\165\275\223\047\167\027\015\134\245\236\352\301  
\133\000\055\014\250\065\140\307\342\157\065\033\075\166\265\347  
\255\335\164\043\117\206\262\107\357\310\057\320\205\174\071\226  
\067\241\053\051\002\275\076\207\317\250\366\035\165\062\317\070  
\343\163\261\356\020\201\265\052\261\210\006\121\036\132\072\110  
\121\363\066\131\142\337\102\146\131\120\267\130\276\365\166\100

```
\232\022\026\346\016\252\327\154\240\325
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Trust for "HARICA Code Signing RSA Root CA 2021"
Issuer: CN=HARICA Code Signing RSA Root CA 2021,O=Hellenic Academic and Research Institutions
CA,C=GR
Serial Number:15:c2:ae:2a:4d:99:9a:63:8c:d3:ba:13:19:76:08:f5
Subject: CN=HARICA Code Signing RSA Root CA 2021,O=Hellenic Academic and Research Institutions
CA,C=GR
Not Valid Before: Fri Feb 19 10:59:54 2021
Not Valid After: Mon Feb 13 10:59:53 2045
Fingerprint (MD5): 00:5d:c9:e3:b2:c0:90:e0:61:9a:42:c0:29:a1:6b:ba
Fingerprint (SHA1): 8d:de:b8:20:46:b6:22:7c:79:24:6a:3e:ad:7b:32:c3:e8:8f:fc:ac
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Code Signing RSA Root CA 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\215\336\270\040\106\266\042\174\171\044\152\076\255\173\062\303
\350\217\374\254
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\000\135\311\343\262\300\220\340\141\232\102\300\051\241\153\272
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\123\101\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\302\256\052\115\231\232\143\214\323\272\023\031\166
\010\365
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR  
CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "HARICA Code Signing ECC Root CA 2021"

# Issuer: CN=HARICA Code Signing ECC Root CA 2021,O=Hellenic Academic and Research Institutions  
CA,C=GR

# Serial Number:4c:8a:63:1d:a9:63:8f:05:a2:fb:76:14:ff:5b:a2:cd

# Subject: CN=HARICA Code Signing ECC Root CA 2021,O=Hellenic Academic and Research Institutions  
CA,C=GR

# Not Valid Before: Fri Feb 19 11:04:36 2021

# Not Valid After: Mon Feb 13 11:04:35 2045

# Fingerprint (MD5): 9d:dd:7d:39:b4:1c:95:fa:82:e0:c3:11:38:ba:69:84

# Fingerprint (SHA1): e4:36:e5:37:b7:13:42:b6:2e:8e:00:30:5a:d9:a3:d1:d7:33:47:e9

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE

CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "HARICA Code Signing ECC Root CA 2021"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061  
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156  
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040  
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165  
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004  
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123  
\151\147\156\151\156\147\040\105\103\103\040\122\157\157\164\040  
\103\101\040\062\060\062\061

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061  
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156  
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040  
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165  
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004  
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123  
\151\147\156\151\156\147\040\105\103\103\040\122\157\157\164\040  
\103\101\040\062\060\062\061

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\114\212\143\035\251\143\217\005\242\373\166\024\377\133  
\242\315

END

CKA\_VALUE MULTILINE\_OCTAL

\060\202\002\146\060\202\001\355\240\003\002\001\002\002\020\114  
\212\143\035\251\143\217\005\242\373\166\024\377\133\242\315\060  
\012\006\010\052\206\110\316\075\004\003\003\060\165\061\013\060  
\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006\003  
\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101\143  
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141  
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163  
\040\103\101\061\055\060\053\006\003\125\004\003\014\044\110\101  
\122\111\103\101\040\103\157\144\145\040\123\151\147\156\151\156  
\147\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060  
\062\061\060\036\027\015\062\061\060\062\061\071\061\061\060\064  
\063\066\132\027\015\064\065\060\062\061\063\061\061\060\064\063  
\065\132\060\165\061\013\060\011\006\003\125\004\006\023\002\107  
\122\061\067\060\065\006\003\125\004\012\014\056\110\145\154\154  
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156  
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151  
\164\165\164\151\157\156\163\040\103\101\061\055\060\053\006\003  
\125\004\003\014\044\110\101\122\111\103\101\040\103\157\144\145  
\040\123\151\147\156\151\156\147\040\105\103\103\040\122\157\157  
\164\040\103\101\040\062\060\062\061\060\166\060\020\006\007\052  
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000  
\004\103\237\274\134\102\152\103\341\254\113\270\016\137\200\006  
\343\005\167\213\177\013\171\327\141\240\220\277\362\123\050\243  
\130\272\224\300\146\152\034\131\332\200\130\201\000\114\274\311  
\171\230\020\014\307\035\013\343\223\334\205\071\150\331\277\247  
\103\322\061\314\202\202\047\272\210\321\322\055\126\067\367\072  
\332\156\071\334\161\020\145\356\070\013\207\172\003\272\060\137  
\144\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004  
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004  
\024\152\161\301\163\152\223\102\246\227\162\136\273\220\137\202  
\222\017\053\326\353\060\016\006\003\125\035\017\001\001\377\004  
\004\003\002\001\206\060\012\006\010\052\206\110\316\075\004\003  
\003\003\147\000\060\144\002\060\036\245\325\013\104\225\020\344  
\147\174\116\205\136\271\105\111\002\163\260\262\034\263\247\042  
\321\000\141\100\017\263\207\067\026\215\000\355\266\213\125\045  
\006\224\220\334\327\347\165\237\002\060\177\164\153\361\112\337  
\360\367\204\173\362\305\171\060\003\110\362\036\040\042\127\144  
\124\127\064\200\167\267\077\043\117\264\365\200\230\302\301\126  
\133\240\347\326\241\217\365\014\157\035

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

#

```

Trust for "HARICA Code Signing ECC Root CA 2021"
Issuer: CN=HARICA Code Signing ECC Root CA 2021,O=Hellenic Academic and Research Institutions
CA,C=GR
Serial Number:4c:8a:63:1d:a9:63:8f:05:a2:fb:76:14:ff:5b:a2:cd
Subject: CN=HARICA Code Signing ECC Root CA 2021,O=Hellenic Academic and Research Institutions
CA,C=GR
Not Valid Before: Fri Feb 19 11:04:36 2021
Not Valid After: Mon Feb 13 11:04:35 2045
Fingerprint (MD5): 9d:dd:7d:39:b4:1c:95:fa:82:e0:c3:11:38:ba:69:84
Fingerprint (SHA1): e4:36:e5:37:b7:13:42:b6:2e:8e:00:30:5a:d9:a3:d1:d7:33:47:e9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Code Signing ECC Root CA 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\344\066\345\067\267\023\102\266\056\216\000\060\132\331\243\321
\327\063\107\351
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\235\335\175\071\264\034\225\372\202\340\303\021\070\272\151\204
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\105\103\103\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\114\212\143\035\251\143\217\005\242\373\166\024\377\133
\242\315
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "Microsoft Identity Verification Root Certificate Authority 2020"
Issuer: CN=Microsoft Identity Verification
Root Certificate Authority 2020,O=Microsoft Corporation,C=US
Serial Number:54:98:d2:d1:d4:5b:19:95:48:13:79:c8:11:c0:87:99
Subject: CN=Microsoft Identity Verification Root Certificate Authority 2020,O=Microsoft Corporation,C=US

```

```
Not Valid Before: Thu Apr 16 18:36:16 2020
Not Valid After: Sun Apr 16 18:44:40 2045
Fingerprint (MD5): be:95:4f:16:01:21:22:44:8c:a8:bc:27:96:02:ac:f5
Fingerprint (SHA1): f4:00:42:e2:e5:f7:e8:ef:81:89:fe:d1:55:19:ae:ce:42:c3:bf:a2
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Identity Verification Root Certificate Authority 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\167\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\110\060\106\006\003\125\004\003\023\077\115\151\143\162\157\163
\157\146\164\040\111\144\145\156\164\151\164\171\040\126\145\162
\151\146\151\143\141\164\151\157\156\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\062\060
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\167\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\110\060\106\006\003\125\004\003\023\077\115\151\143\162\157\163
\157\146\164\040\111\144\145\156\164\151\164\171\040\126\145\162
\151\146\151\143\141\164\151\157\156\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\124\230\322\321\324\133\031\225\110\023\171\310\021\300
\207\231
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\314\060\202\003\264\240\003\002\001\002\002\020\124
\230\322\321\324\133\031\225\110\023\171\310\021\300\207\231\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\167
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\036\060
\034\006\003\125\004\012\023\025\115\151\143\162\157\163\157\146
\164\040\103\157\162\160\157\162\141\164\151\157\156\061\110\060
\106\006\003\125\004\003\023\077\115\151\143\162\157\163\157\146
\164\040\111\144\145\156\164\151\164\171\040\126\145\162\151\146
\151\143\141\164\151\157\156\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\062\060\060\036\027\015\062\060\060\064\061
```

\066\061\070\063\066\061\066\132\027\015\064\065\060\064\061\066  
\061\070\064\064\064\060\132\060\167\061\013\060\011\006\003\125  
\004\006\023\002\125\123\061\036\060\034\006\003\125\004\012\023  
\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160\157  
\162\141\164\151\157\156\061\110\060\106\006\003\125\004\003\023  
\077\115\151\143\162\157\163\157\146\164\040\111\144\145\156\164  
\151\164\171\040\126\145\162\151\146\151\143\141\164\151\157\156  
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164  
\145\040\101\165\164\150\157\162\151\164\171\040\062\060\062\060  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\263\221\052\007\203\006\147\375\236\235\340\307\300\267\244  
\346\102\004\177\017\246\333\137\373\325\132\327\105\240\373\167  
\013\360\200\363\246\155\132\115\171\123\330\240\206\204\127\105  
\040\307\242\124\373\307\242\277\212\307\156\065\363\242\025\304  
\057\116\343\112\205\226\111\015\377\276\231\330\024\366\274\047  
\007\356\102\233\053\365\013\222\006\344\375\151\023\145\250\221  
\162\362\230\204\353\203\075\016\344\327\161\022\110\041\313\015  
\355\366\107\111\267\233\371\311\307\027\266\204\117\377\270\254  
\232\327\163\147\111\205\343\206\275\067\100\320\045\206\324\336  
\265\302\155\142\152\325\251\170\274\055\157\111\371\345\154\024  
\024\375\024\307\323\145\026\067\336\313\156\274\136\051\215\375  
\142\233\025\054\326\005\346\271\211\062\063\243\142\307\327\326  
\122\147\010\304\056\364\126\053\236\013\207\314\354\247\264\246  
\252\353\005\315\031\127\245\072\013\004\047\034\221\147\236\055  
\142\055\057\036\276\332\300\040\313\004\031\312\063\373\211\276  
\230\342\162\240\162\065\276\171\341\234\203\157\344\155\027\157  
\220\363\075\000\206\165\070\216\320\340\111\232\273\333\323\370  
\060\312\325\127\210\150\115\162\323\277\155\177\161\330\375\275  
\015\256\222\144\110\267\133\157\171\046\265\315\233\225\041\204  
\321\357\017\062\075\173\127\214\363\105\007\114\174\340\136\030  
\016\065\166\213\155\236\313\066\164\253\005\370\340\163\135\062  
\126\224\147\227\045\012\306\065\075\224\227\347\301\104\213\200  
\375\301\370\364\164\031\345\060\366\006\373\041\127\076\006\034  
\213\153\025\206\047\111\173\202\223\312\131\350\165\107\350\077  
\070\364\307\123\171\240\266\264\342\134\121\357\275\137\070\301  
\023\346\170\014\225\132\056\305\100\131\050\314\017\044\300\354  
\272\011\167\043\231\070\246\266\034\332\307\272\040\266\327\067  
\330\177\067\257\010\343\073\161\333\156\163\033\175\231\162\260  
\344\206\063\131\164\265\026\000\173\120\155\306\206\023\332\375  
\304\071\202\075\044\000\232\140\332\272\224\300\005\121\054\064  
\254\120\231\023\207\273\263\005\200\262\115\060\002\134\270\046  
\203\135\264\143\163\357\256\043\225\117\140\050\276\067\325\133  
\245\002\003\001\000\001\243\124\060\122\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125  
\035\016\004\026\004\024\310\176\322\152\205\052\033\312\031\230  
\004\007\047\317\120\020\117\150\250\242\060\020\006\011\053\006

\001\004\001\202\067\025\001\004\003\002\001\000\060\015\006\011  
\052\206\110\206\367\015\001\001\014\005\000\003\202\002\001\000  
\257\152\335\346\031\347\055\224\103\031\116\313\351\120\225\144  
\245\003\221\002\213\342\066\200\073\025\242\122\302\026\031\266  
\152\132\135\164\103\060\364\233\377\140\164\011\261\041\036\220  
\026\155\305\044\217\134\146\210\143\364\117\314\175\362\022\114  
\100\020\213\001\237\332\251\310\256\362\225\033\317\235\005\353  
\111\076\164\240\150\133\345\126\054\145\034\202\176\123\332\126  
\331\106\027\171\222\105\304\020\066\010\122\051\027\313\057\246  
\362\176\324\151\044\212\036\217\260\163\015\314\034\112\253\262  
\252\355\247\221\143\001\144\042\250\062\270\176\062\050\263\147  
\163\055\221\264\334\061\001\013\367\107\012\246\361\327\112\355  
\126\140\304\054\010\243\173\100\260\274\164\047\122\207\326\276  
\210\335\067\212\211\156\147\210\035\365\311\135\240\376\266\253  
\072\200\327\032\227\074\027\066\042\101\036\254\115\325\203\346  
\074\070\275\117\060\351\124\251\323\266\004\303\062\166\141\273  
\260\030\305\053\030\263\300\200\325\267\225\260\136\121\115\042  
\374\354\130\252\350\330\224\264\245\056\355\222\336\347\030\174  
\041\127\335\125\143\367\277\155\315\037\322\246\167\050\160\307  
\342\133\072\133\010\322\133\116\310\000\226\263\341\203\066\257  
\206\012\145\134\164\366\352\354\172\152\164\240\360\113\356\357  
\224\243\254\120\362\207\355\327\072\060\203\311\373\175\127\276  
\345\343\370\101\312\345\144\256\263\243\354\130\354\205\232\314  
\357\271\352\363\126\030\271\134\163\232\257\305\167\027\203\131  
\333\067\032\030\162\124\245\101\322\266\043\165\243\103\232\345  
\167\174\226\171\267\101\215\277\354\334\200\240\237\321\167\165  
\130\137\065\023\340\045\032\147\013\175\316\045\372\007\012\344  
\141\041\330\324\034\345\007\306\066\231\364\226\320\306\025\376  
\116\315\327\256\213\235\333\026\375\004\306\222\275\324\210\346  
\251\243\252\273\367\144\070\073\137\314\014\320\065\276\164\031  
\003\246\305\252\114\242\141\066\202\076\035\363\053\274\227\135  
\333\113\170\073\055\365\073\357\140\043\350\365\354\013\043\066  
\225\257\230\146\277\123\323\173\270\151\112\052\226\146\151\304  
\224\306\364\137\156\254\230\170\210\200\006\134\242\262\355\242  
END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Microsoft Identity Verification Root Certificate Authority 2020"

# Issuer: CN=Microsoft Identity Verification Root Certificate Authority 2020,O=Microsoft Corporation,C=US

# Serial Number:54:98:d2:d1:d4:5b:19:95:48:13:79:c8:11:c0:87:99

# Subject: CN=Microsoft Identity Verification Root Certificate Authority 2020,O=Microsoft Corporation,C=US

# Not Valid Before: Thu Apr 16 18:36:16 2020

# Not Valid After: Sun Apr 16 18:44:40 2045

# Fingerprint (MD5): be:95:4f:16:01:21:22:44:8c:a8:bc:27:96:02:ac:f5



```

Fingerprint (SHA1): f4:00:42:e2:e5:f7:e8:ef:81:89:fe:d1:55:19:ae:ce:42:c3:bf:a2
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Identity Verification Root Certificate Authority 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\364\000\102\342\345\367\350\357\201\211\376\321\125\031\256\316
\102\303\277\242
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\276\225\117\026\001\041\042\104\214\250\274\047\226\002\254\365
END
CKA_ISSUER MULTILINE_OCTAL
\060\167\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\110\060\106\006\003\125\004\003\023\077\115\151\143\162\157\163
\157\146\164\040\111\144\145\156\164\151\164\171\040\126\145\162
\151\146\151\143\141\164\151\157\156\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\124\230\322\321\324\133\031\225\110\023\171\310\021\300
\207\231
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

```

```

Microsoft Code Signing Only Certificate
Certificate "Entrust Code Signing Root Certification Authority - CSBR1"
Issuer: CN=Entrust Code Signing Root Certification Authority - CSBR1,O=Entrust, Inc.,C=US
Serial Number: 7f:f1:a8:f9:f4:3a:e8:87:6e:2d:c6:ff:5e:43:3d:b2:ee:30:a6:43
Subject: CN=Entrust Code Signing Root Certification Authority - CSBR1,O=Entrust, Inc.,C=US
Not Valid Before: Fri May 07 13:26:36 2021
Not Valid After: Sun Dec 30 13:26:36 2040
Fingerprint (MD5): 3a:07:e2:0b:54:91:63:95:fd:01:e5:7b:71:aa:46:be
Fingerprint (SHA1): 89:74:24:05:3a:4a:88:7a:c0:98:38:02:91:03:4d:88:5c:87:14:b9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Code Signing Root Certification Authority - CSBR1"

```

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\151\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\026\060\024\006\003\125\004\012\014\015\105\156\164\162\165\163  
\164\054\040\111\156\143\056\061\102\060\100\006\003\125\004\003  
\014\071\105\156\164\162\165\163\164\040\103\157\144\145\040\123  
\151\147\156\151\156\147\040\122\157\157\164\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\040\055\040\103\123\102\122\061

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\151\061\013\060\011\006\003\125\004\006\023\002\125\123\061  
\026\060\024\006\003\125\004\012\014\015\105\156\164\162\165\163  
\164\054\040\111\156\143\056\061\102\060\100\006\003\125\004\003  
\014\071\105\156\164\162\165\163\164\040\103\157\144\145\040\123  
\151\147\156\151\156\147\040\122\157\157\164\040\103\145\162\164  
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162  
\151\164\171\040\055\040\103\123\102\122\061

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\024\177\361\250\371\364\072\350\207\156\055\306\377\136\103  
\075\262\356\060\246\103

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\005\242\060\202\003\212\240\003\002\001\002\002\024\177  
\361\250\371\364\072\350\207\156\055\306\377\136\103\075\262\356  
\060\246\103\060\015\006\011\052\206\110\206\367\015\001\001\015  
\005\000\060\151\061\013\060\011\006\003\125\004\006\023\002\125  
\123\061\026\060\024\006\003\125\004\012\014\015\105\156\164\162  
\165\163\164\054\040\111\156\143\056\061\102\060\100\006\003\125  
\004\003\014\071\105\156\164\162\165\163\164\040\103\157\144\145  
\040\123\151\147\156\151\156\147\040\122\157\157\164\040\103\145  
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150  
\157\162\151\164\171\040\055\040\103\123\102\122\061\060\036\027  
\015\062\061\060\065\060\067\061\063\062\066\063\066\132\027\015  
\064\060\061\062\063\060\061\063\062\066\063\066\132\060\151\061  
\013\060\011\006\003\125\004\006\023\002\125\123\061\026\060\024  
\006\003\125\004\012\014\015\105\156\164\162\165\163\164\054\040  
\111\156\143\056\061\102\060\100\006\003\125\004\003\014\071\105  
\156\164\162\165\163\164\040\103\157\144\145\040\123\151\147\156  
\151\156\147\040\122\157\157\164\040\103\145\162\164\151\146\151  
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171  
\040\055\040\103\123\102\122\061\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\247\201\217\367\024\105\266

\142\103\362\330\256\323\045\136\110\117\121\277\305\175\237\120  
\034\065\321\326\176\141\052\224\031\155\047\106\244\246\032\135  
\367\124\121\152\200\042\306\250\146\165\115\124\203\311\136\150  
\033\253\366\133\144\260\255\255\040\275\124\357\106\153\155\002  
\347\105\256\165\366\216\212\271\062\056\213\270\167\034\122\115  
\171\210\137\245\072\030\311\120\054\227\047\055\277\332\000\175  
\143\177\357\062\354\106\207\143\333\232\237\303\132\041\066\173  
\371\233\325\312\240\156\162\054\374\341\361\236\160\115\010\126  
\025\157\220\253\373\110\272\271\327\301\202\170\205\145\056\177  
\265\311\300\342\024\267\067\021\101\006\342\212\340\250\366\345  
\176\266\170\005\001\303\140\355\117\007\101\056\012\023\111\343  
\220\233\177\335\275\372\254\277\144\121\321\134\233\264\365\134  
\347\134\377\073\233\245\240\032\327\175\011\262\302\267\377\156  
\034\274\310\175\346\351\053\374\162\263\024\351\112\125\022\204  
\234\104\045\165\035\366\052\360\117\245\040\075\150\045\353\141  
\227\174\017\345\266\075\363\256\303\301\021\274\033\216\314\340  
\107\060\136\102\000\206\161\343\130\254\006\312\145\037\173\224  
\246\113\127\147\014\176\136\255\170\147\133\125\343\136\353\307  
\330\354\114\156\206\313\363\334\370\237\207\252\162\130\022\017  
\175\246\370\370\102\071\073\074\054\344\062\115\111\214\340\341  
\000\302\070\240\234\372\204\076\101\334\156\126\256\306\032\133  
\364\147\150\005\001\315\033\277\256\207\274\235\123\366\056\350  
\266\153\344\231\336\305\117\207\130\250\322\145\036\310\037\325  
\162\156\356\131\034\127\073\011\162\235\327\312\267\220\306\315  
\173\105\222\221\102\003\114\175\077\312\362\252\270\302\016\206  
\363\020\237\106\056\244\146\206\150\132\150\030\160\051\070\021  
\200\140\153\212\103\243\163\154\343\263\153\067\377\346\235\147  
\001\222\206\337\057\110\321\373\120\140\325\134\376\041\323\001  
\102\143\376\357\160\264\027\300\217\250\356\323\301\113\137\022  
\352\375\375\056\016\207\104\140\343\251\364\302\030\243\343\375  
\316\014\204\042\015\363\247\170\332\223\363\333\070\317\271\057  
\063\306\377\007\074\136\276\105\323\002\003\001\000\001\243\102  
\060\100\060\035\006\003\125\035\016\004\026\004\024\202\272\326  
\075\227\316\237\317\161\350\222\067\257\375\263\265\151\065\127  
\317\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001  
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002  
\001\206\060\015\006\011\052\206\110\206\367\015\001\001\015\005  
\000\003\202\002\001\000\022\357\070\241\210\341\241\243\326\145  
\334\107\234\363\274\334\317\254\113\214\074\032\276\053\364\367  
\320\147\027\150\206\115\160\250\362\315\320\061\002\127\175\251  
\014\212\073\127\071\236\360\156\367\044\042\005\147\321\301\226  
\301\276\321\360\370\126\147\013\336\272\327\210\233\215\327\153  
\010\166\365\130\221\331\265\303\100\123\032\244\361\205\315\077  
\000\116\077\116\223\073\170\271\322\007\122\144\014\206\151\155  
\350\124\145\126\027\350\000\123\204\212\363\333\373\263\316\013  
\125\142\217\315\114\111\006\070\177\122\303\363\034\327\075\367  
\063\312\062\255\301\251\257\157\353\021\313\356\254\121\277\260  
\046\232\172\116\043\264\112\366\151\264\102\151\326\240\215\266

\214\107\112\073\040\067\267\101\007\357\057\040\330\146\034\151  
\227\250\154\060\174\167\103\136\153\276\046\230\203\017\072\326  
\307\160\052\026\106\055\045\124\206\143\145\127\102\367\043\101  
\351\120\152\007\103\316\116\265\351\037\150\330\330\326\011\112  
\250\350\262\374\220\147\222\344\220\046\363\107\372\326\040\373  
\211\200\342\104\163\071\367\212\206\063\013\370\252\251\347\115  
\354\334\157\325\317\061\115\253\216\037\220\100\326\174\134\202  
\017\256\027\122\161\351\254\347\115\070\355\052\330\166\171\207  
\255\027\243\114\253\267\102\127\277\006\254\345\320\115\060\351  
\125\117\343\105\312\363\340\152\041\064\215\307\237\034\243\143  
\110\222\322\226\007\276\245\107\076\302\052\231\070\247\216\332  
\041\174\121\155\334\313\075\007\351\251\275\111\324\135\065\137  
\133\214\004\121\352\232\130\220\272\033\257\150\170\261\026\017  
\224\051\073\217\233\052\217\311\040\360\161\102\114\134\115\253  
\061\214\253\351\177\046\150\151\240\245\026\015\201\304\321\005  
\014\303\207\146\345\007\143\252\033\116\377\262\007\101\117\245  
\042\106\120\254\146\000\207\122\154\074\262\073\234\227\241\106  
\264\133\336\317\302\152\131\125\007\214\243\244\321\167\065\147  
\106\004\057\331\070\271\106\257\272\216\033\162\046\002\057\166  
\124\357\203\302\057\054\167\160\314\167\020\222\252\003\255\312  
\314\340\117\351\203\106\345\263\074\031\157\172\171\207\266\070  
\232\275\102\316\244\142

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER

CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "Entrust Code Signing Root Certification Authority - CSBR1"

# Issuer: CN=Entrust Code Signing Root Certification Authority - CSBR1,O=Entrust\, Inc.,C=US

# Serial Number:7f:f1:a8:f9:f4:3a:e8:87:6e:2d:c6:ff:5e:43:3d:b2:ee:30:a6:43

# Subject: CN=Entrust Code Signing Root Certification Authority - CSBR1,O=Entrust\, Inc.,C=US

# Not Valid Before: Fri May 07 13:26:36 2021

# Not Valid After: Sun Dec 30 13:26:36 2040

# Fingerprint (MD5): 3a:07:e2:0b:54:91:63:95:fd:01:e5:7b:71:aa:46:be

# Fingerprint (SHA1): 89:74:24:05:3a:4a:88:7a:c0:98:38:02:91:03:4d:88:5c:87:14:b9

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "Entrust Code Signing Root Certification Authority - CSBR1"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\211\164\044\005\072\112\210\172\300\230\070\002\221\003\115\210  
\134\207\024\271

END

CKA\_CERT\_MD5\_HASH

```

MULTILINE_OCTAL
\072\007\342\013\124\221\143\225\375\001\345\173\161\252\106\276
END
CKA_ISSUER MULTILINE_OCTAL
\060\151\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\014\015\105\156\164\162\165\163
\164\054\040\111\156\143\056\061\102\060\100\006\003\125\004\003
\014\071\105\156\164\162\165\163\164\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\055\040\103\123\102\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\177\361\250\371\364\072\350\207\156\055\306\377\136\103
\075\262\356\060\246\103
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

Microsoft Code Signing Only Certificate
Certificate "E-Tugra Global Root CA RSA
v3"
Issuer: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR
Serial Number:0d:4d:c5:cd:16:22:95:96:08:7e:b8:0b:7f:15:06:34:fb:79:10:34
Subject: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
Not Valid Before: Wed Mar 18 09:07:17 2020
Not Valid After: Sun Mar 12 09:07:17 2045
Fingerprint (MD5): 22:be:10:f6:c2:f8:03:88:73:5f:33:29:47:28:47:a4
Fingerprint (SHA1): e9:a8:5d:22:14:52:1c:5b:aa:0a:b4:be:24:6a:23:8a:c9:ba:e2:a9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Global Root CA RSA v3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\122\123\101
\040\166\063

```

END

CKA\_ID

UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122  
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162  
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165  
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033  
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124  
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006  
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154  
\157\142\141\154\040\122\157\157\164\040\103\101\040\122\123\101  
\040\166\063

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\024\015\115\305\315\026\042\225\226\010\176\270\013\177\025  
\006\064\373\171\020\064

END

CKA\_VALUE

MULTILINE\_OCTAL

\060\202\005\363\060\202\003\333\240\003\002\001\002\002\024\015  
\115\305\315\026\042\225\226\010\176\270\013\177\025\006\064\373  
\171\020\064\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\060\201\200\061\013\060\011\006\003\125\004\006\023\002  
\124\122\061\017\060\015\006\003\125\004\007\023\006\101\156\153  
\141\162\141\061\031\060\027\006\003\125\004\012\023\020\105\055  
\124\165\147\162\141\040\105\102\107\040\101\056\123\056\061\035  
\060\033\006\003\125\004\013\023\024\105\055\124\165\147\162\141  
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\046\060  
\044\006\003\125\004\003\023\035\105\055\124\165\147\162\141\040  
\107\154\157\142\141\154\040\122\157\157\164\040\103\101\040\122  
\123\101\040\166\063\060\036\027\015\062\060\060\063\061\070\060  
\071\060\067\061\067\132\027\015\064\065\060\063\061\062\060\071  
\060\067\061\067\132\060\201\200\061\013\060\011\006\003\125\004  
\006\023\002\124\122\061\017\060\015\006\003\125\004\007\023\006  
\101\156\153\141\162\141\061\031\060\027\006\003\125\004\012\023  
\020\105\055\124\165\147\162\141\040\105\102\107\040\101\056\123  
\056\061\035\060\033\006\003\125\004\013\023\024\105\055\124\165  
\147\162\141\040\124\162\165\163\164\040\103\145\156\164\145\162  
\061\046\060\044\006\003\125\004\003\023\035\105\055\124\165\147  
\162\141\040\107\154\157\142\141\154\040\122\157\157\164\040\103  
\101\040\122\123\101\040\166\063\060\202\002\042\060\015\006\011  
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000  
\060\202\002\012\002\202\002\001\000\242\146\360\211\267\162\173  
\356\011\311\143\322\323\103\335\136\303\246\204\070\112\361\215  
\201\273\024\275\107\350\100\027\363\075\303\170\105\162\246\056  
\220\336\232\072\324\040\161\312\274\237\035\113\227\012\307\061  
\272\076\327\376\045\251\052\216\066\364\321\057\307\267\251\135

\063\334\060\160\370\100\154\113\262\246\061\141\321\064\074\075  
\061\172\307\257\304\247\247\204\341\227\244\350\113\366\027\174  
\356\074\007\355\342\212\127\334\266\373\370\103\045\120\352\047  
\201\250\206\274\217\122\112\226\072\140\032\226\273\375\163\364  
\205\375\203\375\177\204\155\064\154\177\152\267\113\001\003\277  
\255\151\267\327\062\331\365\127\152\351\206\202\076\245\146\061  
\263\026\075\302\363\046\140\062\323\122\036\260\154\244\067\076  
\364\365\257\353\341\337\200\006\317\052\101\347\146\011\341\113  
\227\347\167\275\041\155\051\266\147\303\055\176\355\326\171\145  
\321\317\072\266\321\261\136\126\141\120\172\132\316\116\120\061  
\200\003\230\107\347\344\030\174\104\132\306\244\263\073\306\306  
\303\072\360\154\303\213\310\244\221\005\363\365\331\266\252\006  
\241\267\253\344\261\352\041\024\134\203\244\374\377\266\120\323  
\214\022\046\231\166\160\351\300\017\246\164\374\273\320\033\170  
\316\162\222\342\050\234\274\346\351\011\330\072\323\211\346\276  
\056\167\337\001\012\157\226\366\345\215\074\115\122\166\032\126  
\341\163\176\027\254\075\255\154\243\122\022\030\160\346\200\116  
\063\362\176\046\062\254\005\215\070\244\346\166\074\237\020\151  
\016\155\235\322\301\171\040\153\133\317\063\215\321\224\166\065  
\347\135\125\307\267\254\050\253\106\314\347\073\041\265\012\012  
\344\112\131\334\201\065\113\104\225\022\012\147\245\241\377\133  
\000\007\322\300\314\371\077\374\237\063\362\000\370\214\154\207  
\235\006\055\361\357\343\346\006\372\305\146\023\133\374\120\007  
\236\161\206\262\332\157\164\060\317\223\123\350\334\042\326\336  
\040\037\141\215\243\056\243\170\062\220\154\334\254\062\265\005  
\344\365\074\063\015\326\340\207\167\027\114\235\260\330\011\250  
\015\127\367\104\205\360\310\004\276\134\135\132\343\027\216\124  
\143\151\177\111\164\144\005\214\243\002\003\001\000\001\243\143  
\060\141\060\017\006\003\125\035\023\001\001\377\004\005\060\003  
\001\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024  
\262\264\256\346\055\367\046\325\252\165\055\166\113\300\033\123  
\041\320\110\357\060\035\006\003\125\035\016\004\026\004\024\262  
\264\256\346\055\367\046\325\252\165\055\166\113\300\033\123\041  
\320\110\357\060\016\006\003\125\035\017\001\001\377\004\004\003  
\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001\013  
\005\000\003\202\002\001\000\211\250\162\177\214\353\316\056\030  
\304\020\200\055\020\014\377\373\024\315\004\340\024\074\116\232  
\373\237\051\277\042\236\127\271\202\163\022\143\046\265\314\220  
\351\322\052\051\356\234\055\314\054\231\276\105\047\344\261\161  
\355\344\070\225\061\101\362\175\172\143\170\337\312\066\026\057  
\202\210\237\274\021\107\117\166\115\310\055\216\353\337\055\174  
\116\073\332\256\366\343\332\135\024\246\256\350\205\104\235\006  
\156\216\373\357\172\112\152\055\053\050\030\376\277\220\054\165  
\026\237\017\352\226\175\005\356\233\023\245\104\154\370\003\320  
\335\043\341\375\003\022\022\010\364\030\064\263\340\067\013\167  
\021\001\110\277\141\264\265\370\031\331\313\115\352\243\214\357  
\375\360\006\265\155\222\364\112\141\120\204\355\354\111\323\344  
\276\150\346\056\343\061\013\124\013\032\222\326\202\330\266\242

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\145\074\146\004\371\125\332\154\373\333\265\024\146\115\224\203
\073\315\036\246\053\262\376\167\100\206\253\347\337\012\311\375
\366\335\207\126\030\330\260\054\125\140\226\372\010\176\122\220
\365\113\246\056\207\174\313\040\333\006\076\240\135\003\167\175
\242\074\023\033\051\242\023\125\240\075\024\042\257\157\270\320
\232\033\162\335\005\001\215\206\140\277\244\147\356\265\245\015
\321\177\346\032\053\142\146\303\007\272\347\240\110\034\070\303
\351\105\373\247\177\374\355\002\150\032\312\167\022\167\246\000
\125\050\024\354\326\307\022\242\033\145\102\351\221\350\313\076
\207\211\124\135\331\257\235\227\234\151\347\012\377\017\132\170
\213\143\052\114\175\107\224\077\336\113\351\123\320\060\361\305
\366\236\111\337\073\240\221\243\243\376\315\130\314\352\337\257
\157\050\073\240\151\233\217\354\254\256\053\124\235\233\004\261
\107\040\257\226\022\076\143\224\035\004\347\056\273\206\307\014
\232\210\277\166\107\357\367\260\013\227\146\322\104\317\140\122
\007\341\325\054\112\072\047\141\167\312\327\217\347\207\016\060
\377\014\273\004\342\141\303\242\310\227\141\216\264\060\152\074
\155\302\007\137\112\163\057\077\371\026\212\001\146\357\272\221
\312\122\127\173\256\324\346\017\335\013\172\177\213\236\046\040
\317\073\357\201\161\203\131
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "E-Tugra Global Root CA RSA v3"

# Issuer: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR

# Serial Number:0d:4d:c5:cd:16:22:95:96:08:7e:b8:0b:7f:15:06:34:fb:79:10:34

# Subject: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG  
A.S.,L=Ankara,C=TR

# Not Valid Before: Wed Mar 18 09:07:17 2020

# Not Valid After: Sun Mar 12 09:07:17 2045

# Fingerprint (MD5): 22:be:10:f6:c2:f8:03:88:73:5f:33:29:47:28:47:a4

# Fingerprint (SHA1): e9:a8:5d:22:14:52:1c:5b:aa:0a:b4:be:24:6a:23:8a:c9:ba:e2:a9

CKA\_CLASS

CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "E-Tugra Global Root CA RSA v3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\351\250\135\042\024\122\034\133\252\012\264\276\044\152\043\212
\311\272\342\251
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\042\276\020\366\302\370\003\210\163\137\063\051\107\050\107\244
```



END

CKA\_ISSUER MULTILINE\_OCTAL

\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122  
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162  
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165  
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033  
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124  
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006  
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154  
\157\142\141\154\040\122\157\157\164\040\103\101\040\122\123\101  
\040\166\063

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

\002\024\015\115\305\315\026\042\225\226\010\176\270\013\177\025  
\006\064\373\171\020\064

END

CKA\_TRUST\_SERVER\_AUTH

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "E-Tugra Global Root CA ECC v3"

# Issuer: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR

# Serial Number:26:46:19:77:31:e1:4f:6f:28:36:de:39:51:86:e6:d4:97:88:22:c1

# Subject: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG  
A.S.,L=Ankara,C=TR

# Not Valid Before: Wed Mar 18 09:46:58 2020

# Not Valid After: Sun Mar 12 09:46:58 2045

# Fingerprint (MD5): 46:bc:81:bb:f1:b5:1e:f7:4b:96:bc:14:e2:e7:27:64

# Fingerprint (SHA1): 8a:2f:af:57:53:b1:b0:e6:a1:04:ec:5b:6a:69:71:6d:f6:1c:e2:84

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE

CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "E-Tugra Global Root CA ECC v3"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122  
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162  
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165  
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033  
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124  
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006  
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154  
\157\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103

```
\040\166\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103
\040\166\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\046\106\031\167\061\341\117\157\050\066\336\071\121\206
\346\324\227\210\042\301
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\245\060\202\002\052\240\003\002\001\002\002\024\046
\106\031\167\061\341\117\157\050\066\336\071\121\206\346\324\227
\210\042\301\060\012\006\010\052\206\110\316\075\004\003\003\060
\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162\141
\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165\147
\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033\006
\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124\162
\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006\003
\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154\157
\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103\040
\166\063\060\036\027\015\062\060\060\063\061\070\060\071\064\066
\065\070\132\027\015\064\065\060\063\061\062\060\071\064\066\065
\070\132\060\201\200\061\013\060\011\006\003\125\004\006\023\002
\124\122\061\017\060\015\006\003\125\004\007\023\006\101\156\153
\141\162\141\061\031\060\027\006\003\125\004\012\023\020\105\055
\124\165\147\162\141\040\105\102\107\040\101\056\123\056\061\035
\060\033\006\003\125\004\013\023\024\105\055\124\165\147\162\141
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\046\060
\044\006\003\125\004\003\023\035\105\055\124\165\147\162\141\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101\040\105
\103\103\040\166\063\060\166\060\020\006\007\052\206\110\316\075
\002\001\006\005\053\201\004\000\042\003\142\000\004\216\230\051
\277\307\020\036\047\333\253\003\314\050\054\330\136\110\031\020
\051\314\313\131\201\314\214\270\222\027\211\203\052\222\366\303
\244\035\114\142\325\237\326\240\106\334\034\274\166\301\343\107
\320\133\023\332\347\245\263\146\110\347\041\232\112\117\206\012
\175\154\352\115\062\200\012\262\172\011\233\151\113\230\201\342
```

```
\056\354\002\160\226\037\375\365\106\316\312\334\202\243\143\060
\141\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024\377
\202\061\162\076\371\304\146\154\255\070\236\321\260\121\210\245
\220\314\365\060\035\006\003\125\035\016\004\026\004\024\377\202
\061\162\076\371\304\146\154\255\070\236\321\260\121\210\245\220
\314\365\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\012\006\010\052\206\110\316\075\004\003\003\003\151
\000\060\146\002\061\000\346\005\130\151\141\345\055\312\015\313
\361\031\010\275\326\375\121\222\032\176\143\124\004\220\221\232
\065\221\071\231\372\007\251\146\223\272\310\150\324\212\077\372
\355\156\026\002\047\267\002\061\000\335\132\027\053\166\035\145
\102\226\246\254\135\212\171\126\330\212\033\337\232\336\137\307
\120\217\261\133\161\014\046\337\152\100\000\354\063\221\041\161
\276\150\344\043\244\331\255\241\067
```

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Trust for "E-Tugra Global Root CA ECC v3"

# Issuer: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR

# Serial Number:26:46:19:77:31:e1:4f:6f:28:36:de:39:51:86:e6:d4:97:88:22:c1

# Subject: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG  
A.S.,L=Ankara,C=TR

# Not Valid Before: Wed Mar 18 09:46:58 2020

# Not Valid After: Sun Mar 12 09:46:58 2045

# Fingerprint (MD5): 46:bc:81:bb:fl:b5:1e:f7:4b:96:bc:14:e2:e7:27:64

# Fingerprint (SHA1): 8a:2f:af:57:53:b1:b0:e6:a1:04:ec:5b:6a:69:71:6d:f6:1c:e2:84

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN

CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "E-Tugra Global Root CA ECC v3"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

```
\212\057\257\127\123\261\260\346\241\004\354\133\152\151\161\155
\366\034\342\204
```

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

```
\106\274\201\273\361\265\036\367\113\226\274\024\342\347\047\144
```

END

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
```

```
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103
\040\166\063
```

END

CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL

```
\002\024\046\106\031\167\061\341\117\157\050\066\336\071\121\206
\346\324\227\210\042\301
```

END

CKA\_TRUST\_SERVER\_AUTH

CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

# Certificate "SSL.com Code Signing RSA Root CA 2022"

# Issuer: CN=SSL.com Code Signing RSA Root CA 2022,O=SSL Corporation,C=US

# Serial Number:10:97:c4:9c:8c:25:43:28:bb:a6:e8:b9:9b:ab:4f:a1

# Subject: CN=SSL.com Code Signing RSA Root CA 2022,O=SSL Corporation,C=US

# Not Valid Before: Thu Aug 25 16:32:08 2022

# Not Valid After: Sun Aug 19 16:32:07 2046

# Fingerprint (MD5): 5b:a8:b3:07:28:99:7b:83:d4:78:17:4b:f3:af:25:18

# Fingerprint (SHA1): d4:69:52:84:cd:17:98:d9:cb:16:99:46:4c:06:49:94:c4:e2:bb:fd

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_CERTIFICATE

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSL.com Code Signing

RSA Root CA 2022"

CKA\_CERTIFICATE\_TYPE CK\_CERTIFICATE\_TYPE CKC\_X\_509

CKA\_SUBJECT MULTILINE\_OCTAL

```
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\122\123\101\040\122\157\157
\164\040\103\101\040\062\060\062\062
```

END

CKA\_ID UTF8 "0"

CKA\_ISSUER MULTILINE\_OCTAL

```
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\122\123\101\040\122\157\157
```

\164\040\103\101\040\062\060\062\062  
END  
CKA\_SERIAL\_NUMBER MULTILINE\_OCTAL  
\002\020\020\227\304\234\214\045\103\050\273\246\350\271\233\253  
\117\241  
END  
CKA\_VALUE MULTILINE\_OCTAL  
\060\202\005\233\060\202\003\203\240\003\002\001\002\002\020\020  
\227\304\234\214\045\103\050\273\246\350\271\233\253\117\241\060  
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\127  
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060  
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160  
\157\162\141\164\151\157\156\061\056\060\054\006\003\125\004\003  
\014\045\123\123\114\056\143\157\155\040\103\157\144\145\040\123  
\151\147\156\151\156\147\040\122\123\101\040\122\157\157\164\040  
\103\101\040\062\060\062\062\060\036\027\015\062\062\060\070\062  
\065\061\066\063\062\060\070\132\027\015\064\066\060\070\061\071  
\061\066\063\062\060\067\132\060\127\061\013\060\011\006\003\125  
\004\006\023\002\125\123\061\030\060\026\006\003\125\004\012\014  
\017\123\123\114\040\103\157\162\160\157\162\141\164\151\157\156  
\061\056\060\054\006\003\125\004\003\014\045\123\123\114\056\143  
\157\155\040\103\157\144\145\040\123\151\147\156\151\156\147\040  
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\062  
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001  
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001  
\000\214\165\040\310\214\334\116\221\121\006\265\133\357\105\273  
\331\376\140\353\112\223\207\354\377\227\217\140\223\236\161\141  
\100\352\357\113\313\222\130\330\153\026\334\336\055\210\362\363  
\323\004\226\300\045\147\041\345\035\333\237\122\201\366\000\053  
\146\220\361\254\036\250\117\141\044\335\166\057\003\307\065\310  
\066\254\201\123\140\042\300\121\222\231\357\350\046\056\231\124  
\315\011\217\137\134\074\360\253\347\073\263\247\253\006\306\061  
\227\276\114\355\364\006\201\061\202\113\120\020\265\240\021\171  
\334\130\313\300\345\036\263\301\157\110\134\255\227\012\263\036  
\254\056\127\330\275\276\070\120\104\343\063\375\327\301\265\277  
\242\116\373\170\264\073\070\230\050\351\126\055\124\200\213\153  
\176\035\343\225\206\247\236\027\124\106\133\136\377\237\346\153  
\065\212\121\245\246\173\134\012\042\015\302\327\203\057\332\074  
\075\362\212\036\375\036\076\241\330\034\117\156\010\122\156\117  
\254\037\311\376\237\231\115\273\122\124\261\222\203\133\100\023  
\357\024\265\063\221\074\202\244\253\365\252\110\152\351\270\373  
\200\100\006\374\345\036\176\077\274\012\253\046\342\305\253\007  
\004\327\115\170\265\353\332\153\123\133\123\212\246\362\327\136  
\121\042\115\037\314\252\213\272\300\016\202\331\024\272\331\362  
\055\367\045\270\313\251\103\322\114\104\036\026\165\314\265\344  
\160\037\051\201\125\064\262\076\376\377\321\170\032\100\222\047  
\052\150\045\265\322\236\357\274\370\024\113\157\122\043\026\153  
\020\211\324\337\272\334\314\030\131\161\251\346\313\330\220\161

\275\040\364\244\152\046\111\225\235\106\030\105\026\211\037\025  
\135\250\103\260\140\227\236\327\066\332\072\262\157\113\162\116  
\231\166\327\060\067\367\246\235\273\333\135\246\356\174\030\354  
\102\371\025\350\016\270\333\154\102\153\020\135\104\014\326\324  
\316\202\214\357\053\060\213\161\341\010\362\101\221\143\343\376  
\340\300\250\245\215\231\000\101\142\316\102\106\241\235\312\345  
\232\234\121\333\140\172\104\125\016\052\052\160\244\231\377\052  
\176\140\264\035\226\127\272\073\374\333\277\306\061\200\252\072  
\000\031\057\210\037\111\244\353\167\100\367\114\203\356\202\221  
\057\002\003\001\000\001\243\143\060\141\060\017\006\003\125\035  
\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125  
\035\043\004\030\060\026\200\024\307\366\310\013\142\355\024\014  
\243\027\266\252\271\036\321\340\203\126\241\135\060\035\006\003  
\125\035\016\004\026\004\024\307\366\310\013\142\355\024\014\243  
\027\266\252\271\036\321\340\203\126\241\135\060\016\006\003\125  
\035\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052  
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\142  
\120\336\062\077\353\066\065\170\215\211\167\110\017\017\243\135  
\007\250\272\366\122\077\066\122\316\265\300\171\114\353\135\053  
\370\022\254\103\333\347\173\214\051\052\237\153\072\323\174\365  
\025\167\227\073\375\041\375\363\310\134\311\076\005\224\257\173  
\253\350\215\342\257\015\300\240\033\337\257\013\272\252\264\105  
\125\201\310\141\231\141\270\260\232\350\131\314\011\023\331\247  
\126\007\206\356\355\240\354\215\001\145\232\231\314\043\242\300  
\221\035\135\006\335\015\247\372\074\304\304\131\042\306\233\072  
\300\035\151\075\054\266\261\036\212\276\075\202\017\153\061\162  
\140\127\220\013\124\212\336\125\012\036\165\111\000\154\266\112  
\063\357\106\330\326\313\304\361\174\154\011\226\351\251\341\030  
\375\257\377\264\317\147\157\177\007\245\110\215\005\020\226\071  
\220\171\132\226\267\343\346\067\070\062\261\306\061\001\044\164  
\002\304\313\013\317\272\166\276\134\212\040\303\351\164\147\353  
\155\022\234\071\075\340\212\325\053\113\044\343\171\214\110\234  
\221\253\327\202\041\070\277\304\263\301\007\356\220\075\255\372  
\242\276\051\133\122\061\252\154\263\034\165\363\346\240\330\214  
\003\226\210\272\370\312\121\063\141\013\035\325\153\234\023\031  
\056\026\317\317\015\207\113\227\304\007\331\013\253\230\221\352  
\272\007\203\230\222\100\012\040\315\270\153\232\367\200\376\073  
\311\342\371\103\310\050\347\115\227\027\300\167\363\060\352\046  
\204\033\325\123\274\060\205\137\151\356\074\264\011\350\261\233  
\244\070\202\272\353\300\152\214\155\053\050\060\170\344\062\253  
\267\033\341\122\044\000\221\347\113\032\333\241\210\014\156\352  
\135\034\107\231\215\161\115\275\336\336\100\231\004\263\100\341  
\303\213\252\304\222\030\227\173\374\314\203\200\074\332\051\362  
\177\316\304\151\000\233\141\175\155\226\326\025\202\214\365\203  
\052\034\367\123\166\162\045\360\051\200\304\062\144\123\017\117  
\124\364\127\015\326\013\334\376\162\210\264\137\113\331\036\077  
\003\206\057\071\020\066\247\061\305\046\007\225\213\110\161\361  
\253\054\006\352\322\034\116\225\215\347\027\352\255\261\106\105

\323\066\375\313\304\141\157\011\042\104\062\047\247\153\150

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

#

Microsoft Code Signing Only Certificate

# Trust for "SSL.com Code Signing RSA Root CA 2022"

# Issuer: CN=SSL.com Code Signing RSA Root CA 2022,O=SSL Corporation,C=US

# Serial Number:10:97:c4:9c:8c:25:43:28:bb:a6:e8:b9:9b:ab:4f:a1

# Subject: CN=SSL.com Code Signing RSA Root CA 2022,O=SSL Corporation,C=US

# Not Valid Before: Thu Aug 25 16:32:08 2022

# Not Valid After: Sun Aug 19 16:32:07 2046

# Fingerprint (MD5): 5b:a8:b3:07:28:99:7b:83:d4:78:17:4b:f3:af:25:18

# Fingerprint (SHA1): d4:69:52:84:cd:17:98:d9:cb:16:99:46:4c:06:49:94:c4:e2:bb:fd

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSL.com Code Signing RSA Root CA 2022"

CKA\_CERT\_SHA1\_HASH MULTILINE\_OCTAL

\324\151\122\204\315\027\230\331\313\026\231\106\114\006\111\224

\304\342\273\375

END

CKA\_CERT\_MD5\_HASH MULTILINE\_OCTAL

\133\250\263\007\050\231\173\203\324\170\027\113\363\257\045\030

END

CKA\_ISSUER MULTILINE\_OCTAL

\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061

\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157

\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125

\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145

\040\123\151\147\156\151\156\147\040\122\123\101\040\122\157\157

\164\040\103\101\040\062\060\062\062

END

CKA\_SERIAL\_NUMBER

MULTILINE\_OCTAL

\002\020\020\227\304\234\214\045\103\050\273\246\350\271\233\253

\117\241

END

CKA\_TRUST\_SERVER\_AUTH CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_EMAIL\_PROTECTION CK\_TRUST CKT\_NSS\_MUST\_VERIFY\_TRUST

CKA\_TRUST\_CODE\_SIGNING CK\_TRUST CKT\_NSS\_TRUSTED\_DELEGATOR

CKA\_TRUST\_STEP\_UP\_APPROVED CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

```
Certificate "SSL.com Code Signing ECC Root CA 2022"
Issuer: CN=SSL.com Code Signing ECC Root CA 2022,O=SSL Corporation,C=US
Serial Number:6e:8e:e4:5b:10:4c:c9:0c:7e:b4:d8:88:8f:e5:ec:64
Subject: CN=SSL.com Code Signing ECC Root CA 2022,O=SSL Corporation,C=US
Not
 Valid Before: Thu Aug 25 16:31:35 2022
Not Valid After: Sun Aug 19 16:31:34 2046
Fingerprint (MD5): aa:b1:b5:a9:b3:57:91:7d:fa:8f:2e:68:33:fb:55:a5
Fingerprint (SHA1): 0d:9e:9a:b2:07:65:a8:9e:d9:cd:8d:f2:c7:a6:3b:c7:74:95:ef:31
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Code Signing ECC Root CA 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\105\103\103\040\122\157\157
\164\040\103\101\040\062\060\062\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\105\103\103\040\122\157\157
\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\156\216\344\133\020\114\311\014\176\264\330\210\217\345
\354\144
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\113\060\202\001\322\240\003\002\001\002\002\020\156
\216\344\133\020\114\311\014\176\264\330\210\217\345\354\144\060
\012\006\010\052\206\110\316\075\004\003\003\060\127\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003
\125\004\012\014\017\123\123\114\040\103\157\162\160\157\162\141
\164\151\157\156\061\056\060\054\006\003\125\004\003\014\045\123
\123\114\056\143\157\155\040\103\157\144\145\040\123\151\147\156
\151\156\147\040\105\103\103\040\122\157\157\164\040\103\101\040
\062\060\062\062\060\036\027\015\062\062\060\070\062\065\061\066
\063\061\063\065\132\027\015\064\066\060\070\061\071\061\066\063
```



\061\063\064\132\060\127\061\013\060\011\006\003\125\004\006\023  
\002\125\123\061\030\060\026\006\003\125\004\012\014\017\123\123  
\114\040\103\157\162\160\157\162\141\164\151\157\156\061\056\060  
\054\006\003\125\004\003\014\045\123\123\114\056\143\157\155\040  
\103\157\144\145\040\123\151\147\156\151\156\147\040\105\103\103  
\040\122\157\157\164\040\103\101\040\062\060\062\062\060\166\060  
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000  
\042\003\142\000\004\166\310\254\324\326\225\222\174\027\062\345  
\313\153\101\371\051\273\261\353\242\166\265\066\330\154\113\215  
\345\076\112\127\046\046\307\237\073\137\106\146\047\121\300\054  
\143\034\164\335\254\071\323\157\075\016\224\276\276\053\060\222  
\316\242\102\126\015\120\324\244\054\161\364\047\141\333\240\201  
\077\325\115\126\026\265\314\034\067\313\063\064\021\150\307\074  
\173\015\351\224\315\243\143\060\141\060\017\006\003\125\035\023  
\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035  
\043\004\030\060\026\200\024\130\136\026\303\055\263\346\352\243  
\111\263\245\276\326\336\256\171\225\153\215\060\035\006\003\125  
\035\016\004\026\004\024\130\136\026\303\055\263\346\352\243\111  
\263\245\276\326\336\256\171\225\153\215\060\016\006\003\125\035  
\017\001\001\377\004\004\003\002\001\206\060\012\006\010\052\206  
\110\316\075\004\003\003\003\147\000\060\144\002\060\123\214\163  
\061\116\200\134\267\236\073\017\010\130\023\276\331\100\366\361  
\277\175\367\231\240\353\314\200\000\015\252\160\066\355\066\043  
\173\101\270\024\025\126\166\323\226\343\025\205\144\002\060\044  
\344\366\370\275\023\156\072\267\077\334\277\315\170\337\046\200  
\127\022\257\150\147\117\377\362\053\261\242\241\231\264\303\223  
\033\216\172\313\174\277\024\216\353\352\270\376\341\003\137

END

CKA\_NSS\_MOZILLA\_CA\_POLICY

CK\_BBOOL CK\_FALSE

CKA\_NSS\_SERVER\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

CKA\_NSS\_EMAIL\_DISTRICT\_AFTER CK\_BBOOL CK\_FALSE

# Microsoft Code Signing Only Certificate

#

Trust for "SSL.com Code Signing ECC Root CA 2022"

# Issuer: CN=SSL.com Code Signing ECC Root CA 2022,O=SSL Corporation,C=US

# Serial Number:6e:8e:e4:5b:10:4c:c9:0c:7e:b4:d8:88:8f:e5:ec:64

# Subject: CN=SSL.com Code Signing ECC Root CA 2022,O=SSL Corporation,C=US

# Not Valid Before: Thu Aug 25 16:31:35 2022

# Not Valid After: Sun Aug 19 16:31:34 2046

# Fingerprint (MD5): aa:b1:b5:a9:b3:57:91:7d:fa:8f:2e:68:33:fb:55:a5

# Fingerprint (SHA1): 0d:9e:9a:b2:07:65:a8:9e:d9:cd:8d:f2:c7:a6:3b:c7:74:95:ef:31

CKA\_CLASS CK\_OBJECT\_CLASS CKO\_NSS\_TRUST

CKA\_TOKEN CK\_BBOOL CK\_TRUE

CKA\_PRIVATE CK\_BBOOL CK\_FALSE

CKA\_MODIFIABLE CK\_BBOOL CK\_FALSE

CKA\_LABEL UTF8 "SSL.com Code Signing ECC Root CA 2022"

```
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\015\236\232\262\007\145\250\236\331\315\215\362\307\246\073\307
\164\225\357\061
```

END

```
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\252\261\265\251\263\127\221\175\372\217\056\150\063\373\125\245
```

END

```
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\105\103\103\040\122\157\157
\164\040\103\101\040\062\060\062\062
```

END

```
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\156\216\344\133\020\114\311\014\176\264\330\210\217\345
\354\144
```

END

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

Found in path(s):

```
* /opt/cola/permits/2164175484_1724904323.7563157/0/ca-certificates-2024.2.69_v8.0.303-91.4.el9_4.src.rpm-
cosi-expand-archive-J82ASJ1R/certdata.txt
```

No license file was found, but licenses were detected in source scan.

////

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////

update-ca-trust(8)

=====

:doctype: manpage

:man source: update-ca-trust

## NAME

----

update-ca-trust - manage consolidated and dynamic configuration of CA certificates and associated trust

## SYNOPSIS

-----

\*update-ca-trust\* [extract] [-o 'DIR'--output='DIR']

## DESCRIPTION

-----

update-ca-trust(8) is used to manage a consolidated and dynamic configuration feature of Certificate Authority (CA) certificates and associated trust.

The feature is available for new applications that read the consolidated configuration files found in the /etc/pki/ca-trust/extracted directory or that load the PKCS#11 module p11-kit-trust.so

Parts of the new feature are also provided in a way to make it useful for legacy applications.

Many legacy applications expect CA certificates and trust configuration in a fixed location, contained in files with particular path and name, or by referring to a classic PKCS#11 trust module provided by the NSS cryptographic library.

The dynamic configuration feature provides functionally compatible replacements for classic configuration files and for the classic NSS trust module named libnssckbi.

In order to enable legacy applications, that read the classic files or access the classic module, to make use of the new consolidated and dynamic configuration feature, the classic filenames have been changed to symbolic links.

The symbolic links refer to dynamically created and consolidated output stored below the /etc/pki/ca-trust/extracted directory hierarchy.

The output is produced using the 'update-ca-trust' command (without parameters), or using the 'update-ca-trust extract' command.

In order to produce the output, a flexible set of source configuration is read, as described in section <<sourceconf,SOURCE CONFIGURATION>>.

In addition, the classic PKCS#11 module

is replaced with a new PKCS#11 module (p11-kit-trust.so) that dynamically reads the same source configuration.

[[sourceconf]]

## SOURCE CONFIGURATION

-----  
The dynamic configuration feature uses several source directories that will be scanned for any number of source files. \*It is important to select the correct subdirectory for adding files, as the subdirectory defines how contained certificates will be trusted or distrusted, and which file formats are read.\*

Files in \*subdirectories below the directory hierarchy /usr/share/pki/ca-trust-source/\* contain CA certificates and trust settings in the PEM file format. The trust settings found here will be interpreted with a \*low priority\*.

Files in \*subdirectories below the directory hierarchy /etc/pki/ca-trust/source/\* contain CA certificates and trust settings in the PEM file format. The trust settings found here will be interpreted with a \*high priority\*.

.You may use the following rules of thumb to decide, whether your configuration files should be added to the /etc or rather to the /usr directory hierarchy:

\* If you are manually adding a configuration file to a system, you probably want it to override any other default configuration, and you most likely should add it to the respective subdirectory in the /etc hierarchy.

\* If you are creating a package that provides additional root CA certificates, that is intended for distribution to several computer systems, but you still want to allow the administrator to override your list, then your package should add your files to the respective subdirectory in the /usr hierarchy.

\* If you are creating a package that is supposed to override the default system trust settings, that is intended for distribution to several computer systems, then your package should install the files to the respective subdirectory in the /etc hierarchy.

.\*QUICK HELP 1\*:. To add a certificate in the simple PEM or DER file formats to the list of CAs trusted on the system:

- \* add it as a new file to directory /etc/pki/ca-trust/source/anchors/
- \* run 'update-ca-trust extract'

.\*QUICK HELP 2\*:. If your certificate is in the extended BEGIN TRUSTED file format (which may contain distrust/blocklist trust flags, or trust flags for usages other than TLS) then:

- \* add it as a new file to directory /etc/pki/ca-trust/source/
- \* run 'update-ca-trust extract'

.In order to offer simplicity and flexibility, the way certificate files are treated depends on the subdirectory they are installed to.

- \* simple trust anchors subdirectory: /usr/share/pki/ca-trust-source/anchors/  
or /etc/pki/ca-trust/source/anchors/
- \* simple blocklist (distrust) subdirectory: /usr/share/pki/ca-trust-source/blocklist/ or /etc/pki/ca-trust/source/blocklist/
- \* extended format directory: /usr/share/pki/ca-trust-source/ or /etc/pki/ca-trust/source/

.In the main directories /usr/share/pki/ca-trust-source/ or /etc/pki/ca-trust/source/ you may install one or multiple files in the following file formats:

- \* certificate files that include trust flags,  
in the BEGIN/END TRUSTED CERTIFICATE file format  
(any file name), which have been created using the openssl x509 tool  
and the -addreject -addtrust options.

Bundle files with multiple certificates are supported.

- \* files in the p11-kit file format using the .p11-kit file name  
extension, which can (e.g.) be used to distrust certificates  
based on serial number and issuer name, without having the  
full certificate available.

(This is currently an undocumented format, to be extended later.

For examples of the supported

formats, see the files

shipped with the ca-certificates package.)

- \* certificate files without trust flags in either the DER file format or in  
the PEM (BEGIN/END CERTIFICATE) file format (any file name). Such files  
will be added with neutral trust, neither trusted nor distrusted.

They will simply be known to the system, which might be helpful to  
assist cryptographic software in constructing chains of certificates.

(If you want a CA certificate in these file formats to be trusted, you  
should remove it from this directory and move it to the  
./anchors subdirectory instead.)

In the anchors subdirectories /usr/share/pki/ca-trust-source/anchors/ or /etc/pki/ca-trust/source/anchors/  
you may install one or multiple certificates in either the DER file  
format or in the PEM (BEGIN/END CERTIFICATE) file format.  
Each certificate will be treated as \*trusted\* for all purposes.

In the blocklist subdirectories /usr/share/pki/ca-trust-source/blocklist/ or /etc/pki/ca-trust/source/blocklist/  
you  
may install one or multiple certificates in either the DER file  
format or in the PEM (BEGIN/END CERTIFICATE) file format.  
Each certificate will be treated as \*distrusted\* for all purposes.

Please refer to the x509(1) manual page for the documentation of the  
BEGIN/END CERTIFICATE and BEGIN/END TRUSTED CERTIFICATE file formats.

Applications that rely on a static file for a list of trusted CAs  
may load one of the files found in the /etc/pki/ca-trust/extracted  
directory. After modifying any file in the  
/usr/share/pki/ca-trust-source/ or /etc/pki/ca-trust/source/

directories or in any of their subdirectories, or after adding a file,  
it is necessary to run the 'update-ca-trust extract' command,  
in order to update the consolidated files in /etc/pki/ca-trust/extracted/ .

Applications that load the classic PKCS#11 module using filename libnssckbi.so  
(which has been converted into a symbolic link pointing to the new module)  
and any application capable of  
loading PKCS#11 modules  
and loading p11-kit-trust.so, will benefit from  
the dynamically merged set of certificates and trust information stored in the  
/usr/share/pki/ca-trust-source/ and /etc/pki/ca-trust/source/ directories.

[[extractconf]]

## EXTRACTED CONFIGURATION

-----

The directory /etc/pki/ca-trust/extracted/ contains generated CA certificate  
bundle files which are created and updated, based on the <<sourceconf,SOURCE CONFIGURATION>>  
by running the 'update-ca-trust extract' command.

If your application isn't able to load the PKCS#11 module p11-kit-trust.so,  
then you can use these files in your application to load a list of global  
root CA certificates.

Please never manually edit the files stored in this directory,  
because your changes will be lost and the files automatically overwritten,  
each time the 'update-ca-trust extract' command gets executed.

In order to install new trusted or distrusted certificates,  
please rather install them in the respective subdirectory below the  
/usr/share/pki/ca-trust-source/  
or /etc/pki/ca-trust/source/  
directories, as described in the <<sourceconf,SOURCE CONFIGURATION>> section.

The directory /etc/pki/ca-trust/extracted/java/ contains  
a CA certificate bundle in the java keystore file format.  
Distrust information cannot be represented in this file format,  
and distrusted certificates are missing from these files.  
File cacerts contains CA certificates trusted for TLS server authentication.

The directory /etc/pki/ca-trust/extracted/openssl/ contains  
CA certificate bundle files in the extended BEGIN/END TRUSTED CERTIFICATE file format,  
as described in the x509(1) manual page.  
File ca-bundle.trust.crt contains the full set of all trusted  
or distrusted certificates, including the associated trust flags.

The directory /etc/pki/ca-trust/extracted/pem/ contains  
CA certificate bundle files in the simple BEGIN/END CERTIFICATE file format,

as described in the x509(1) manual page.  
Distrust information cannot be represented in this  
file format,  
and distrusted certificates are missing from these files.  
File `tls-ca-bundle.pem` contains CA certificates  
trusted for TLS server authentication.  
File `email-ca-bundle.pem` contains CA certificates  
trusted for E-Mail protection.  
File `objsign-ca-bundle.pem` contains CA certificates  
trusted for code signing.

The directory `/etc/pki/ca-trust/extracted/edk2/` contains a CA  
certificate bundle ("`cacerts.bin`") in the "sequence of  
EFI\_SIGNATURE\_LISTs" format, defined in the UEFI-2.7 specification,  
sections "31.4.1 Signature Database" and  
"EFI\_CERT\_X509\_GUID". Distrust information cannot be represented in  
this file format, and distrusted certificates are missing from these  
files. File "`cacerts.bin`" contains CA certificates trusted for TLS  
server authentication.

## COMMANDS

-----

(absent/empty command)

~~~~~

Same as the `*extract*` command described below. (However, the command may print  
fewer warnings, as this command is being run during rpm package installation,  
where  
non-fatal status output is undesired.)

extract

~~~~~

Instruct `update-ca-trust` to scan the `<<sourceconf,SOURCE CONFIGURATION>>` and  
produce updated versions of the consolidated configuration files stored below  
the `/etc/pki/ca-trust/extracted` directory hierarchy.

## EXTRACT OPTIONS

^^^^^^^^^^^^^^^^

`*-o DIR*, *--output=DIR*::`

Write the extracted trust store into the given directory instead of  
updating `/etc/pki/ca-trust/extracted`.

## FILES

-----

`/etc/pki/tls/certs/ca-bundle.crt::`

Classic filename, file contains a list of CA certificates trusted for TLS server authentication usage, in the simple  
BEGIN/END CERTIFICATE file format, without distrust information.

This file is a symbolic link that refers to the consolidated output created by the `update-ca-trust` command.

/etc/pki/tls/certs/ca-bundle.trust.crt::

Classic filename, file contains a list of CA certificates in the extended BEGIN/END TRUSTED CERTIFICATE file format, which includes trust (and/or distrust) flags specific to certificate usage.

This file is a symbolic link that refers to the consolidated output created by the update-ca-trust command.

/etc/pki/java/cacerts::

Classic filename, file contains a list of CA certificates trusted for TLS server authentication usage, in the Java keystore file format, without distrust information.

This file is a symbolic link that refers to the consolidated output created by the update-ca-trust command.

/usr/share/pki/ca-trust-source::

Contains multiple, low priority source configuration files as explained in section <<sourceconf,SOURCE CONFIGURATION>>. Please pay attention to the specific meanings of the respective subdirectories.

/etc/pki/ca-trust/source::

Contains multiple, high priority source configuration files as explained in section <<sourceconf,SOURCE CONFIGURATION>>. Please pay attention to the specific meanings of the respective subdirectories.

/etc/pki/ca-trust/extracted::

Contains consolidated and automatically generated configuration files for consumption by applications,

which are created using the 'update-ca-trust extract' command. Don't edit files in this directory, because they will be overwritten.

See section <<extractconf,EXTRACTED CONFIGURATION>> for additional details.

## AUTHOR

-----

Written by Kai Engert and Stef Walter.

Found in path(s):

\* /opt/cola/permits/2164175484\_1724904323.7563157/0/ca-certificates-2024.2.69\_v8.0.303-91.4.el9\_4.src.rpm-cosi-expand-archive-J82ASJ1R/update-ca-trust.8.txt

No license file was found, but licenses were detected in source scan.

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```

Found in path(s):



\* /opt/cola/permits/2164175484\_1724904323.7563157/0/ca-certificates-2024.2.69\_v8.0.303-91.4.el9\_4.src.rpm-cosi-expand-archive-J82ASJ1R/certdata2pem.py

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Found in path(s):

\* /opt/cola/permits/2164175484\_1724904323.7563157/0/ca-certificates-2024.2.69\_v8.0.303-91.4.el9\_4.src.rpm-cosi-expand-archive-J82ASJ1R/nssckbi.h

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- update License: field to SPDX

Found in path(s):

\* /opt/cola/permits/2164175484\_1724904323.7563157/0/ca-certificates-2024.2.69\_v8.0.303-91.4.el9\_4.src.rpm-cosi-expand-archive-J82ASJ1R/ca-certificates.spec

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////

ca-legacy(8)

=====

:doctype: manpage

:man source: ca-legacy

NAME

----

ca-legacy - Manage the system configuration for legacy CA certificates

SYNOPSIS

-----

`*ca-legacy* ['COMMAND']`

## DESCRIPTION

-----

`ca-legacy(8)` is used to include or exclude a set of legacy Certificate Authority (CA) certificates in the system's list of trusted CA certificates.

The list of CA certificates and trust flags included in the `ca-certificates` package are based on the decisions made by Mozilla.org according to the Mozilla CA policy.

Occasionally, removal or distrust decisions made by Mozilla.org might be incompatible with the requirements or limitations of some applications that also use the CA certificates list in the Linux environment.

The `ca-certificates` package might keep some CA certificates included and trusted by default, as long as it is seen necessary by the maintainers, despite the fact that they have been removed by Mozilla. These certificates are called legacy CA certificates.

The general requirements to keep legacy CA certificates included and trusted might change over time, for example if functional limitations of software packages have been resolved. Future versions of the `ca-certificates` package might reduce the set of legacy CA certificates that are included and trusted by default.

The `ca-legacy(8)` command can be used to override the default behaviour.

The mechanisms to individually trust or distrust CA certificates as described in `update-ca-trust(8)` still apply.

## COMMANDS

-----

`*check*::`

The current configuration will be shown.

`*default*::`

Configure the system to use the default configuration, as recommended by the package maintainers.

`*disable*::`

Configure the system to explicitly disable legacy CA certificates. Using this configuration, the system will use the set of included and trusted CA certificates as released by Mozilla.

`*install*::`

The configuration file will be read and the system configuration will be set accordingly. This command is executed automatically during

upgrades of the ca-certificates package.

## FILES

-----

/etc/pki/ca-trust/ca-legacy.conf::

A configuration file that will be used and modified by the ca-legacy command.

The contents of the configuration file will be read on package upgrades.

## AUTHOR

-----

Written by Kai Engert.

Found in path(s):

\* /opt/cola/permits/2164175484\_1724904323.7563157/0/ca-certificates-2024.2.69\_v8.0.303-91.4.el9\_4.src.rpm-cosi-expand-archive-J82ASJ1R/ca-legacy.8.txt

# 1.231 libevent 2.1.12-8.el9\_4

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Found in path(s):

\* /opt/cola/permits/2173509635\_1725629747.7975738/0/libevent-c8-zip/libevent/SPECS/libevent.spec

# 1.232 libmnl 1.0.4-16.el9\_4

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## 1.236 glib 2.68.4-14.el9\_4.1

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## 1.237 x-term 0.24.0

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## 1.238 openssl 3.3.2-r1

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To do so,  
attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>
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```

```
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the Free Software Foundation; either version 1, or (at your option)
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```
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```

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## 1.239 easyjson 0.7.7

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# 1.240 gopkg.in-yaml 2.4.0

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# 1.241 google-uuid 1.3.0

## 1.241.1 Available under license :

Paul Borman <borman@google.com>

bmatsuo

shawnps

theory

jboverfelt

dsymonds

cd1

wallclockbuilder

dansouza

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## 1.242 gnupg 1.15.1

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```
(21:protected-private-key(3:elg(1:p129:|B36I(s7)+ZJ/pvE;"tg7N ca"Gxvnyu&bB#h'7=89&oG
R<hO)(1:g1:)(1:y128:Ji]WU_UP}AQ\YMhAl|2e{ _tcMNDg}{ QnWsK 4pY{ $bDCs)(9:protected25:openpgp-s2k3-
sha1-aes-cbc((4:sha18:JcE7:6452224)16: i[Q*vK)192:FJA!O!ZAF
biJ&Tsb!t
&9@R\~V+x>?sedDz-W(yqf?u^e?s1saV8<T0:tC5%ZMh?$|,y_e[1D)(12:protected-at15:20130812T105135)))
{
 "op": "keylist",
 "keys": ["bravo@example.net", "alpha@example.net"],
 "with-secret": true
}
(21:protected-private-key(3:elg(1:p129:W#} }l;;m>
;4YV$Qg
LoLy~*Tru*+ID8"-9,:17^g*({ #7)(1:g1:)(1:y128:2o62,Tj/
rRi3sSS iCAYNYbVtAHKi7(UPp)?Od{ 'R^f)(9:protected25:openpgp-s2k3-sha1-aes-
cbc((4:sha18:fw`E7:5242880)16:aqR)192:5f1a-` {^EV699WoB\,:Rs1*W6Lu iZ
```

```
:=ZqURM47;pA3#DL
so8O)Th^P@IP0&.DR;"rkN7)(12:protected-at15:20101008T070216)))
#+TITLE: GPGME Python Bindings HOWTO Examples
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

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```
:PROPERTIES:
:CUSTOM_ID: gpgme-python3-examples
:END:
```

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```

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```
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:END:
```

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cython

```
{
 "op": "config",
 "component": "gpg"
}
```

;;; gpgme-package.lisp

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;;; Conventions:

;;;

;;; gpg-error is used for error handling.

;;;

;;; Standard I/O streams are used for input and output.

```
(defpackage #:gpgme
 (:use #:common-lisp #:cffi #:gpg-error)
 (:import-from #:trivial-garbage
 #:finalize))
```

```
(:export #:check-version
 #:*version*
 #:context
 #:protocol
 #:armorp
 #:textmodep
 #:+include-certs-default+
 #:include-certs
 #:keylist-mode
 #:signers
 #:sig-notations
 #:with-context
 #:key-data
 #:get-key
 #:op-encrypt
 #:op-decrypt
 #:op-sign
 #:op-verify
 #:op-import
 #:op-export))
{
 "op": "encrypt",
 "keys": ["bravo@example.net", "alpha@example.net"],
 "data": "Hello world",
 "file_name": "test.txt",
 "armor": false,
 "always-trust": true
}
{
 "type": "signature",
 "base64": false,
 "data": "*"
}

```

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-05-12 Marcus Brinkmann <marcus@g10code.com>

\* gpgme.texi (I/O Callback Example): Fix example code.

\* gpgme.texi (Generating Keys): Fix OpenPGP parameters and reference GPG and GPGSM manual.

2010-01-05 Werner Koch <wk@g10code.com>

\* gpgme.texi (Changing Passphrases): New.

2009-07-21 Werner Koch <wk@g10code.com>

\* uiserver.texi (UI Server Encrypt): Add --expect-sign option to PREP\_ENCRYPT.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Result Management): New section.

2009-06-16 Werner Koch <wk@g10code.com>

\* gpgme.texi (Exporting Keys): Document gpgme\_op\_export\_keys.  
(Importing Keys): Document gpgme\_op\_import\_keys.  
(Data Buffer Meta-Data): Document URL encodings.

2009-05-28

Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Library Version Check): Document selftest error.  
(Creating Contexts): Likewise.

2009-05-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Encrypting a Plaintext): Document GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Engine Information): Replace path by file\_name.

2008-11-28 Werner Koch <wk@g10code.com>

\* gpgme.texi (Listing Keys): Change description of the return value to match the code. Spotted by Colin Leroy.

2008-10-15 Werner Koch <wk@g10code.com>

\* uiserver.texi (Miscellaneous UI Server Commands): Add option --protocol to the SENDER command.

2008-07-17 Werner Koch <wk@g10code.com>

\* module-overview.sk: New.

2008-07-04 Werner Koch <wk@g10code.com>

\* gpgme.texi (Algorithms): Add a hint on symmetric only encryption.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Cancellation): Document gpgme\_cancel\_async.

2008-06-25

Werner Koch <wk@g10code.com>

\* gpgme.texi (Listing Keys): Updated example to the current API.

Noted by Nico Schottelius.

2008-06-05 Werner Koch <wk@g10code.com>

\* uiserver.texi (Miscellaneous UI Server Commands): Describe START\_CONFDialog.

2008-06-04 Werner Koch <wk@g10code.com>

\* gpgme.texi: Use @copying command. Change license to GPLv3. Include protocol specs from GpgOL and GPGEx. Minor cleanups.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (File Based Data Buffers): Document the need for blocking operations.

(Callback Based Data Buffers): Likewise.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Library Version Check): Rename snippet function to init\_gpgme.

(I/O Callback Example): Call it here.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi: Document that data encoding affects some output data objects now.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Protocols and Engines):

Document GPGME\_PROTOCOL\_UNKNOWN.

2007-09-11 Werner Koch <wk@g10code.com>

\* gpgme.texi (I/O Callback Example): Typo fix.

2007-08-07 Werner Koch <wk@g10code.com>

\* gpgme.texi (Verify): Describe chain\_model.

2007-07-12 Werner Koch <wk@g10code.com>

\* gpgme.texi (Library Version Check): Add remark that the socket layer will get initialized.

2007-06-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Advanced Key Editing): New section.

2007-05-21 Werner Koch <wk@g10code.com>

\* Makefile.am (online): New target.

2007-05-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Error Strings): Fix documentation of gpgme\_strerror\_r.

2006-11-01 Moritz Schulte <moritz@g10code.com>

\* gpgme.texi (Data Buffer I/O Operations): Fixed entry for gpgme\_data\_seek: OFFSET is not a pointer; some s/whence/offset/.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Destroying Data Buffers): Clarify that gpgme\_data\_release\_and\_get\_mem destroys DH unconditionally.

2005-03-24

Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Library Version Check): Make example code compatible to W32 systems.

2006-06-21 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Passphrase Callback): Fix inverted condition in description.

2005-12-20 Werner Koch <wk@g10code.com>

\* gpgme.texi (Verify): Document pka\_trust.

2005-12-06 Werner Koch <wk@g10code.com>

\* gpgme.texi (Key Management): Updated to match the fixes for subkey fingerprints and the secret flag.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Destroying Data Buffers): Document gpgme\_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Management): Add the new member notations of gpgme\_sig\_key\_t.  
(Key Listing Mode): Document GPGME\_KEYLIST\_MODE\_SIG\_NOTATIONS.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi: Enclose all return parameters of dectypes in curly brackets.

\* gpgme.texi (Signature Notation Data): New section.  
(Verify): Added more about the notation data structure.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Data Buffer I/O Operations, Data Buffer Meta-Data): New subsections.

\* gpgme.texi: Replace plaintext\_filename with file\_name.

\* gpgme.texi (Key Management): Document is\_qualified.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Decrypt): Add plaintext\_filename to gpgme\_decrypt\_result\_t.  
(Verify): Likewise for gpgme\_verify\_result\_t.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Verify): Add information about new fields in gpgme\_signature\_t.

\* gpgme.texi (Decrypt): Add gpgme\_recipient\_t.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Listing Mode): Fix return type of  
gpgme\_set\_keylist\_mode.  
Reported by "Sergio" <ml\_sergico@virgilio.it>.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Included Certificates): Document  
GPGME\_INCLUDE\_CERTS\_DEFAULT.

2005-01-12 Marcus  
Brinkmann <marcus@g10code.de>

\* gpgme.texi (Engine Configuration): New section.  
(Crypto Engine): New subsection.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

\* lesser.texi (Library Copying): Change from @appendixsec to  
@appendix.  
\* gpgme.texi (Features): Change reference to GPL to one to LGPL.  
  
\* Makefile.am: Change license to LGPL.  
(gpgme\_TEXINFOS): Replace gpl.texi with lesser.texi.

\* gpgme.texi: Change license to LGPL (also for documentation of  
GPGME's license).  
\* lesser.texi: New file.  
\* gpl.texi: File removed.

\* gpgme.texi (Creating Contexts): Fix cut&paste error. Reported  
by Noel Torres <envite@rolamasao.org>.

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (gpgme\_TEXINFOS): Remove fdl.texi.  
\* gpgme.texi: Do not include fdl.texi. Change license to GPL.  
\* fdl.texi: File removed.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Management): Change type of keylist\_mode in  
gpgme\_key\_t to gpgme\_keylist\_mode\_t.

2004-09-28  
Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Passphrase Callback): Fix last change.

2004-09-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Passphrase Callback): Document  
GPG\_ERR\_NOT\_IMPLEMENTED.

\* gpgme.texi: Update copyright year for tex version.

2004-07-29 Moritz Schulte <moritz@g10code.com>

\* gpgme.texi (Verify): Fix gpgme\_get\_key example (ancient  
force\_update argument was still there).

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Listing Keys): Elaborate on the length restrictions  
on search patterns.

\* gpgme.texi (Decrypt and Verify): Document the NO\_DATA error  
code.

(Verify): Document the relationship between gpgme\_op\_verify\_result  
and the decrypt and verify operations.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Verify): Document GPG\_ERR\_CERT\_REVOKED status.

\* gpgme.texi (Decrypt): Add note about new field wrong\_key\_usage  
of gpgme\_decrypt\_result\_t.

\* gpgme.texi (Key Management): Add  
note about new field  
keylist\_mode of gpgme\_key\_t.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Verify): Correct type of member wrong\_key\_usage.

2004-03-29 Moritz Schulte <moritz@duesseldorf.ccc.de>

\* gpgme.texi (Verify): Fix type of gpgme\_op\_verify\_result.

\* gpgme.texi (Key Listing Mode): Typo fix.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Library Version Check): Fix the instruction when to  
set the locale.



2004-03-03 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (I/O Callback Example Qt): New section by Marc Mutz.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (cancellation): New section.

2004-02-17 Werner Koch <wk@gnupg.org>

\* gpgme.texi (Key Listing Mode): Doc KEYLIST\_MODE\_VALIDATE.

2004-02-06 Moritz Schulte <mo@g10code.com>

\* gpgme.texi: A couple of small fixes regarding the Largefile Support section.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Largefile Support): New section.

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Management): Fix exportable field.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Management): Rename member class in gpgme\_key\_sig\_t to sig\_class.  
(Creating a Signature): Likewise for gpgme\_signature\_t.

2003-12-23 Moritz Schulte <mo@g10code.com>

\* gpgme.texi (Listing Keys): Minor clarification for gpgme\_get\_key.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Signal Handling): New section.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Multi Threading): Correct documentation on memory synchronization requirement.

\* gpgme.texi (Locale): New section.

(Multi Threading): Set locale in example.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Error Strings): Add gpgme\_strerror\_r.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Multi Threading): Update documentation.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

\*

gpgme.texi (Header): We don't use the assuan namespace anymore.  
Document new thread options.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Creating a Signature): Change type of member class  
to unsigned int.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Verify): Get error code from SIG->status in the code  
for gpgme\_get\_sig\_status.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Management): Add can\_authenticate flag.

\* gpgme.texi (Listing Keys): Document GPG\_ERR\_AMBIGUOUS\_NAME for  
gpgme\_get\_key.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (EXTRA\_DIST): Remove variable.

\* gpgme.texi (Encrypting a Plaintext): Bad passphrase is only  
possible with symmetric encryption, change the wording to reflect  
that.

\* gpgme.texi (Creating a Signature): Document  
GPG\_ERR\_UNUSABLE\_SECKEY.

\* gpgme.texi (Encrypting a Plaintext): Mention encrypt and sign  
operations in result function.  
(Creating  
a Signature): Likewise.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Listing Mode): Remove word duplication.  
(Listing Keys): Remove mentioning of force argument.  
(Verify): Don't mention r\_stat. Fix some typos.  
(Decrypt and Verify): Correct info how to get the result. Don't mention r\_stat.  
(Manipulating Data Buffers): Fix documentation of return value.  
(Listing Keys): Update examples.  
(Decrypt): Result might also be available when operation failed.  
(Verify): Result might also be available when operation failed.  
All spotted by Stphane Corthsy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Error Sources): Fix cut and paste error.

2003-07-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Management): Clarify difference between can\_sign and can\_certify.  
(Information About Keys): Likewise for GPGME\_ATTR\_CAN\_SIGN and GPGME\_ATTR\_CAN\_CERTIFY.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Progress Meter Callback): Change return type of gpgme\_progress\_cb\_t to void.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi: Add 2003 to copyright notice.

\* gpgme.texi (Header): Fix name space documentation on libgpg-error.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Multi Threading): Remove reference to gpgme\_recipients\_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Crypto Operations): Rename gpgme\_invalid\_user\_id\_t to gpgme\_invalid\_key\_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi: Change error codes to GPG\_ERR\_\* variants.  
(Error Handling): Rewritten.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Exporting Keys): Change and document prototypes.  
Add new gpgme\_op\_export\_ext and gpgme\_op\_export\_ext\_start  
variants.  
(Selecting Recipients): Section removed.  
(Encrypting a Plaintext): Change prototypes and document the  
changes.

2003-05-28 Marcus Brinkmann <marcus@g10code.de>

\*  
gpgme.texi (Exporting Keys): Change argument type from  
gpgme\_recipient\_t to gpgme\_user\_id\_t.  
(Encrypting a Plaintext): Likewise.  
(Selecting Recipients): Rewritten.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Protocol Selection): Do not use @acronym in @node  
because that breaks texi2dvi.  
  
\* gpgme.texi (Passphrase Callback): Document new prototype.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Header): Remove Gpgme as namespace prefix. Add  
\_GPGME to namespace prefix.  
\* gpgme.texi (Multi Threading): Add note about link order.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Listing Keys): Document what happens if key is not  
found.  
  
\* gpgme.texi (Importing Keys): Fix cut and paste error.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Encrypting a Plaintext): Remove reference to  
gpgme\_get\_op\_info.  
(Detailed Results): Subsection removed.  
  
\* gpgme.texi (Key Listing Mode): Add GPGME\_KEYLIST\_MODE\_SIGS.

(Manipulating Keys): Add obsolescence note.  
(Key Signatures): Likewise.  
(Information About Keys): Likewise.  
(Key Management): Add new data types GpgmeSubkey, GpgmeKeySig, GpgmeUserID, and all the information about GpgmeKey.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Listing Keys): Remove force\_update argument from gpgme\_get\_key.

\* gpgme.texi (Trust Item Management): Add data members of GpgmeTrustItem type.  
(Information About Trust Items): Add note about obsolescence.  
(Manipulating Trust Items): Add gpgme\_trust\_item\_ref and gpgme\_trust\_item\_unref.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Verify): Rewritten to take into account new and deprecated functions and data types.

\* gpgme.texi (Decrypt): Descript gpgme\_op\_decrypt\_result and GpgmeDecryptResult.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Encrypting a Plaintext): Add info about GpgmeEncryptResult and gpgme\_op\_encrypt\_result.

\* gpgme.texi  
(Creating a Signature): Add info about GpgmeNewSignature, GpgmeSignResult and gpgme\_op\_sign\_result.  
(Crypto Operations): Add GpgmeInvalidUserID.  
(Algorithms): New chapter.

\* gpgme.texi (Deleting Keys): Document GPGME\_Ambiguous\_Specification.  
(Error Values): Remove GPGME\_Invalid\_Type and GPGME\_Invalid\_Mode.  
Add GPGME\_Unknown\_Reason, GPGME\_Not\_Found, GPGME\_Ambiguous\_Specification, GPGME\_Wrong\_Key\_Usage, GPGME\_Key\_Revoked, GPGME\_Key\_Expired, GPGME\_No\_CRL\_Known, GPGME\_CRL\_Too\_Old, GPGME\_Policy\_Mismatch, GPGME\_No\_Secret\_Key, GPGME\_Key\_Not\_Trusted, GPGME\_Issuer\_Missing, GPGME\_Chain\_Too\_Long, GPGME\_Unsupported\_Algorithm, GPGME\_Sig\_Expired, GPGME\_Bad\_Signature, GPGME\_No\_Public\_Key.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Importing Keys): Change GPGME\_IMPORT\_PRIVATE to GPGME\_IMPORT\_SECRET.

\* gpgme.texi (Importing Keys): Remove note about gpgme\_get\_op\_info.  
(Detailed Results): Remove note about import.

\* gpgme.texi (Importing Keys): Add documentation  
for  
GpgmeImportStatus, GpgmeImportResult and gpgme\_op\_import\_result.

\* gpgme.texi (Generating Keys): Fix documentation of public and  
secret arguments.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Generating Keys): Document changed gpgme\_op\_genkey  
and new gpgme\_op\_genkey\_result function. Document  
GpgmeGenKeyResult data type.

\* gpgme.texi (Error Values): Rename GPGME\_No\_Passphrase to  
GPGME\_Bad\_Passphrase.

\* gpgme.texi (Decrypt): Likewise.

(Decrypt and Verify): Likewise.

(Creating a Signature): Likewise.

(Encrypting a Plaintext): Likewise.

\* gpgme.texi (Error Values): Rename GPGME\_No\_Recipients to  
GPGME\_No\_UserID and GPGME\_Invalid\_Recipient to  
GPGME\_Invalid\_UserID.

(Encrypting a Plaintext): Likewise.

\* gpgme.texi (Error Values): Remove GPGME\_Busy and GPGME\_No\_Request.

(Listing Keys): Likewise.

(Listing Trust Items): Likewise.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Cancelling an Operation): Removed.

(Passphrase

Callback): Document new type for GpgmePassphraseCb.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Engine Information): Rename member part to  
file\_name.

\* gpgme.texi (Protocols and Engines): Document  
gpgme\_get\_protocol\_name.

\* gpgme.texi (Engine Information): Rewritten.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (I/O Callback Interface): Document new even  
GPGME\_EVENT\_START.  
(Waiting For Completion): Document new possible return values.  
(I/O Callback Interface): Document return type of GpgmeIOCb.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Hooking Up Into Idle Time): Section removed.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Verify): Drop R\_STAT argument in gpgme\_op\_verify.  
\* gpgme.texi (Decrypt and Verify): Likewise for  
gpgme\_op\_decrypt\_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Information About Keys): Document that  
GPGME\_ATTR\_IS\_SECRET is not representable  
as a string anymore.

2002-12-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Signatures): New section.  
(Listing Keys): Add gpgme\_get\_key.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Memory Based Data Buffers): New subsection.  
(File Based Data Buffers): Likewise.  
(Callback Based Data Buffers): Likewise.  
(Manipulating Data Buffers): Update interfaces. Add  
gpgme\_data\_seek.  
\* gpgme.texi (Engine Version Check): Remove gpgme\_check\_engine.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Verify): Document the new interface.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Generating Keys): Document new argument to gpgme\_op\_genkey.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Verify): Fix prototype of gpgme\_get\_sig\_key.  
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Selecting Signers): Fix reference count.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Header): Document name space.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Importing Keys): Document gpgme\_op\_import\_ext.

\* gpgme.texi (Importing Keys): Undocument EOF.

2002-08-14 Werner Koch <wk@gnupg.org>

\* gpgme.texi (Information About Keys): Changed GPGME\_ATTR\_TYPE.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Deleting Keys): Say that secret keys might not be deleted.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Information About Keys): Document (badly) the new key attributes.

\* gpgme.texi (Manipulating Data Buffers): Mention that backend tries to detect encoding automatically.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Run Control): Update this section.  
(Waiting For Completion): Likewise for this subsection.  
(Cancelling an Operation): Likewise for this subsection.  
(Using External Event Loops): New subsection with several subsubsections.



2002-06-28

Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Multi Threading): Remove item about the need to synchronize anything against gpgme\_wait (except gpgme\_wait itself).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Information About Keys): Fix documentation for IDX. (Information About Trust Items): Likewise.

2002-06-26 Werner Koch <wk@gnupg.org>

\* gpgme.texi (Importing Keys): Document the return value -1 of gpgme\_op\_import.

2002-06-20 Werner Koch <wk@gnupg.org>

\* gpgme.texi (Verify): Explain the new whatidx variable.

2002-06-10 Werner Koch <wk@gnupg.org>

\* gpgme.texi (Verify): Document attribute GPGME\_ATTR\_ERRTOK.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Multi Threading): Document new autodetection.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (DISTCLEANFILES): New variable.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi: Some typographical corrections throughout.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Using Automake): New section.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Multi Threading): Escape { and }.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Overview): Replace note about thread-safeness.  
(Multi Threading): New section.

2002-05-03 Werner Koch <wk@gnupg.org>

\* gpgme.texi (Manipulating Data Buffers): Changed some data types  
to void\*.  
(Protocol Selection): Added gpgme\_get\_protocol.  
(Verify): Updated to include the new attribute functions and  
status codes.

2002-04-27 Werner Koch <wk@gnupg.org>

\* gpgme.texi (Manipulating Data Buffers): New type GpgmeDataEncoding.

2002-04-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Passphrase Callback): Document that either return  
argument can be NULL.  
(Progress Meter Callback): Likewise.

2002-04-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Passphrase Callback): Fix small  
typo. Document the  
new function gpgme\_get\_passphrase\_cb.  
(Progress Meter Callback): Document the new function  
gpgme\_get\_progress\_cb.

2002-04-16 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Creating a Signature): Fix function name. Reported  
by Wichert Ackerman <wichert@debian.org>.

2002-03-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (direntry): End index entry with a full stop.  
Patch submitted by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Detailed Results): Fix syntax error in last change.

2002-03-08 Werner Koch <wk@gnupg.org>

\* gpgme.texi (Detailed Results): Import does also return info.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Encrypting a Plaintext): Document symmetric encryption.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Error Strings): Add example.

\* gpgme.texi (Listing Keys): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\*

gpgme.texi (Information About Keys): Document GPGME\_ATTR\_EXPIRE.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Verify): Document verification of normal and cleartext signatures.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Listing Keys): Document gpgme\_op\_keylist\_ext\_start.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Encrypting a Plaintext): Document GPGME\_Invalid\_Recipients.  
(Error Values): Likewise.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Encrypting a Plaintext): Document gpgme\_op\_encrypt\_sign and gpgme\_op\_encrypt\_sign\_start.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Creating a Signature): Add a note about certificates to include.  
(Included Certificates): New section.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Detailed Results): Remove literal tags.  
(Generating Keys): Update documentation.

\* gpgme.texi (Generating Keys):  
Fix syntax error.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Waiting For Completion): Adjust doc to changes in the code.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Key Listing Mode): Update documentation.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Generating Keys): Document error at creation failure.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Deleting Keys): Document new error values.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Importing Keys): Add reference to gpgme\_get\_op\_info.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi: Some spell checking.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi: Add all the gpgme\_op\_\*\_start functions.  
Fill the concept index with many, many entries.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Run Control): New section.  
(Verify): Document gpgme\_get\_notation.  
(More Information):  
New section describing gpgme\_get\_op\_info.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Passphrase callback): Change GpgmePassphraseCb's R\_HD type from void\* to void\*\*.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Creating data buffers): Change gpgme\_data\_new\_from\_filepart's LENGTH type from off\_t to size\_t.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi (Generating keys): New subsection.  
(Exporting keys): Likewise.  
(Importing keys): Likewise.  
(Deleting keys): Likewise.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.texi: g10Code -> g10 Code  
  
\* gpgme.texi (Top): Complete detailmenu.  
  
\* gpgme.texi: Convert embarrassing cruft to the real thing.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

\* ChangeLog: New file.  
\* gpgme.texi: Likewise.  
\* gpl.texi: Likewise.  
\* fdl.texi: Likewise.  
\* Makefile.am (info\_TEXINFOS): New variable.  
(gpgme\_TEXINFOS): Likewise.

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(private-key

(oid.1.2.840.113549.1.1.1

(n

#00e0ce96f90b6c9e02f3922beada93fe50a875eac6bcc18bb9a9cf2e84965caa2d1ff95a7f542465c6c0c19d276e4526ce  
048868a7a914fd343cc3a87dd74291ffc565506d5bbb25cbac6a0e2dd1f8bcaab0d4a29c2f37c950f363484bf269f78914  
40464baf79827e03a36e70b814938eebdc63e964247be75dc58b014b7ea251#)

(e #010001#)

(d

#046129F2489D71579BE0A75FE029BD6CDB574EBF57EA8A5B0FDA942CAB943B117D7BB95E5D28875E0F  
9FC5FCC06A72F6D502464DABDED78EF6B716177B83D5BDC543DC5D3FED932E59F5897E92E6F58A0F334  
24106A3B6FA2CBF877510E4AC21C3EE47851E97D12996222AC3566D4CCB0B83D164074ABF7DE655FC244  
6DA1781#)

(p

#00e861b700e17e8afe6837e7512e35b6ca11d0ae47d8b85161c67baf64377213fe52d772f2035b3ca830af41d8a4120e1c1c70d12cc22f00d28d31dd48a8d424f1#)

(q

#00f7a7ca5367c661f8e62df34f0d05c10c88e5492348dd7bddc942c9a8f369f935a07785d2db805215ed786e4285df1658eed3ce84f469b81b50d358407b4ad361#)

(u

#304559a9ead56d2309d203811a641bb1a09626bc8eb36ffa23c968ec5bd891eebbafc73ae666e01ba7c8990bae06cc2bbe10b75e69fcacb353a6473079d8e9b#)

)

This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

\* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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## Main Menu

\*\*\*\*\*

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35 of the GPGME library.

### \* Menu:

- \* Introduction::           How to use this manual.
- \* Preparation::           What you should do before using the library.
- \* Protocols and Engines::   Supported crypto protocols.
- \* Algorithms::           Supported algorithms.
- \* Error Handling::         Error numbers and their meanings.
- \* Exchanging Data::        Passing data to and from GPGME.
- \* Contexts::             Handling GPGME contexts.

## Appendices

- \* UI Server Protocol::     The GnuPG UI Server Protocol.
- \* Debugging::            How to solve problems.
- \* Deprecated Functions::   Documentation of deprecated functions.
  
- \* Library Copying::        The GNU Lesser General Public License says how you can copy and share GnuPG Made Easy.
- \* Copying::                The GNU General Public License says how you can copy and share this manual.

## Indices

- \* Concept Index::         Index of concepts and programs.
- \* Function and Data Index::   Index of functions, variables and data types.

## The Detailed Node Listing

### Introduction

- \* Getting Started::        Purpose of the manual, and how to use it.
- \* Features::             Reasons to install and use GPGME.
- \* Overview::             Basic architecture of the GPGME library.

### Preparation

- \* Header::                What header file you need to include.

- \* Building the Source:: Compiler options to be used.
- \* Largefile Support (LFS):: How to use GPGME with LFS.
- \* Using Automake:: Compiler options to be used the easy way.
- \* Using Libtool:: Avoiding compiler options entirely.
- \* Library Version Check:: Getting and verifying the library version.
- \* Signal Handling:: How GPGME affects signal handling.
- \* Multi-Threading:: How GPGME can be used in an MT environment.

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- \* Engine Information:: Obtaining more information about the engines.
- \* Engine Configuration:: Changing the engine configuration.
- \* OpenPGP:: Support for the OpenPGP protocol.
- \* Cryptographic Message Syntax:: Support for the CMS.

## Algorithms

- \* Public Key Algorithms:: A list of all public key algorithms.
- \* Hash Algorithms:: A list of all hash algorithms.

## Error Handling

- \* Error Values:: The error value and what it means.
- \* Error Codes:: A list of important error codes.
- \* Error Sources:: A list of important error sources.
- \* Error Strings:: How to get a descriptive string from a value.

## Exchanging Data

- \* Creating Data Buffers:: Creating new data buffers.
- \* Destroying Data Buffers:: Releasing data buffers.
- \* Manipulating Data Buffers:: Operations on data buffers.

## Creating Data Buffers

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- \* File Based Data Buffers:: Creating file based data buffers.
- \* Callback Based Data Buffers:: Creating callback based data buffers.

## Manipulating Data Buffers

- \* Data Buffer I/O Operations:: I/O operations on data buffers.
- \* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- \* Data Buffer Convenience:: Convenience function for data buffers.



## Contexts

- \* Creating Contexts:: Creating new GPGME contexts.
- \* Destroying Contexts:: Releasing GPGME contexts.
- \* Result Management:: Managing the result of crypto operations.
- \* Context Attributes:: Setting properties of a context.
- \* Key Management:: Managing keys with GPGME.
- \* Crypto Operations:: Using a context for cryptography.
- \* Miscellaneous:: Miscellaneous operations.
- \* Run Control:: Controlling how operations are run.

## Context Attributes

- \* Protocol Selection:: Selecting the protocol used by a context.
- \* Crypto Engine:: Configuring the crypto engine.
- \* Setting the Sender:: How to tell the engine the sender.
- \* ASCII Armor:: Requesting ASCII armored output.
- \* Text Mode:: Choosing canonical text mode.
- \* Offline Mode:: Choosing offline mode.
- \* Included Certificates:: Including a number of certificates.
- \* Key Listing Mode:: Selecting key listing mode.
- \* Passphrase Callback:: Getting the passphrase from the user.
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- \* Locale:: Setting the locale of a context.

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- \* Listing Keys:: Browsing the list of available keys.
- \* Information About Keys:: Requesting detailed information about keys.
- \* Manipulating Keys:: Operations on keys.
- \* Generating Keys::  
Creating new key pairs.
- \* Signing Keys:: Adding key signatures to public keys.
- \* Exporting Keys:: Retrieving key data from the key ring.
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- \* Selecting Signers:: How to choose the keys to sign with.
- \* Creating a Signature:: How to create a signature.
- \* Signature Notation Data::  
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- \* Encrypting a Plaintext:: How to encrypt a plaintext.

## Miscellaneous

- \* Running other Programs:: Running other Programs.
- \* Using the Assuan protocol:: Using the Assuan protocol.
- \* Checking for updates:: How to check for software updates.

## Run Control

- \* Waiting For Completion:: Waiting until an operation is completed.
- \* Using External Event Loops:: Advanced control over what happens when.
- \* Cancellation:: How to end pending operations prematurely.

## Using External Event Loops

- \* I/O Callback Interface:: How I/O callbacks are registered.
- \* Registering I/O Callbacks:: How to use I/O callbacks for a context.
- \* I/O Callback Example:: An example how to use I/O callbacks.
- \* I/O Callback Example GTK+:: How to integrate GPGME in GTK+.
- \* I/O Callback Example GDK:: How to integrate GPGME in GDK.
- \* I/O Callback Example Qt:: How to integrate GPGME in Qt.

## File:

gpgme.info, Node: Introduction, Next: Preparation, Prev: Top, Up: Top

## 1 Introduction

\*\*\*\*\*

GnuPG Made Easy (GPGME) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. GPGME provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

GPGME uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

\* Menu:

- \* Getting Started:: Purpose of the manual, and how to use it.
- \* Features:: Reasons to install and use GPGME.
- \* Overview:: Basic architecture of the GPGME library.

File: gpgme.info, Node: Getting Started, Next: Features, Up: Introduction

## 1.1 Getting Started

=====

This manual documents the GPGME library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to GPGME or its users.

This manual can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those languages bindings follow the general programming model of GPGME but may provide some extra high level abstraction on top of the GPGME style API. For now please see the README files in the lang/ directory of the source distribution.

File: gpgme.info, Node: Features, Next: Overview, Prev: Getting Started, Up: Introduction

## 1.2 Features

=====

GPGME has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

its free software

Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (\*note Library Copying::).

its flexible

GPGME provides transparent support for several cryptographic protocols by different engines. Currently, GPGME supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

its easy

GPGME hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for GPGME has been added to a program, it is easy to add support for other crypto protocols once GPGME backends provide them.

its language friendly

GPGME comes with languages bindings for several common programming languages: Common Lisp, C++, Python 2, and Python 3.

File: [gpgme.info](#), Node: [Overview](#), [Prev: Features](#), [Up: Introduction](#)

### 1.3 Overview

=====

GPGME provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, GPGME has rich key management facilities including listing keys, querying their attributes, generating, importing,

exporting and deleting keys, and acquiring information about the trust path.

With some precautions, GPGME can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

File: gpgme.info, Node: Preparation, Next: Protocols and Engines, Prev: Introduction, Up: Top

## 2 Preparation

\*\*\*\*\*

To use GPGME, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

\* Menu:

- \* Header::                   What header file you need to include.
- \* Building the Source::     Compiler options to be used.
- \* Largefile Support (LFS)::   How to use GPGME with LFS.
- \* Using Automake::           Compiler options to be used the easy way.
- \* Using Libtool::            Avoiding compiler options entirely.
- \* Library Version Check::    Getting and verifying the library version.
- \* Signal Handling::         How GPGME affects signal handling.
- \* Multi-Threading::         How GPGME can be used in an MT environment.

File: gpgme.info, Node: Header, Next: Building the Source, Up: Preparation

### 2.1 Header

=====

All interfaces (data types and functions) of the library are defined in the header file `gpgme.h`. You must include this in all programs using the library, either directly or through some other header file, like this:

```
#include <gpgme.h>
```

The name space of GPGME is `gpgme_*` for function names and data types and `GPGME_*` for other symbols. Symbols internal to GPGME take the form `_gpgme_*` and `_GPGME_*`.

Because GPGME makes use of the GPG Error library, using GPGME will also use the GPG\_ERR\_\* name space directly, and the gpg\_err\*, gpg\_str\*, and gpgmt\_\* name space indirectly.

File: gpgme.info, Node: Building the Source, Next: Largefile Support (LFS), Prev: Header, Up: Preparation

## 2.2 Building the Source

=====

If you want to compile a source file including the gpgme.h header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the -I option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, gpgme ships with a small helper program gpgme-config that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the --cflags option to gpgme-config. The following example shows how it can be used at the command line:

```
gcc -c foo.c `gpgme-config --cflags`
```

Adding the output of gpgme-config --cflags to the compiler command line will ensure that the compiler can find the GPGME header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the -L option). For this, the option --libs to gpgme-config can be used. For convenience, this option also outputs all other options that are required to link the program with GPGME (in particular, the -lgpgme option). The example shows how to link foo.o with the GPGME library to a program foo.

```
gcc -o foo foo.o `gpgme-config --libs`
```

Of

course you can also combine both examples to a single command by specifying both options to gpgme-config:

```
gcc -o foo foo.c `gpgme-config --cflags --libs`
```

If you need to detect the installed language bindings you can use list them using:

```
gpgme-config --print-lang
```

or test for the availability using

```
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
```

File: gpgme.info, Node: Largefile Support (LFS), Next: Using Automake, Prev: Building the Source, Up: Preparation

## 2.3 Largefile Support (LFS)

=====

GPGME is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type `off_t` is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type `off64_t` is provided, which is 64 bit wide. Or you can replace the existing `off_t` data type with its 64 bit wide counterpart. All occurrences of `off_t` are then automatically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size

does matter for GPGME, because some data types it uses in its interfaces are affected by that. For example, the `off_t` data type is used in the `gpgme_data_seek` function, to match its POSIX counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms GPGME is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the `gpgme.h` header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms `off_t` is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (`CreateFile` et al.) for large files. Released binary versions of GPGME (`libgpgme-11.dll`) have always been build with a 32 bit `off_t`. To avoid an ABI break we stick to this convention for 32 bit Windows by using `long` there. GPGME versions for 64 bit Windows have never been released and thus we are able to use `int64_t` instead of `off_t` there. For easier migration the typedef `gpgme_off_t` has been defined. The reason we cannot use `off_t` directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for `off_t`. Some widely used toolkits make use of this hack and in turn GPGME would need to use it also. However, this would introduce an ABI break and existing software making use of `libgpgme` might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using `off_t` to use `gpgme_off_t` which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in GPGME is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro `AC_SYS_LARGEFILE`. If you do this, then you dont need to worry about anything else: It will just work. In this case you might also want to use `AC_FUNC_FSEEKO` to take advantage of some new interfaces, and `AC_TYPE_OFF_T` (just in



case).

If you do not use Autoconf, you can define the preprocessor symbol `_FILE_OFFSET_BITS` to 64 `_before_` including any header files, for example by specifying the option `-D_FILE_OFFSET_BITS=64` on the compiler command line. You will also want to define the preprocessor symbol `LARGEFILE_SOURCE` to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the GPGME header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (`_LARGEFILE64_SOURCE`).

File: `gpgme.info`, Node: Using Automake, Next: Using Libtool, Prev: Largefile Support (LFS), Up: Preparation

## 2.4 Using Automake

=====

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the `gpgme-config` script at all. GPGME provides an extension to Automake that does all the work for you.

```
-- Macro: AM_PATH_GPGME ([MINIMUM-VERSION], [ACTION-IF-FOUND],
 [ACTION-IF-NOT-FOUND])
-- Macro: AM_PATH_GPGME_PTH ([MINIMUM-VERSION], [ACTION-IF-FOUND],
 [ACTION-IF-NOT-FOUND])
-- Macro: AM_PATH_GPGME_PTHREAD ([MINIMUM-VERSION], [ACTION-IF-FOUND],
 [ACTION-IF-NOT-FOUND])
Check whether GPGME (at least version MINIMUM-VERSION, if given)
exists on the host system. If it is found, execute
ACTION-IF-FOUND, otherwise do ACTION-IF-NOT-FOUND, if given.
```

Additionally, the function defines `GPGME_CFLAGS` to the flags needed for compilation of the program to find the `gpgme.h` header file, and `GPGME_LIBS` to the linker flags needed to link the program to the GPGME library. If the used helper script does not match the target type you are building for a warning is printed and the string `libgcrypt` is appended to the variable `gpg_config_script_warn`.

`AM_PATH_GPGME_PTH`  
checks for the version of GPGME that can be used with GNU Pth, and defines `GPGME_PTH_CFLAGS` and

GPGME\_PTH\_LIBS.

AM\_PATH\_GPGME\_PTHREAD checks for the version of GPGME that can be used with the native pthread implementation, and defines GPGME\_PTHREAD\_CFLAGS and GPGME\_PTHREAD\_LIBS. Since version 1.8.0 this is no longer required to GPGME\_PTHREAD as GPGME itself is thread safe.

This macro searches for gpgme-config along the PATH. If you are cross-compiling, it is useful to set the environment variable SYSROOT to the top directory of your target. The macro will then first look for the helper program in the bin directory below that top directory. An absolute directory name must be used for SYSROOT. Finally, if the configure command line option --with-gpgme-prefix is used, only its value is used for the top directory below which the helper script is expected.

You can use the defined Autoconf variables like this in your Makefile.am:

```
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
```

File: gpgme.info, Node: Using Libtool, Next: Library Version Check, Prev: Using Automake, Up: Preparation

## 2.5 Using Libtool

=====

The easiest way is to just use GNU Libtool. If you use libtool, and link to libgpgme.la, libgpgme-pth.la or libgpgme-pthread.la respectively, everything will be done automatically by Libtool.

File: gpgme.info, Node: Library Version Check, Next: Signal Handling, Prev: Using Libtool, Up: Preparation

## 2.6 Library Version Check

=====

```
-- Function: const char * gpgme_check_version
 (const char *REQUIRED_VERSION)
```

The function gpgme\_check\_version has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems,

and for this reason alone it must be invoked early in your program, before you make use of the other functions in GPGME. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If `REQUIRED_VERSION` is `NULL`, the function returns a pointer to a statically allocated string containing the version number of the library.

If `REQUIRED_VERSION` is not `NULL`, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If `REQUIRED_VERSION` is not a valid version number, or if the version requirement is not met, the function returns `NULL`.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking `gpgme_new` or `gpgme_data_new`, so that a detailed error code can be returned (historically, `gpgme_check_version` does not return a detailed error code).

```
-- Function: int gpgme_set_global_flag (const char *NAME,
 const char *VALUE)
```

SINCE: 1.4.0

On some systems it is not easy to set environment variables and thus hard to use GPGMEs internal trace facility for debugging. This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses GPGME functions between a call to this function and after the return from the call to `gpgme_check_version`.

All currently supported features require that this function is called as early as possible even before `gpgme_check_version`.

The features are identified by the following values for NAME:

#### debug

To enable debugging use the string debug for NAME and VALUE identical to the value used with the environment variable GPGME\_DEBUG.

#### disable-gpgconf

Using this feature with any VALUE disables the detection of the gpgconf program and thus forces GPGME to fallback into the simple OpenPGP only mode. It may be used to force the use of GnuPG-1 on systems which have both GPG versions installed. Note that in general the use of `gpgme_set_engine_info` is a better way to select a specific engine version.

#### gpgconf-name

##### gpg-name

Set the name of the gpgconf respective gpg binary. The defaults are GNU/GnuPG/gpgconf and GNU/GnuPG/gpg. Under

Unix the leading directory part is ignored. Under Windows the leading directory part is used as the default installation directory; the .exe suffix is added by GPGME. Use forward slashed even under Windows.

#### require-gnupg

Set the minimum version of the required GnuPG engine. If that version is not met, GPGME fails early instead of trying to use the existent version. The given version must be a string with major, minor, and micro number. Example: "2.1.0".

#### w32-inst-dir

On Windows GPGME needs to know its installation directory to find its spawn helper. This is in general no problem because a DLL has this information. Some applications however link statically to GPGME and thus GPGME can only figure out the installation directory of this application which may be wrong in certain cases. By supplying an installation directory as

value to this flag, GPGME will assume that that directory is the installation directory. This flag has no effect on non-Windows platforms.

This function returns 0 on success. In contrast to other functions the non-zero return value on failure does not convey any error code. For setting debug the only possible error cause is an out of memory condition; which would exhibit itself later anyway. Thus the return value may be ignored.

After initializing GPGME, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

```
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
{
 /* Initialize the locale environment. */
 setlocale (LC_ALL, "");
 gpgme_check_version (NULL);
 gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
#ifdef LC_MESSAGES
 gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
}
```

Note that you are highly recommended to initialize the locale settings like this. GPGME can not do this for you because it would not be thread safe. The conditional on LC\_MESSAGES is only necessary for portability to W32 systems.

File: gpgme.info, Node: Signal Handling, Next: Multi-Threading, Prev: Library Version Check, Up: Preparation

## 2.7 Signal Handling

=====

The GPGME library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a SIGPIPE signal will be delivered to the application. The default action is to abort the program. To protect against this, gpgme\_check\_version sets the SIGPIPE signal action to SIG\_IGN, which means that the signal will be ignored.

GPGME will only do that if the signal action for SIGPIPE is SIG\_DEF at the time gpgme\_check\_version is called. If it is something different, GPGME will take no action.

This means that if your application does not install any signal handler for SIGPIPE, you dont need to take any precautions. If you do install a signal handler for SIGPIPE, you must be prepared to handle any SIGPIPE events that occur due to GPGME writing to a defunct

pipe. Furthermore, if your application is multi-threaded, and you install a signal action for SIGPIPE, you must make sure you do this either before `gpgme_check_version` is called or afterwards.

File: [gpgme.info](#), Node: Multi-Threading, Prev: [Signal Handling](#), Up: [Preparation](#)

## 2.8 Multi-Threading

=====

The GPGME library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

The function `gpgme_check_version` must be called before any other function in the library, because it initializes the thread support subsystem in GPGME. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use GPGME. For this, it is sufficient to call `gpgme_check_version` before creating the other threads using `GPGME(1)`.

Any `gpgme_data_t` and `gpgme_ctx_t` object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

Only one thread at any time is allowed to call `gpgme_wait`. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

The function `gpgme_strerror` is not thread safe. You have to use `gpgme_strerror_r` instead.

----- Footnotes -----

(1) At least this is true for POSIX threads, as `pthread_create` is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term Memory Synchronization. For other thread packages other, more relaxed or more strict rules may apply.

File: [gpgme.info](#), Node: [Protocols and Engines](#), Next: [Algorithms](#), Prev: [Preparation](#), Up: [Top](#)

### 3 Protocols and Engines

\*\*\*\*\*

GPGME supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. GPGME uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by GPGME. Where an exchange of information between the application and the backend is necessary, GPGME provides the necessary callback function hooks and further interfaces.

-- Data type: enum gpgme\_protocol\_t

The gpgme\_protocol\_t type specifies the set of possible protocol values that are supported by GPGME. The following protocols are supported:

GPGME\_PROTOCOL\_OpenPGP

GPGME\_PROTOCOL\_OPENPGP

This specifies the OpenPGP protocol.

GPGME\_PROTOCOL\_CMS

This specifies the Cryptographic Message Syntax.

GPGME\_PROTOCOL\_GPGCONF

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME\_PROTOCOL\_ASSUAN

SINCE: 1.2.0

This specifies the raw Assuan protocol.

GPGME\_PROTOCOL\_G13

SINCE: 1.3.0

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME\_PROTOCOL\_UISERVER

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME\_PROTOCOL\_SPAWN

SINCE: 1.5.0

Special protocol for use with  
gpgme\_op\_spawn.

#### GPGME\_PROTOCOL\_UNKNOWN

Reserved for future extension. You may use this to indicate that the used protocol is not known to the application. Currently, GPGME does not accept this value in any operation, though, except for gpgme\_get\_protocol\_name.

-- Function: const char \* gpgme\_get\_protocol\_name  
(gpgme\_protocol\_t PROTOCOL)

The function gpgme\_get\_protocol\_name returns a statically allocated string describing the protocol PROTOCOL, or NULL if the protocol number is not valid.

\* Menu:

- \* Engine Version Check:: Verifying the engine version.
- \* Engine Information:: Obtaining more information about the engines.
- \* Engine Configuration:: Changing the engine configuration.
- \* OpenPGP:: Support for the OpenPGP protocol.
- \* Cryptographic Message Syntax:: Support for the CMS.
- \* Assuan:: Support for the raw Assuan protocol.

File: gpgme.info,

Node: Engine Version Check, Next: Engine Information, Up: Protocols and Engines

### 3.1 Engine Version Check

=====

-- Function: const char \* gpgme\_get\_dirinfo (const char \*WHAT)  
SINCE: 1.5.0

The function gpgme\_get\_dirinfo returns a statically allocated string with the value associated to WHAT. The returned values are the defaults and wont change even after gpgme\_set\_engine\_info has been used to configure a different engine. NULL is returned if no value is available. Commonly supported values for WHAT are:

homedir

Return the default home directory.

sysconfdir

Return the name of the system configuration directory

bindir



Return the name of the directory with GnuPG program files.

libdir

Return the name of the directory with GnuPG related library files.

libexecdir

Return the name of the directory with GnuPG helper program files.

datadir

Return the name of the directory with GnuPG shared data.

localedir

Return the name of the directory with GnuPG locale data.

agent-socket

Return the name of the socket to connect to the gpg-agent.

agent-ssh-socket

Return the name of the socket to connect to the ssh-agent component of gpg-agent.

dirmngr-socket

Return the name of the socket to connect to the dirmngr.

uiserver-socket

Return the name of the socket to connect to the user interface server.

gpgconf-name

Return the file name of the engine configuration tool.

gpg-name

Return the file name of the OpenPGP engine.

gpgsm-name

Return the file name of the CMS engine.

g13-name

Return the name of the file container encryption engine.

gpg-wks-client-name

Return the name of the Web Key Service tool.

-- Function: gpgme\_error\_t gpgme\_engine\_check\_version

(gpgme\_protocol\_t PROTOCOL)

The function `gpgme_engine_check_version` verifies that the engine implementing the protocol `PROTOCOL` is installed in the expected path and meets the version requirement of GPGME.

This function returns the error code `GPG_ERR_NO_ERROR` if the engine is available and `GPG_ERR_INV_ENGINE` if it is not.

File: `gpgme.info`, Node: Engine Information, Next: Engine Configuration, Prev: Engine Version Check, Up: Protocols and Engines

### 3.2 Engine Information

=====

-- Data type: `gpgme_engine_info_t`

The `gpgme_engine_info_t` type specifies a pointer to a structure describing a crypto engine. The structure contains the following elements:

`gpgme_engine_info_t next`

This is a pointer to the next engine info structure in the linked list, or `NULL` if this is the last element.

`gpgme_protocol_t protocol`

This is the protocol for which the crypto engine is used.

You

can convert this to a string with `gpgme_get_protocol_name` for printing.

`const char *file_name`

This is a string holding the file name of the executable of the crypto engine. Currently, it is never `NULL`, but using `NULL` is reserved for future use, so always check before you use it.

`const char *home_dir`

This is a string holding the directory name of the crypto engines configuration directory. If it is `NULL`, then the default directory is used. See `gpgme_get_dirinfo` on how to get the default directory.

`const char *version`

This is a string containing the version number of the crypto engine. It might be `NULL` if the version number can not be determined, for example because the executable doesn't exist or is invalid.

```
const char *req_version
```

This is a string containing the minimum required version number

of the crypto engine for GPGME to work correctly. This is the version number that `gpgme_engine_check_version` verifies against. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

```
-- Function: gpgme_error_t gpgme_get_engine_info
```

```
(gpgme_engine_info_t *INFO)
```

The function `gpgme_get_engine_info` returns a linked list of engine info structures in `INFO`. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, and a system error if the memory could not be allocated.

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

```
gpgme_ctx_t ctx;
gpgme_error_t
err;
```

```
[...]
```

```
if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
{
 gpgme_engine_info_t info;
 err = gpgme_get_engine_info (&info);
 if (!err)
 {
 while (info && info->protocol != gpgme_get_protocol (ctx))
 info = info->next;
 if (!info)
 fprintf (stderr, "GPGME compiled without support for protocol %s",
 gpgme_get_protocol_name (info->protocol));
 else if (info->file_name && !info->version)
 fprintf (stderr, "Engine %s not installed properly",
 info->file_name);
 else if (info->file_name && info->version && info->req_version)
 fprintf (stderr, "Engine %s version %s installed, "
```

```

 "but at least version %s required", info->file_name,
 info->version, info->req_version);
 else
 fprintf (stderr, "Unknown problem with engine
for protocol %s",
 gpgme_get_protocol_name (info->protocol));
 }
}

```

File: gpgme.info, Node: Engine Configuration, Next: OpenPGP, Prev: Engine Information, Up: Protocols and Engines

### 3.3 Engine Configuration

=====

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

```

-- Function: gpgme_error_t gpgme_set_engine_info
(gpgme_protocol_t PROTO, const char *FILE_NAME,
const char *HOME_DIR)
SINCE: 1.1.0

```

The function `gpgme_set_engine_info` changes the default configuration of the crypto engine implementing the protocol `PROTO`.

`FILE_NAME` is the file name of the executable program implementing this protocol, and `HOME_DIR` is the directory name of the configuration directory for this crypto engine. If `HOME_DIR` is

`NULL`, the engines default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

The functions `gpgme_ctx_get_engine_info` and `gpgme_ctx_set_engine_info` can be used to change the engine configuration per context. \*Note Crypto Engine::.

File: gpgme.info, Node: OpenPGP, Next: Cryptographic Message Syntax, Prev: Engine Configuration, Up: Protocols and Engines

### 3.4 OpenPGP

=====

OpenPGP is implemented by GnuPG, the GNU Privacy Guard. This is the first protocol that was supported by GPGME.

The OpenPGP protocol is specified by GPGME\_PROTOCOL\_OpenPGP.

File: gpgme.info, Node: Cryptographic Message Syntax, Next: Assuan, Prev: OpenPGP, Up: Protocols and Engines

### 3.5 Cryptographic Message Syntax

=====

CMS is implemented by GpgSM, the S/MIME implementation for GnuPG.

The CMS protocol is specified by GPGME\_PROTOCOL\_CMS.

File: gpgme.info, Node: Assuan, Prev: Cryptographic Message Syntax, Up: Protocols and Engines

### 3.6 Assuan

=====

Assuan is the RPC library used by the various GnuPG components. The Assuan protocol allows one to talk to arbitrary Assuan servers using GPGME. \*Note Using the Assuan protocol::

The ASSUAN protocol is specified by GPGME\_PROTOCOL\_ASSUAN.

File: gpgme.info, Node: Algorithms, Next: Error Handling, Prev: Protocols and Engines, Up: Top

## 4 Algorithms

\*\*\*\*\*

The crypto backends support a variety of algorithms used in public key cryptography.(1) The following sections list the identifiers used to denote such an algorithm.

\* Menu:

\* Public Key Algorithms:: A list of all public key algorithms.

\* Hash Algorithms:: A list of all hash algorithms.

----- Footnotes -----

(1) Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.

File:

gpgme.info, Node: Public Key Algorithms, Next: Hash Algorithms, Up: Algorithms

## 4.1 Public Key Algorithms

=====

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

-- Data type: enum gpgme\_pubkey\_algo\_t

The gpgme\_pubkey\_algo\_t type specifies the set of all public key algorithms that are supported by GPGME. Possible values are:

### GPGME\_PK\_RSA

This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

### GPGME\_PK\_RSA\_E

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

### GPGME\_PK\_RSA\_S

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

### GPGME\_PK\_DSA

This value indicates DSA, the Digital Signature Algorithm.

### GPGME\_PK\_ELG

This value indicates ElGamal.

### GPGME\_PK\_ELG\_E

This value also indicates ElGamal and is used specifically in GnuPG.

### GPGME\_PK\_ECC

SINCE: 1.5.0

This value is a generic indicator for elliptic curve algorithms.

### GPGME\_PK\_ECDSA

SINCE: 1.3.0

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

GPGME\_PK\_ECDH

SINCE: 1.3.0

This value indicates ECDH, the Elliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

GPGME\_PK\_EDDSA

SINCE: 1.7.0

This value indicates the EdDSA algorithm.

-- Function: const char \* gpgme\_pubkey\_algo\_name  
(gpgme\_pubkey\_algo\_t ALGO)

The function gpgme\_pubkey\_algo\_name returns a pointer to a statically allocated string containing a description of the public key algorithm ALGO. This string can be used to output the name of the public key algorithm to the user.

If ALGO is not a valid public key algorithm, NULL is returned.

-- Function: char \* gpgme\_pubkey\_algo\_string (gpgme\_subkey\_t KEY)  
SINCE: 1.7.0

The function gpgme\_pubkey\_algo\_string is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. rsa2048 or ed25519). The caller must free the result using gpgme\_free. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets ERRNO.

File: gpgme.info, Node: Hash Algorithms, Prev: Public Key Algorithms, Up: Algorithms

## 4.2 Hash Algorithms

=====

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

-- Data type: enum gpgme\_hash\_algo\_t

The gpgme\_hash\_algo\_t type specifies the set of all hash algorithms that are supported by GPGME. Possible values are:

GPGME\_MD\_MD5

GPGME\_MD\_SHA1  
GPGME\_MD\_RMD160  
GPGME\_MD\_MD2  
GPGME\_MD\_TIGER  
GPGME\_MD\_HAVAL  
GPGME\_MD\_SHA256  
GPGME\_MD\_SHA384  
GPGME\_MD\_SHA512  
GPGME\_MD\_SHA224  
SINCE: 1.5.0

GPGME\_MD\_MD4  
GPGME\_MD\_CRC32  
GPGME\_MD\_CRC32\_RFC1510  
GPGME\_MD\_CRC24\_RFC2440

-- Function: const char \* gpgme\_hash\_algo\_name (gpgme\_hash\_algo\_t ALGO)

The function gpgme\_hash\_algo\_name returns a pointer to a statically allocated string containing a description of the hash algorithm ALGO. This string can be used to output the name of the hash algorithm to the user.

If ALGO is not a valid hash algorithm, NULL is returned.

File: gpgme.info, Node: Error Handling, Next: Exchanging Data, Prev: Algorithms, Up: Top

## 5 Error Handling

\*\*\*\*\*

Many functions in GPGME can return an error if they fail. For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

GPGME uses the libpgg-error library. This allows to share the error codes with other components of the GnuPG system, and thus pass



error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no information is lost. As a consequence, GPGME does not use its own identifiers for error codes, but uses those provided by libgpg-error. They usually start with GPG\_ERR\_.

However, GPGME does provide aliases for the functions defined in libgpg-error, which might be preferred for name space consistency.

\* Menu:

- \* Error Values::           The error value and what it means.
- \* Error Sources::         A list of important error sources.
- \* Error Codes::           A list of important error codes.
- \* Error Strings::         How to get a descriptive string from a value.

File: gpgme.info, Node: Error Values, Next: Error Sources, Up: Error Handling

## 5.1 Error Values

=====

-- Data type: gpgme\_err\_code\_t

The gpgme\_err\_code\_t type is an alias for the libgpg-error type gpg\_err\_code\_t. The error code indicates the type of an error, or the reason why an operation failed.

A list of important error codes can be found in the next section.

-- Data type: gpgme\_err\_source\_t

The gpgme\_err\_source\_t type is an alias for the libgpg-error type gpg\_err\_source\_t. The error source has not a precisely defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.

-- Data type: gpgme\_error\_t

The gpgme\_error\_t type is an alias for the libgpg-error type gpg\_error\_t. An error value like this has always two components, an error code and an error source. Both together form the error value.

Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used. However, it is guaranteed that only 0 is used to indicate success (GPG\_ERR\_NO\_ERROR), and that in this case all other parts of the error value are set to 0, too.

#### Note

that in GPGME, the error source is used purely for diagnostical purposes. Only the error code should be checked to test for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

```
-- Function: static inline gpgme_err_code_t gpgme_err_code
(gpgme_error_t ERR)
```

The static inline function `gpgme_err_code` returns the `gpgme_err_code_t` component of the error value `ERR`. This function must be used to extract the error code from an error value in order to compare it with the `GPG_ERR_*` error code macros.

```
-- Function: static inline gpgme_err_source_t gpgme_err_source
(gpgme_error_t ERR)
```

The static inline function `gpgme_err_source` returns the `gpgme_err_source_t` component of the error value `ERR`. This function must be used to extract the error source from an error value in order to compare it with the `GPG_ERR_SOURCE_*` error source macros.

```
-- Function: static inline gpgme_error_t gpgme_err_make
(gpgme_err_source_t SOURCE, gpgme_err_code_t CODE)
```

The static inline function `gpgme_err_make` returns the error value consisting of the error source `SOURCE` and the error code `CODE`.

This function can be used in callback functions to construct an error value to return it to the library.

```
-- Function: static inline gpgme_error_t gpgme_error
(gpgme_err_code_t CODE)
```

The static inline function `gpgme_error` returns the error value consisting of the default error source and the error code `CODE`.

For GPGME applications, the default error source is `GPG_ERR_SOURCE_USER_1`. You can define `GPGME_ERR_SOURCE_DEFAULT` before including `gpgme.h` to change this default.

This function can be used in callback functions to construct an error value to return it to the library.

The libpgg-error library provides error codes for all system error numbers it knows about. If ERR is an unknown error number, the error code GPG\_ERR\_UNKNOWN\_ERRNO is used. The following functions can be used to construct error values from system error numbers.

-- Function: `gpgme_error_t gpgme_err_make_from_errno (gpgme_err_source_t SOURCE, int ERR)`  
The function `gpgme_err_make_from_errno` is like `gpgme_err_make`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

-- Function: `gpgme_error_t gpgme_error_from_errno (int ERR)`  
The function `gpgme_error_from_errno` is like `gpgme_error`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

-- Function: `gpgme_err_code_t gpgme_err_code_from_errno (int ERR)`  
The function `gpgme_err_code_from_errno` returns the error code for the system error `ERR`. If `ERR` is not a known system error, the function returns `GPG_ERR_UNKNOWN_ERRNO`.

-- Function: `int gpgme_err_code_to_errno (gpgme_err_code_t ERR)`  
The function `gpgme_err_code_to_errno` returns the system error for the error code `ERR`. If `ERR` is not an error code representing a system error, or if this system error is not defined on this system, the function returns 0.

File: `gpgme.info`, Node: Error Sources, Next: Error Codes, Prev: Error Values, Up: Error Handling

## 5.2 Error Sources

=====

The library `libpgg-error` defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is 0, the whole error value will be 0. In this case the error source part is of course `GPG_ERR_SOURCE_UNKNOWN`.

The list of error sources that might occur in applications using GPGME is:

#### GPG\_ERR\_SOURCE\_UNKNOWN

The error source is not known. The value of this error source is 0.

#### GPG\_ERR\_SOURCE\_GPGME

The error source is GPGME itself. This is the default for errors that occur in the GPGME library.

#### GPG\_ERR\_SOURCE\_GPG

The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

#### GPG\_ERR\_SOURCE\_GPGSM

The error source is GPGSM, which is the crypto engine used for the CMS protocol.

#### GPG\_ERR\_SOURCE\_GCRYPT

The error source is libgcrypt, which is used by crypto engines to perform cryptographic operations.

#### GPG\_ERR\_SOURCE\_GPGAGENT

The error source is gpg-agent, which is used by crypto engines to perform operations with the secret key.

#### GPG\_ERR\_SOURCE\_PINENTRY

The error source is pinentry, which is used by gpg-agent to query the passphrase to unlock a secret key.

#### GPG\_ERR\_SOURCE\_SCD

The error source is the SmartCard Daemon, which is used by gpg-agent to delegate operations with the secret key to a SmartCard.

#### GPG\_ERR\_SOURCE\_KEYBOX

The error source is libkbx, a library used by the crypto engines to manage local keyrings.

#### GPG\_ERR\_SOURCE\_USER\_1

#### GPG\_ERR\_SOURCE\_USER\_2

#### GPG\_ERR\_SOURCE\_USER\_3

#### GPG\_ERR\_SOURCE\_USER\_4

These error sources are not used by any GnuPG component and can be

used by other software. For example, applications using GPGME can use them to mark error values coming from callback handlers. Thus `GPG_ERR_SOURCE_USER_1` is the default for errors created with `gpgme_error` and `gpgme_error_from_errno`, unless you define `GPGME_ERR_SOURCE_DEFAULT` before including `gpgme.h`.

File: `gpgme.info`, Node: Error Codes, Next: Error Strings, Prev: Error Sources, Up: Error Handling

### 5.3 Error Codes

=====

The library `libgpg-error` defines many error values. Most of them are not used by GPGME directly, but might be returned by GPGME because it received them

from the crypto engine. The below list only includes such error codes that have a specific meaning in GPGME, or which are so common that you should know about them.

#### `GPG_ERR_EOF`

This value indicates the end of a list, buffer or file.

#### `GPG_ERR_NO_ERROR`

This value indicates success. The value of this error code is 0.

Also, it is guaranteed that an error value made from the error code 0 will be 0 itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

#### `GPG_ERR_GENERAL`

This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

#### `GPG_ERR_ENOMEM`

This value means that an out-of-memory condition occurred.

#### `GPG_ERR_E...`

System errors are mapped to `GPG_ERR_FOO` where FOO is the symbol for the system error.

#### `GPG_ERR_INV_VALUE`

This value means that some user provided data was out of range.

This can also refer to objects. For example, if an empty `gpgme_data_t` object was expected, but one containing data was

provided, this error value is returned.

#### GPG\_ERR\_UNUSABLE\_PUBKEY

This value means that some recipients for a message were invalid.

#### GPG\_ERR\_UNUSABLE\_SECKEY

This value means that some signers were invalid.

#### GPG\_ERR\_NO\_DATA

This value means that a `gpgme_data_t` object which was expected to have content was found empty.

#### GPG\_ERR\_CONFLICT

This value means that a conflict of some sort occurred.

#### GPG\_ERR\_NOT\_IMPLEMENTED

This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

#### GPG\_ERR\_DECRYPT\_FAILED

This value indicates that a decryption operation was unsuccessful.

#### GPG\_ERR\_BAD\_PASSPHRASE

This value means that the user did not provide a correct passphrase when requested.

#### GPG\_ERR\_CANCELED

This value means that the operation was canceled.

#### GPG\_ERR\_INV\_ENGINE

This value means that the engine that implements the desired protocol is currently not available. This can either be because the sources were configured to exclude support for this engine, or because the engine is not installed properly.

#### GPG\_ERR\_AMBIGUOUS\_NAME

This value indicates that a user ID or other specifier did not specify a unique key.

#### GPG\_ERR\_WRONG\_KEY\_USAGE

This value indicates that a key is not used appropriately.

#### GPG\_ERR\_CERT\_REVOKED

This value indicates that a key signature was revoked.

#### GPG\_ERR\_CERT\_EXPIRED

This value indicates that a key signature expired.

#### GPG\_ERR\_NO\_CRL\_KNOWN

This value indicates that no certificate revocation list is known for the certificate.

#### GPG\_ERR\_NO\_POLICY\_MATCH

This value indicates that a policy issue occurred.

#### GPG\_ERR\_NO\_SECKEY

This value indicates that no secret key for the user ID is available.

#### GPG\_ERR\_MISSING\_CERT

This value indicates that a key could not be imported because the issuer certificate is missing.

#### GPG\_ERR\_BAD\_CERT\_CHAIN

This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

#### GPG\_ERR\_UNSUPPORTED\_ALGORITHM

This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

#### GPG\_ERR\_BAD\_SIGNATURE

This value means a verification failed because the signature is bad.

#### GPG\_ERR\_NO\_PUBKEY

This value means a verification failed because the public key is not available.

#### GPG\_ERR\_USER\_1

#### GPG\_ERR\_USER\_2

...

#### GPG\_ERR\_USER\_16

These error codes are not used by any GnuPG component and can be freely used by other software. Applications using GPGME might use them to mark specific errors returned by callback handlers if no suitable error codes (including the system errors) for these errors exist already.

File: gpgme.info, Node: Error Strings, Prev: Error Codes, Up: Error Handling

## 5.4 Error Strings

=====

-- Function: `const char * gpgme_strerror (gpgme_error_t ERR)`

The function `gpgme_strerror` returns a pointer to a statically allocated string containing a description of the error code contained in the error value `ERR`. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use `gpgme_strerror_r` in multi-threaded programs.

-- Function: `int gpgme_strerror_r (gpgme_error_t ERR, char *BUF, size_t BUFLLEN)`

The function `gpgme_strerror_r` returns the error string for `ERR` in the user-supplied buffer `BUF` of size `BUFLLEN`.

This function is, in

contrast to `gpgme_strerror`, thread-safe if a thread-safe `strerror_r` function is provided by the system. If the function succeeds, 0 is returned and `BUF` contains the string describing the error. If the buffer was not large enough, `ERANGE` is returned and `BUF` contains as much of the beginning of the error string as fits into the buffer.

-- Function: `const char * gpgme_strsource (gpgme_error_t ERR)`

The function `gpgme_strsource` returns a pointer to a statically allocated string containing a description of the error source contained in the error value `ERR`. This string can be used to output a diagnostic message to the user.

The following example illustrates the use of `gpgme_strerror`:

```
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
{
 fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
 argv[0], gpgme_strsource (err), gpgme_strerror (err));
 exit (1);
}
```

File: `gpgme.info`, Node: `Exchanging Data`, Next: `Contexts`, Prev: `Error Handling`, Up: `Top`

## 6 Exchanging Data

\*\*\*\*\*



A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by GPGME. The user provides and receives the data via `gpgme_data_t` objects, regardless of the communication protocol between GPGME and the crypto engine in use.

-- Data type: `gpgme_data_t`

The `gpgme_data_t` type is a handle for a container for generic data, which is used by GPGME to exchange data with the user.

`gpgme_data_t` objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

-- Data type: `gpgme_off_t`

SINCE: 1.4.1

On POSIX platforms the `gpgme_off_t` type is an alias for `off_t`; it may be used interchangeably. On Windows platforms `gpgme_off_t` is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64 bit signed integer for 64 bit Windows.

-- Data type: `gpgme_ssize_t`

The `gpgme_ssize_t` type is an alias for `ssize_t`. It has only been introduced to overcome portability problems pertaining to the declaration of `ssize_t` by different toolchains.

\* Menu:

- \* Creating Data Buffers::     Creating new data buffers.
- \* Destroying Data Buffers::   Releasing data buffers.
- \* Manipulating Data Buffers::   Operations on data buffers.

File: `gpgme.info`, Node: Creating Data Buffers, Next: Destroying Data Buffers, Up: Exchanging Data

## 6.1 Creating Data Buffers

=====

Data

objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

\* Menu:

\* Memory Based Data Buffers:: Creating memory based data buffers.

\* File Based Data Buffers:: Creating file based data buffers.

\* Callback Based Data Buffers:: Creating callback based data buffers.

File: gpgme.info, Node: Memory Based Data Buffers, Next: File Based Data Buffers, Up: Creating Data Buffers

### 6.1.1 Memory Based Data Buffers

-----

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source and to its destination, which can often be avoided by using one of the other data object

-- Function: `gpgme_error_t gpgme_data_new (gpgme_data_t *DH)`

The function `gpgme_data_new` creates a new `gpgme_data_t` object

and returns a handle for it in `DH`. The data object is memory based and initially empty.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_mem (gpgme_data_t *DH, const char *BUFFER, size_t SIZE, int COPY)`

The function `gpgme_data_new_from_mem` creates a new `gpgme_data_t` object and fills it with `SIZE` bytes starting from `BUFFER`.

If `COPY` is not zero, a private copy of the data is made. If `COPY` is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains valid for the whole life span of the data object.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `BUFFER` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_file (gpgme_data_t *DH, const char *FILENAME, int COPY)`

The function `gpgme_data_new_from_file` creates a new

gpgme\_data\_t object and fills it with the content of the file  
FILENAME.

If COPY is not zero, the whole file is read in at initialization  
time and the file is not used anymore after that. This is the only  
mode supported currently. Later, a value of zero for COPY might  
cause all reads to be delayed until the data is needed, but this is  
not yet implemented.

The function returns the error code GPG\_ERR\_NO\_ERROR if the data  
object was successfully created, GPG\_ERR\_INV\_VALUE if DH or  
FILENAME is not a valid pointer, GPG\_ERR\_NOT\_IMPLEMENTED if CODE  
is zero, and GPG\_ERR\_ENOMEM if not enough memory is available.

```
-- Function: gpgme_error_t gpgme_data_new_from_filepart
 (gpgme_data_t *DH, const char *FILENAME,
 FILE *FP,
 off_t OFFSET, size_t LENGTH)
```

The function gpgme\_data\_new\_from\_filepart creates a new  
gpgme\_data\_t object and fills it with a part of the file  
specified by FILENAME or FP.

Exactly one of FILENAME and FP must be non-zero, the other must be  
zero. The argument that is not zero specifies the file from which  
LENGTH bytes are read into the data object, starting from OFFSET.

The function returns the error code GPG\_ERR\_NO\_ERROR if the data  
object was successfully created, GPG\_ERR\_INV\_VALUE if DH and  
exactly one of FILENAME and FP is not a valid pointer, and  
GPG\_ERR\_ENOMEM if not enough memory is available.

File: gpgme.info, Node: File Based Data Buffers, Next: Callback Based Data Buffers, Prev: Memory Based Data  
Buffers, Up: Creating Data Buffers

### 6.1.2 File Based Data Buffers

-----

File based data objects operate directly on file descriptors or streams.  
Only a small amount of data is stored  
in core at any time, so the size  
of the data objects is not limited by GPGME.

```
-- Function: gpgme_error_t gpgme_data_new_from_fd (gpgme_data_t *DH,
 int FD)
```

The function gpgme\_data\_new\_from\_fd creates a new gpgme\_data\_t  
object and uses the file descriptor FD to read from (if used as an  
input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_stream`  
(`gpgme_data_t *DH, FILE *STREAM`)

The function `gpgme_data_new_from_stream` creates a new `gpgme_data_t` object and uses the I/O stream `STREAM` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_estream`  
(`gpgme_data_t *DH, gpgrt_stream_t STREAM`)

The function `gpgme_data_new_from_estream` creates a new `gpgme_data_t` object and uses the `gpgrt` stream `STREAM` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode.

Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG\_ERR\_NO\_ERROR if the data object was successfully created, and GPG\_ERR\_ENOMEM if not enough memory is available.

File: gpgme.info, Node: Callback Based Data Buffers, Prev: File Based Data Buffers, Up: Creating Data Buffers

### 6.1.3 Callback Based Data Buffers

-----  
If neither memory nor file based data objects are a good fit for your application, you can implement the functions a data object provides yourself and create a data object from these callback functions.

-- Data type: `ssize_t (*gpgme_data_read_cb_t) (void *HANDLE, void *BUFFER, size_t SIZE)`

The `gpgme_data_read_cb_t` type is the type of functions which GPGME calls if it wants to read data from a user-implemented data object. The function should read up to `SIZE` bytes from the current read position into the space starting at `BUFFER`. The `HANDLE` is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, `ERRNO` should be set to describe the type of the error.

-- Data type: `ssize_t (*gpgme_data_write_cb_t) (void *HANDLE, const void *BUFFER, size_t SIZE)`

The `gpgme_data_write_cb_t` type is the type of functions which GPGME calls if it wants to write data to a user-implemented data object. The function should write up to `SIZE` bytes to the current write position from the space starting at `BUFFER`. The `HANDLE` is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, `ERRNO` should be set to describe the

type of the error.

-- Data type: `off_t (*gpgme_data_seek_cb_t) (void *HANDLE, off_t OFFSET, int WHENCE)`

The `gpgme_data_seek_cb_t` type is the type of functions which GPGME calls if it wants to change the current read/write position in a user-implemented data object, just like the `lseek` function.

The function

should return the new read/write position, and -1 on error. If an error occurs, `ERRNO` should be set to describe the type of the error.

-- Data type: `void (*gpgme_data_release_cb_t) (void *HANDLE)`

The `gpgme_data_release_cb_t` type is the type of functions which GPGME calls if it wants to destroy a user-implemented data object. The `HANDLE` is provided by the user at data object creation time.

-- Data type: `struct gpgme_data_cbs`

This structure is used to store the data callback interface functions described above. It has the following members:

`gpgme_data_read_cb_t read`

This is the function called by GPGME to read data from the data object. It is only required for input data object.

`gpgme_data_write_cb_t write`

This is the function called by GPGME to write data to the data object. It is only required for output data object.

`gpgme_data_seek_cb_t seek`

This is the function called by GPGME to change the current read/write pointer in the data object (if available). It is optional.

`gpgme_data_release_cb_t release`

This is the function called by GPGME to release a data object. It is optional.

-- Function: `gpgme_error_t gpgme_data_new_from_cbs (gpgme_data_t *DH, gpgme_data_cbs_t CBS, void *HANDLE)`

The function `gpgme_data_new_from_cbs` creates a new `gpgme_data_t` object and uses the user-provided callback functions to operate on the data object.

The handle `HANDLE` is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code GPG\_ERR\_NO\_ERROR if the data object was successfully created, and GPG\_ERR\_ENOMEM if not enough memory is available.

File: gpgme.info, Node: Destroying Data Buffers, Next: Manipulating Data Buffers, Prev: Creating Data Buffers, Up: Exchanging Data

## 6.2 Destroying Data Buffers

=====

-- Function: void gpgme\_data\_release (gpgme\_data\_t DH)

The function gpgme\_data\_release destroys the data object with the handle DH. It releases all associated resources that were not provided by the user in the first place.

-- Function: char \* gpgme\_data\_release\_and\_get\_mem (gpgme\_data\_t DH, size\_t \*LENGTH)

The function gpgme\_data\_release\_and\_get\_mem is like gpgme\_data\_release, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with gpgme\_free. In case the user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return NULL. In any case, the data object DH is destroyed.

-- Function: void gpgme\_free (void \*BUFFER)  
SINCE: 1.1.1

The function gpgme\_free releases the memory returned by gpgme\_data\_release\_and\_get\_mem and gpgme\_pubkey\_algo\_string. It should be used instead of the system libraries free function in case different allocators are used by a program. This is often the case if gpgme is used under Windows as a DLL.

File: gpgme.info, Node: Manipulating Data Buffers, Prev: Destroying Data Buffers, Up: Exchanging Data

## 6.3 Manipulating Data Buffers

=====

Data buffers contain data and meta-data. The following operations can

be used to manipulate both.

\* Menu:

- \* Data Buffer I/O Operations:: I/O operations on data buffers.
- \* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- \* Data Buffer Convenience:: Convenience function for data buffers.

File: gpgme.info, Node: Data Buffer I/O Operations, Next: Data Buffer Meta-Data, Up: Manipulating Data Buffers

### 6.3.1 Data Buffer I/O Operations

-----

-- Function: `ssize_t gpgme_data_read`  
(`gpgme_data_t DH`, `void *BUFFER`,  
 `size_t LENGTH`)

The function `gpgme_data_read` reads up to `LENGTH` bytes from the data object with the handle `DH` into the space starting at `BUFFER`.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets `ERRNO`.

-- Function: `ssize_t gpgme_data_write` (`gpgme_data_t DH`,  
 `const void *BUFFER`, `size_t SIZE`)

The function `gpgme_data_write` writes up to `SIZE` bytes starting from `BUFFER` into the data object with the handle `DH` at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, `ERRNO` is set.

-- Function: `off_t gpgme_data_seek` (`gpgme_data_t DH`, `off_t OFFSET`,  
 `int WHENCE`)

The function `gpgme_data_seek` changes the current read/write position.

The `WHENCE` argument specifies how the `OFFSET` should be interpreted.

It must be one of the following symbolic constants:

`SEEK_SET`

Specifies that `OFFSET` is a count of characters from the beginning of the data object.



## SEEK\_CUR

Specifies that OFFSET is a count of characters from the current file position. This count may be positive or negative.

## SEEK\_END

Specifies that OFFSET is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with SEEK\_CUR to read the current read/write position.

If the function fails, -1 is returned and ERRNO is set.

File: gpgme.info, Node: Data Buffer Meta-Data, Next: Data Buffer Convenience, Prev: Data Buffer I/O Operations, Up: Manipulating Data Buffers

### 6.3.2 Data Buffer Meta-Data

-----  
-- Function: char \* gpgme\_data\_get\_file\_name (gpgme\_data\_t DH)  
SINCE: 1.1.0

The function gpgme\_data\_get\_file\_name returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, NULL will be returned.

-- Function: gpgme\_error\_t gpgme\_data\_set\_file\_name (gpgme\_data\_t DH,  
const char \*FILE\_NAME)  
SINCE: 1.1.0

The function gpgme\_data\_set\_file\_name sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned

to the user when decrypting or verifying the output data.

The function returns the error code `GPG_ERR_INV_VALUE` if `DH` is not a valid pointer and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Data type: `enum gpgme_data_encoding_t`

The `gpgme_data_encoding_t` type specifies the encoding of a `gpgme_data_t` object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

#### `GPGME_DATA_ENCODING_NONE`

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best

to detect the encoding automatically.

#### `GPGME_DATA_ENCODING_BINARY`

This specifies that the data is encoding in binary form; i.e. there is no special encoding.

#### `GPGME_DATA_ENCODING_BASE64`

This specifies that the data is encoded using the Base-64 encoding scheme as used by MIME and other protocols.

#### `GPGME_DATA_ENCODING_ARMOR`

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

#### `GPGME_DATA_ENCODING_MIME`

SINCE: 1.7.0

This specifies that the data is encoded as a MIME part.

#### `GPGME_DATA_ENCODING_URL`

SINCE: 1.2.0

The data is a list of linefeed delimited URLs. This is only useful with `gpgme_op_import`.

#### `GPGME_DATA_ENCODING_URL0`

SINCE: 1.2.0

The data is a list of binary zero delimited URLs. This is

only useful with `gpgme_op_import`.

## GPGME\_DATA\_ENCODING URLESC

SINCE: 1.2.0

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is not yet implemented.

-- Function: `gpgme_data_encoding_t gpgme_data_get_encoding`  
(`gpgme_data_t` DH)

The function `gpgme_data_get_encoding` returns the encoding of the data object with the handle DH. If DH is not a valid pointer (e.g. NULL) `GPGME_DATA_ENCODING_NONE` is returned.

-- Function: `gpgme_error_t gpgme_data_set_encoding`  
(`gpgme_data_t` DH, `gpgme_data_encoding_t` ENC)

The function `gpgme_data_set_encoding` changes the encoding of the data object with the handle DH to ENC.

-- Function: `gpgme_error_t gpgme_data_set_flag` (`gpgme_data_t` DH,  
const char \*NAME, const char \*VALUE)

SINCE: 1.7.0

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for NAME:

### size-hint

The value is a decimal number with the length gpgme shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the applications knows the total size of the data. If this is set the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

This function returns 0 on success.

File: `gpgme.info`, Node: Data Buffer Convenience, Prev: Data Buffer Meta-Data, Up: Manipulating Data Buffers

### 6.3.3 Data Buffer Convenience Functions

-----  
-- Data type: enum `gpgme_data_type_t`

SINCE: 1.4.3

The `gpgme_data_type_t` type is used to return the detected type of the content of a data buffer.

#### GPGME\_DATA\_TYPE\_INVALID

This is returned by `gpgme_data_identify` if it was not possible to identify the data. Reasons for this might be a non-seekable stream

or a memory problem. The value is 0.

#### GPGME\_DATA\_TYPE\_UNKNOWN

The type of the data is not known.

#### GPGME\_DATA\_TYPE\_PGP\_SIGNED

The data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.

#### GPGME\_DATA\_TYPE\_PGP\_ENCRYPTED

SINCE: 1.7.0

The data is an OpenPGP encrypted message.

#### GPGME\_DATA\_TYPE\_PGP\_SIGNATURE

SINCE: 1.7.0

The data is an OpenPGP detached signature.

#### GPGME\_DATA\_TYPE\_PGP\_OTHER

This is a generic OpenPGP message. In most cases this will be encrypted data.

#### GPGME\_DATA\_TYPE\_PGP\_KEY

This is an OpenPGP key (private or public).

#### GPGME\_DATA\_TYPE\_CMS\_SIGNED

This is a CMS signed message.

#### GPGME\_DATA\_TYPE\_CMS\_ENCRYPTED

This is a CMS encrypted (enveloped data) message.

#### GPGME\_DATA\_TYPE\_CMS\_OTHER

This is used for other CMS message types.

#### GPGME\_DATA\_TYPE\_X509\_CERT

The data is a X.509 certificate

#### GPGME\_DATA\_TYPE\_PKCS12

The data is a PKCS#12 message. This is commonly used to exchange private keys for X.509.

-- Function: `gpgme_data_type_t gpgme_data_identify (gpgme_data_t DH)`

SINCE: 1.4.3

The function `gpgme_data_identify` returns the type of the data with the handle `DH`. If it is not possible to perform the identification, the function returns zero (`GPGME_DATA_TYPE_INVALID`). Note that depending on how the data

object has been created the identification may not be possible or the data object may change its internal state (file pointer moved). For file or memory based data object, the state should not change.

File: gpgme.info, Node: Contexts, Next: UI Server Protocol, Prev: Exchanging Data, Up: Top

## 7 Contexts

\*\*\*\*\*

All cryptographic operations in GPGME are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

-- Data type: gpgme\_ctx\_t

The gpgme\_ctx\_t type is a handle for a GPGME context, which is used to hold the configuration, status and result of cryptographic operations.

\* Menu:

- \* Creating Contexts:: Creating new GPGME contexts.
- \* Destroying Contexts:: Releasing GPGME contexts.
- \* Result Management:: Managing the result of crypto operations.
- \* Context Attributes:: Setting properties of a context.
- \* Key Management:: Managing keys with GPGME.
- \* Crypto Operations:: Using a context for cryptography.
- \* Miscellaneous:: Miscellaneous operations
- \* Run Control:: Controlling how operations are run.

File: gpgme.info, Node: Creating Contexts, Next: Destroying Contexts, Up: Contexts

### 7.1 Creating Contexts

=====

-- Function: gpgme\_error\_t gpgme\_new (gpgme\_ctx\_t \*CTX)

The function gpgme\_new creates a new gpgme\_ctx\_t object and returns a handle for it in CTX.

The function returns the error code GPG\_ERR\_NO\_ERROR if the context was successfully created, GPG\_ERR\_INV\_VALUE if CTX is not a valid pointer, and GPG\_ERR\_ENOMEM if not enough memory is available. Also, it returns GPG\_ERR\_NOT\_OPERATIONAL if gpgme\_check\_version was not called to initialize GPGME, and GPG\_ERR\_SELFTEST\_FAILED if a selftest failed. Currently, the

only selftest is for Windows MingW32 targets to see if  
-mms-bitfields was used (as required).

File: gpgme.info, Node: Destroying Contexts, Next: Result Management, Prev: Creating Contexts, Up: Contexts

## 7.2 Destroying Contexts

=====

-- Function: void gpgme\_release (gpgme\_ctx\_t CTX)  
The function gpgme\_release destroys the context with the handle  
CTX and releases all associated resources.

File: gpgme.info, Node: Result Management, Next: Context Attributes, Prev: Destroying Contexts, Up: Contexts

## 7.3 Result Management

=====

The  
detailed result of an operation is returned in operation-specific  
structures such as gpgme\_decrypt\_result\_t. The corresponding  
retrieval functions such as gpgme\_op\_decrypt\_result provide static  
access to the results after an operation completes. Those structures  
shall be considered read-only and an application must not allocate such  
a structure on its own. The following interfaces make it possible to  
detach a result structure from its associated context and give it a  
lifetime beyond that of the current operation or context.

-- Function: void gpgme\_result\_ref (void \*RESULT)  
SINCE: 1.2.0

The function gpgme\_result\_ref acquires an additional reference  
for the result RESULT, which may be of any type gpgme\_\*\_result\_t.  
As long as the user holds a reference, the result structure is  
guaranteed to be valid and unmodified.

-- Function: void gpgme\_result\_unref (void \*RESULT)  
SINCE: 1.2.0

The function gpgme\_result\_unref releases a reference for  
the  
result RESULT. If this was the last reference, the result  
structure will be destroyed and all resources associated to it will  
be released.

Note that a context may hold its own references to result structures,  
typically until the context is destroyed or the next operation is

started. In fact, these references are accessed through the `gpgme_op_*_result` functions.

File: `gpgme.info`, Node: Context Attributes, Next: Key Management, Prev: Result Management, Up: Contexts

## 7.4 Context Attributes

=====

### \* Menu:

- \* Protocol Selection:: Selecting the protocol used by a context.
- \* Crypto Engine:: Configuring the crypto engine.
- \* Setting the Sender:: How to tell the engine the sender.
- \* ASCII Armor:: Requesting ASCII armored output.
- \* Text Mode:: Choosing canonical text mode.
- \* Offline Mode:: Choosing offline mode.
- \* Pinentry Mode:: Choosing the pinentry mode.
- \* Included Certificates:: Including a number of certificates.
- \* Key Listing Mode:: Selecting key listing mode.
- \* Passphrase Callback:: Getting the passphrase from the user.
- \* Progress Meter Callback:: Being informed about the progress.
- \* Status Message Callback:: Status messages received from `gpg`.
- \* Context Flags:: Additional flags for a context.
- \* Locale:: Setting the locale of a context.
- \* Additional Logs:: Additional logs of a context.

File: `gpgme.info`, Node: Protocol Selection, Next: Crypto Engine, Up: Context Attributes

### 7.4.1 Protocol Selection

-----

-- Function: `gpgme_error_t gpgme_set_protocol (gpgme_ctx_t CTX, gpgme_protocol_t PROTO)`  
The function `gpgme_set_protocol` sets the protocol used within the context `CTX` to `PROTO`. All crypto operations will be performed by the crypto engine configured for that protocol. \*Note  
Protocols  
and Engines::.

Setting the protocol with `gpgme_set_protocol` does intentionally not check if the crypto engine for that protocol is available and installed correctly. \*Note Engine Version Check::.

The function returns the error code `GPG_ERR_NO_ERROR` if the protocol could be set successfully, and `GPG_ERR_INV_VALUE` if

PROTOCOL is not a valid protocol.

-- Function: `gpgme_protocol_t gpgme_get_protocol (gpgme_ctx_t CTX)`  
The function `gpgme_get_protocol` retrieves the protocol currently use with the context `CTX`.

File: `gpgme.info`, Node: `Crypto Engine`, Next: `Setting the Sender`, Prev: `Protocol Selection`, Up: `Context Attributes`

## 7.4.2 Crypto Engine

-----

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context. \*Note Engine Information::. The default can also be changed globally. \*Note Engine Configuration::.

-- Function: `gpgme_engine_info_t gpgme_ctx_get_engine_info (gpgme_ctx_t CTX)`  
SINCE: 1.1.0

The function `gpgme_ctx_get_engine_info` returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context `CTX`.

The result is valid until the next invocation of `gpgme_ctx_set_engine_info` for this particular context.

This function can not fail.

-- Function: `gpgme_error_t gpgme_ctx_set_engine_info (gpgme_ctx_t CTX, gpgme_protocol_t PROTO, const char *FILE_NAME, const char *HOME_DIR)`  
SINCE: 1.1.0

The function `gpgme_ctx_set_engine_info` changes the configuration of the crypto engine implementing the protocol `PROTO` for the context `CTX`.

`FILE_NAME` is the file name of the executable program implementing this protocol, and `HOME_DIR` is the directory name of the configuration directory for this crypto engine. If `HOME_DIR` is `NULL`, the engines default will be used.



Currently this function must be used before starting the first crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context CTX.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

File: `gpgme.info`, Node: Setting the Sender, Next: ASCII Armor, Prev: Crypto Engine, Up: Context Attributes

### 7.4.3 How to tell the engine the sender.

-----

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. GPGME provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not supported.

```
-- Function: gpgme_error_t
gpgme_set_sender (gpgme_ctx_t CTX,
 int ADDRESS)
```

SINCE: 1.8.0

The function `gpgme_set_sender` specifies the sender address for use in sign and verify operations. `ADDRESS` is expected to be the `addr-spec` part of an address but may also be a complete mailbox address, in which case this function extracts the `addr-spec` from it. Using `NULL` for `ADDRESS` clears the sender address.

The function returns 0 on success or an error code on failure. The most likely failure is that no valid `addr-spec` was found in `ADDRESS`.

```
-- Function: const char * gpgme_get_sender (gpgme_ctx_t CTX)
```

SINCE: 1.8.0

The function `gpgme_get_sender` returns the current sender address from the context, or `NULL` if none was set. The returned value is valid as long as the `CTX` is valid and `gpgme_set_sender` has not been called again.

#### 7.4.4

##### ASCII Armor

-----

-- Function: void gpgme\_set\_armor (gpgme\_ctx\_t CTX, int YES)  
The function gpgme\_set\_armor specifies if the output should be ASCII armored. By default, output is not ASCII armored.

ASCII armored output is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme\_get\_armor (gpgme\_ctx\_t CTX)  
The function gpgme\_get\_armor returns 1 if the output is ASCII armored, and 0 if it is not, or if CTX is not a valid pointer.

#### 7.4.5 Text Mode

-----

-- Function: void gpgme\_set\_textmode (gpgme\_ctx\_t CTX, int YES)  
The function gpgme\_set\_textmode specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme\_get\_textmode (gpgme\_ctx\_t CTX)  
The function gpgme\_get\_textmode returns 1 if canonical text mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

#### 7.4.6 Offline Mode

-----

-- Function: void gpgme\_set\_offline (gpgme\_ctx\_t CTX, int YES)  
SINCE: 1.6.0

The function gpgme\_set\_offline specifies if offline mode should be used. Offline mode is disabled if YES is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode GPGME\_KEYLIST\_MODE\_VALIDATE.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

-- Function: int gpgme\_get\_offline (gpgme\_ctx\_t CTX)  
SINCE: 1.6.0

The function gpgme\_get\_offline returns 1 if offline mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Pinentry Mode, Next: Included Certificates, Prev: Offline Mode, Up: Context Attributes

#### 7.4.7

##### Pinentry Mode

-----  
-- Function: gpgme\_error\_t gpgme\_set\_pinentry\_mode (gpgme\_ctx\_t CTX,  
gpgme\_pinentry\_mode\_t MODE)

SINCE: 1.4.0

The function gpgme\_set\_pinentry\_mode specifies the pinentry mode to be used.

For GnuPG >= 2.1 this option is required to be set to

GPGME\_PINENTRY\_MODE\_LOOPBACK to enable the passphrase callback mechanism in GPGME through `gpgme_set_passphrase_cb`.

-- Function: `gpgme_pinentry_mode_t gpgme_get_pinentry_mode`  
(`gpgme_ctx_t` CTX)  
SINCE: 1.4.0

The function `gpgme_get_pinentry_mode` returns the mode set for the context.

-- Data type: enum `gpgme_pinentry_mode_t`  
SINCE: 1.4.0

The `gpgme_minentry_mode_t` type specifies the set of possible pinentry modes that are supported by GPGME if GnuPG  $\geq 2.1$  is used. The following modes are supported:

GPGME\_PINENTRY\_MODE\_DEFAULT  
SINCE: 1.4.0

Use the default of the agent, which is `ask`.

GPGME\_PINENTRY\_MODE\_ASK  
SINCE: 1.4.0

Force the use of the Pinentry.

GPGME\_PINENTRY\_MODE\_CANCEL  
SINCE: 1.4.0

Emulate use of Pinentry's cancel button.

GPGME\_PINENTRY\_MODE\_ERROR  
SINCE: 1.4.0

Return a Pinentry error `No Pinentry`.

GPGME\_PINENTRY\_MODE\_LOOPBACK  
SINCE: 1.4.0

Redirect Pinentry queries to the caller. This enables the use of `gpgme_set_passphrase_cb` because pinentry queries are redirected to `gpgme`.

Note: For 2.1.0 - 2.1.12 this mode requires `allow-loopback-pinentry` to be enabled in the `gpg-agent.conf` or an agent started with that option.

#### 7.4.8 Included Certificates

-----

-- Function: void gpgme\_set\_include\_certs (gpgme\_ctx\_t CTX,  
int NR\_OF\_CERTS)  
The function gpgme\_set\_include\_certs specifies how many certificates should be included in an S/MIME signed message. By default, only the senders certificate is included. The possible values of NR\_OF\_CERTS are:

GPGME\_INCLUDE\_CERTS\_DEFAULT  
SINCE: 1.0.3

Fall back to the default of the crypto backend. This is the default for GPGME.

- 2  
Include all certificates except the root certificate.
- 1  
Include all certificates.
- 0  
Include no certificates.
- 1  
Include the senders certificate only.
- n  
Include the first n certificates of the certificates path, starting from the senders certificate. The number n must be positive.

Values of NR\_OF\_CERTS smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by all other engines.

-- Function: int gpgme\_get\_include\_certs (gpgme\_ctx\_t CTX)  
The function gpgme\_get\_include\_certs returns the number of certificates to include into an S/MIME signed message.

#### 7.4.9 Key Listing Mode

-----  
-- Function: gpgme\_error\_t gpgme\_set\_keylist\_mode (gpgme\_ctx\_t CTX,  
gpgme\_keylist\_mode\_t MODE)

The function gpgme\_set\_keylist\_mode changes the default behaviour of the key listing functions. The value in MODE is a bitwise-or combination of one or multiple of the following bit values:

#### GPGME\_KEYLIST\_MODE\_LOCAL

The GPGME\_KEYLIST\_MODE\_LOCAL symbol specifies that the local keyring should be searched for keys in the keylisting operation. This is the default.

Using only this option results in a --list-keys.

#### GPGME\_KEYLIST\_MODE\_EXTERN

The GPGME\_KEYLIST\_MODE\_EXTERN symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with GPGME\_KEYLIST\_MODE\_LOCAL. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a --search-keys for GPGME\_PROTOCOL\_OpenPGP and something similar to --list-external-keys for GPGME\_PROTOCOL\_CMS.

#### GPGME\_KEYLIST\_MODE\_LOCATE

This is a shortcut for the combination of GPGME\_KEYLIST\_MODE\_LOCAL and GPGME\_KEYLIST\_MODE\_EXTERN, which results in a --locate-keys for GPGME\_PROTOCOL\_OpenPGP.

#### GPGME\_KEYLIST\_MODE\_SIGS

The GPGME\_KEYLIST\_MODE\_SIGS symbol specifies that the key signatures should be included in the listed keys.

#### GPGME\_KEYLIST\_MODE\_SIG\_NOTATIONS

SINCE: 1.1.1

The GPGME\_KEYLIST\_MODE\_SIG\_NOTATIONS symbol specifies that the signature notations on key signatures should be included in the listed keys. This only works if GPGME\_KEYLIST\_MODE\_SIGS is also enabled.

#### GPGME\_KEYLIST\_MODE\_WITH\_TOFU

SINCE: 1.7.0

The `GPGME_KEYLIST_MODE_WITH_TOFU` symbol specifies that information pertaining to the TOFU trust model should be included in the listed keys.

#### `GPGME_KEYLIST_MODE_WITH_KEYGRIP`

SINCE: 1.14.0

The `GPGME_KEYLIST_MODE_WITH_KEYRIP` symbol specifies that the keygrip is always included in the listing. The default depends on the version of the backend and the used protocol.

#### `GPGME_KEYLIST_MODE_WITH_SECRET`

SINCE: 1.5.1

The `GPGME_KEYLIST_MODE_WITH_SECRET` returns information about the presence of a corresponding secret key in a public key listing. A public key listing with this mode is slower than a standard listing but can be used instead of a second run to list the secret keys.

This is only supported for GnuPG

versions  $\geq$  2.1. Note that using this option also makes sure that the keygrip is available in the output.

#### `GPGME_KEYLIST_MODE_EPHEMERAL`

SINCE: 1.2.0

The `GPGME_KEYLIST_MODE_EPHEMERAL` symbol specifies that keys flagged as ephemeral are included in the listing.

#### `GPGME_KEYLIST_MODE_VALIDATE`

SINCE: 0.4.5

The `GPGME_KEYLIST_MODE_VALIDATE` symbol specifies that the backend should do key or certificate validation and not just get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

At least one of `GPGME_KEYLIST_MODE_LOCAL` and `GPGME_KEYLIST_MODE_EXTERN` must be specified. For future binary compatibility, you should get the current mode with `gpgme_get_keylist_mode` and modify it by setting or clearing the appropriate bits, and then using that calculated value in the `gpgme_set_keylisting_mode` operation. This will leave all other bits in the mode value intact (in particular those that are not

used in the current version of the library).

The function returns the error code `GPG_ERR_NO_ERROR` if the mode could be set correctly, and `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer or `MODE` is not a valid mode.

-- Function: `gpgme_keylist_mode_t gpgme_get_keylist_mode`  
(`gpgme_ctx_t CTX`)

The function `gpgme_get_keylist_mode` returns the current key listing mode of the context `CTX`. This value can then be modified and used in a subsequent `gpgme_set_keylist_mode` operation to only affect the desired bits (and leave all others intact).

The function returns 0 if `CTX` is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

File: `gpgme.info`, Node: Passphrase

Callback, Next: Progress Meter Callback, Prev: Key Listing Mode, Up: Context Attributes

#### 7.4.10 Passphrase Callback

-----

-- Data type: `gpgme_error_t (*gpgme_passphrase_cb_t)(void *HOOK, const char *UID_HINT, const char *PASSPHRASE_INFO, int PREV_WAS_BAD, int FD)`

The `gpgme_passphrase_cb_t` type is the type of functions usable as passphrase callback function.

The argument `UID_HINT` might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), `UID_HINT` will be `NULL`.

The argument `PASSPHRASE_INFO`, if not `NULL`, will give further information about the context in which the passphrase is required.

This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then `PREV_WAS_BAD` is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor `FD`. The function `gpgme_io_writen` should be used for the write operation. Note that if the user returns 0 to indicate success, the user must at least write a newline character before returning from the callback.



If an error occurs, return the corresponding `gpgme_error_t` value. You can use the error code `GPG_ERR_CANCELED` to abort the operation. Otherwise, return 0.

Note: The `passphrase_cb` only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See `gpgme_set_pinentry_mode` for more details on 2.1.x usage.

-- Function: `void gpgme_set_passphrase_cb (gpgme_ctx_t CTX, gpgme_passphrase_cb_t PASSFUNC, void *HOOK_VALUE)`  
The function `gpgme_set_passphrase_cb` sets the function that is used when a passphrase needs to be provided by the user to `PASSFUNC`. The function `PASSFUNC` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `HOOK_VALUE`. By default, no passphrase callback function is set.

Not all crypto engines require this callback to retrieve the passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not even support an external passphrase callback at all, in this case the error code `GPG_ERR_NOT_SUPPORTED` is returned.

For GnuPG  $\geq$  2.1 the pinentry mode has to be set to `GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback. See `gpgme_set_pinentry_mode`.

The user can disable the use of a passphrase callback function by calling `gpgme_set_passphrase_cb` with `PASSFUNC` being `NULL`.

-- Function: `void gpgme_get_passphrase_cb (gpgme_ctx_t CTX, gpgme_passphrase_cb_t *PASSFUNC, void **HOOK_VALUE)`  
The function `gpgme_get_passphrase_cb` returns the function that is used when a passphrase needs to be provided by the user in `*PASSFUNC`, and the first argument for this function in `*HOOK_VALUE`. If no passphrase callback is set, or `CTX` is not a valid pointer, `NULL` is returned in both variables.

`PASSFUNC` or `HOOK_VALUE` can be `NULL`. In this case, the corresponding value will not be returned.

File: `gpgme.info`, Node: Progress Meter Callback, Next: Status Message Callback, Prev: Passphrase Callback, Up: Context Attributes

### 7.4.11 Progress Meter Callback

-----  
-- Data type: void (\*gpgme\_progress\_cb\_t)(void \*HOOK, const char \*WHAT,  
int TYPE, int CURRENT, int TOTAL)

The gpgme\_progress\_cb\_t type is the type of functions usable as progress callback function.

The arguments are specific to the crypto engine. More information about the progress information returned from the GnuPG engine can be

found in the GnuPG source code in the file doc/DETAILS in the section PROGRESS.

-- Function: void gpgme\_set\_progress\_cb (gpgme\_ctx\_t CTX,  
gpgme\_progress\_cb\_t PROGFUNC, void \*HOOK\_VALUE)

The function gpgme\_set\_progress\_cb sets the function that is used when progress information about a cryptographic operation is available. The function PROGFUNC needs to be implemented by the user, and whenever it is called, it is called with its first argument being HOOK\_VALUE. By default, no progress callback function is set.

Setting a callback function allows an interactive program to display progress information about a long operation to the user.

The user can disable the use of a progress callback function by calling gpgme\_set\_progress\_cb with PROGFUNC being NULL.

-- Function: void gpgme\_get\_progress\_cb (gpgme\_ctx\_t CTX,  
gpgme\_progress\_cb\_t \*PROGFUNC, void \*\*HOOK\_VALUE)

The function gpgme\_get\_progress\_cb returns the function that is used to inform the user about the progress made in \*PROGFUNC, and the first argument for this function in \*HOOK\_VALUE. If no progress callback is set, or CTX is not a valid pointer, NULL is returned in both variables.

PROGFUNC or HOOK\_VALUE can be NULL. In this case, the corresponding value will not be returned.

File: gpgme.info, Node: Status Message Callback, Next: Context Flags, Prev: Progress Meter Callback, Up: Context Attributes

### 7.4.12 Status Message Callback

-- Data type: `gpgme_error_t (*gpgme_status_cb_t)(void *HOOK, const char *KEYWORD, const char *ARGS)`

The `gpgme_status_cb_t` type is the type of function usable as a status message callback function.

The argument `KEYWORD` is the name of the status message while the `ARGS` argument contains any arguments for the status message.

If an error occurs, return the corresponding `gpgme_error_t` value.

Otherwise,  
return 0.

-- Function: `void gpgme_set_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t STATUSFUNC, void *HOOK_VALUE)`  
SINCE: 1.6.0

The function `gpgme_set_status_cb` sets the function that is used when a status message is received from `gpg` to `STATUSFUNC`. The function `STATUSFUNC` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `HOOK_VALUE`. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling `gpgme_set_status_cb` with `STATUSFUNC` being `NULL`.

-- Function: `void gpgme_get_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t *STATUSFUNC, void **HOOK_VALUE)`  
SINCE: 1.6.0

The function `gpgme_get_status_cb` returns the function that is used to process status messages from `gpg` in `*STATUSFUNC`, and the first argument for this function in `*HOOK_VALUE`. If no status message callback is set, or `CTX` is not a valid pointer, `NULL` is returned in both variables.

File: `gpgme.info`, Node: Context Flags, Next: Locale, Prev: Status Message Callback, Up: Context Attributes

#### 7.4.13 Context Flags

-----

-- Function: `gpgme_error_t gpgme_set_ctx_flag (gpgme_ctx_t CTX, const char *NAME, const char *VALUE)`

SINCE: 1.7.0

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for NAME:

"redraw"

This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a Pinentry. A Curses based application may use this information to redraw the screen; for example:

```
err = gpgme_op_keylist_start (ctx, "foo@example.org", 0);
while
(!err)
{
 err = gpgme_op_keylist_next (ctx, &key);
 if (err)
 break;
 show_key (key);
 gpgme_key_release (key);
}
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
 redraw_screen ();
gpgme_release (ctx);
```

"full-status"

Using a VALUE of "1" the status callback set by `gpgme_set_status_cb` returns all status lines with the exception of PROGRESS lines. With the default of "0" the status callback is only called in certain situations.

"raw-description"

Setting the VALUE to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the description field of the `gpgme_tofu_info_t` object.

"export-session-key"

Using a VALUE of "1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for VALUE, session keys are not exported.

"override-session-key"

The string given in VALUE is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a

decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via ps(1).

#### "auto-key-retrieve"

Setting the VALUE to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible.

Keyservers or Web Key Directory operators can see which keys

you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

#### "auto-key-import"

Setting the VALUE to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

#### "include-key-block"

Setting the VALUE to "1" forces the GPG backend to embed the signing key as well as an encryption subkey into the the signature.

#### "request-origin"

The string given in VALUE is passed to the GnuPG engines to request restrictions based on the origin of the request.

Valid values are documented in the GnuPG manual and the gpg man page under the option --request-origin. Requires at least GnuPG 2.2.6 to have an effect.

#### "no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

#### "ignore-mdc-error"

This flag passes the option --ignore-mdc-error to gpg. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag legacy\_cipher\_nomdc set. For failsafe reasons this flag is reset after each operation.

## "auto-key-locate"

The string given in VALUE is passed to gpg. This can be used to change the behavior of a GPGME\_KEYLIST\_MODE\_LOCATE keylisting. Valid values are documented in the GnuPG manual and the gpg

man page under the option --auto-key-locate.

Requires at least GnuPG 2.1.18.

Note: Keys retrieved through auto-key-locate are automatically imported in the keyring.

## trust-model

SINCE: 1.11.2

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default. If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail. Example: "tofu+pgp".

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future operations. A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

## "extended-edit"

This flag passes the option --expert to gpg key edit. This can be used to get additional callbacks in gpgme\_op\_edit.

This function returns 0 on success.

-- Function: const char \* gpgme\_get\_ctx\_flag (gpgme\_ctx\_t CTX, const char \*NAME)

SINCE: 1.8.0

The value of flags settable by gpgme\_set\_ctx\_flag can be retrieved by this function. If NAME is unknown the function returns NULL. For boolean flags an empty string is returned for False and the string "1" is returned for True; either atoi(3) or a test for an empty string can be used to get the boolean value.

File: gpgme.info, Node: Locale, Next: Additional Logs, Prev: Context Flags, Up: Context Attributes

7.4.14 Locale

-----  
A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

```
-- Function: gpgme_error_t
gpgme_set_locale (gpgme_ctx_t CTX,
 int CATEGORY, const char *VALUE)
SINCE: 0.4.3
```

The function `gpgme_set_locale` sets the locale of the context `CTX`, or the default locale if `CTX` is a null pointer.

The locale settings that should be changed are specified by `CATEGORY`. Supported categories are `LC_CTYPE`, `LC_MESSAGES`, and `LC_ALL`, which is a wildcard you can use if you want to change all the categories at once.

The value to be used for the locale setting is `VALUE`, which will be copied to GPGMEs internal data structures. `VALUE` can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default value at startup.

The function returns an error if not enough memory is available.

File: `gpgme.info`, Node: Additional Logs, Prev: Locale, Up: Context Attributes

#### 7.4.15 Additional Logs

-----

Additional logs can be associated with a context. These logs are engine specific and can be obtained with `gpgme_op_getauditlog`.

```
-- Function: gpgme_error_t gpgme_op_getauditlog (gpgme_ctx_t CTX,
 gpgme_data_t OUTPUT, unsigned int FLAGS)
```

SINCE: 1.1.1

The function `gpgme_op_getauditlog` is used to obtain additional logs as specified by `FLAGS` into the `OUTPUT` data. If

The function returns the error code `GPG_ERR_NO_ERROR` if a log could be queried from the engine, and `GPG_ERR_NOT_IMPLEMENTED` if the log specified in `FLAGS` is not available for this engine. If no log is available `GPG_ERR_NO_DATA` is returned.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

#### `GPGME_AUDITLOG_DIAG`

SINCE: 1.11.2

Obtain diagnostic output which would be written to `stderr` in interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and `GPG_ERR_NO_DATA` will be returned.

Implemented for: `GPGME_PROTOCOL_OpenPGP`

#### `GPGME_AUDITLOG_DEFAULT`

SINCE: 1.11.2

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the `GETAUDITLOG` command. For `GPGME_PROTOCOL_CMS` this provides additional information about the X509 certificate chain.

Implemented for: `GPGME_PROTOCOL_CMS`

#### `GPGME_AUDITLOG_HTML`

SINCE: 1.1.1

Same as `GPGME_AUDITLOG_DEFAULT` but in HTML.

Implemented for: `GPGME_PROTOCOL_CMS`

-- Function: `gpgme_error_t`  
`gpgme_op_getauditlog_start` (`gpgme_ctx_t` CTX,  
    `gpgme_data_t` OUTPUT, unsigned int FLAGS)  
SINCE: 1.1.1



This is the asynchronous variant of `gpgme_op_getauditlog`.

File: `gpgme.info`, Node: Key Management, Next: Crypto Operations, Prev: Context Attributes, Up: Contexts

## 7.5 Key Management

=====

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

\* Menu:

- \* Key objects:: Description of the key structures.
- \* Listing Keys:: Browsing the list of available keys.
- \* Information About Keys:: Requesting detailed information about keys.
- \* Manipulating Keys:: Operations on keys.
- \* Generating Keys:: Creating new key pairs.
- \* Signing Keys:: Adding key signatures to public keys.
- \* Exporting Keys:: Retrieving key data from the key ring.
- \* Importing Keys:: Adding keys to the key ring.
- \* Deleting Keys:: Removing keys from the key ring.
- \* Changing Passphrases:: Change the passphrase of a key.
- \* Changing TOFU Data:: Changing data pertaining to TOFU.
- \* Advanced Key Editing:: Advanced key edit operation.

File: `gpgme.info`, Node: Key objects, Next: Listing Keys, Up: Key Management

### 7.5.1 Key objects

-----

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

-- Data type: `gpgme_key_t`

The `gpgme_key_t` type is a pointer to a key object. It has the following members:

`gpgme_keylist_mode_t` `keylist_mode`  
SINCE: 0.9.0

The keylist mode that was active when the key was retrieved.

unsigned int revoked : 1

This is true if the key is revoked.

unsigned int expired : 1

This is true if the key is expired.

unsigned int disabled : 1

This is true if the key is disabled.

unsigned int invalid : 1

This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

unsigned int can\_encrypt : 1

This is true if the key (ie one of its subkeys) can be used for encryption.

unsigned int can\_sign : 1

This is true if the key (ie one of its subkeys) can be used to create data signatures.

unsigned int can\_certify : 1

This is true if the key (ie one of its subkeys) can be used to create key certificates.

unsigned int can\_authenticate : 1

SINCE: 0.4.5

This is true  
if the key (ie one of its subkeys) can be used  
for authentication.

unsigned int is\_qualified : 1

SINCE: 1.1.0

This is true if the key can be used for qualified signatures according to local government regulations.

unsigned int secret : 1

This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if GPGME\_KEYLIST\_MODE\_WITH\_SECRET is active.

unsigned int origin : 5

SINCE: 1.8.0

Reserved for the origin of this key.

gpgme\_protocol\_t protocol

This is the protocol supported by this key.

char \*issuer\_serial

If protocol is GPGME\_PROTOCOL\_CMS, then this is the issuer serial.

char \*issuer\_name

If protocol is GPGME\_PROTOCOL\_CMS, then this is the issuer name.

char \*chain\_id

If protocol is GPGME\_PROTOCOL\_CMS, then this is the chain ID, which can be used to build the certificate chain.

gpgme\_validity\_t owner\_trust

If protocol is GPGME\_PROTOCOL\_OpenPGP, then this is the owner trust.

gpgme\_subkey\_t subkeys

This is a linked list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

gpgme\_user\_id\_t uids

This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

char \*fpr

SINCE: 1.7.0

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

unsigned long last\_update

SINCE: 1.8.0

Reserved for the time of the last update of this key.

-- Data type: gpgme\_subkey\_t

SINCE: 1.5.0

The `gpgme_subkey_t` type is a pointer to a subkey structure. Subkeys are one component of a `gpgme_key_t` object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One `gpgme_key_t` can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

`gpgme_subkey_t next`

This is a pointer to the next subkey structure in the linked list, or NULL if this is the last element.

`unsigned int revoked : 1`

This is true if the subkey is revoked.

`unsigned int expired : 1`

This is true if the subkey is expired.

`unsigned int disabled : 1`

This is true if the subkey is disabled.

`unsigned int`

`invalid : 1`

This is true if the subkey is invalid.

`unsigned int can_encrypt : 1`

This is true if the subkey can be used for encryption.

`unsigned int can_sign : 1`

This is true if the subkey can be used to create data signatures.

`unsigned int can_certify : 1`

This is true if the subkey can be used to create key certificates.

`unsigned int can_authenticate : 1`

SINCE: 0.4.5

This is true if the subkey can be used for authentication.

`unsigned int is_qualified : 1`

SINCE: 1.1.0

This is true if the subkey can be used for qualified

signatures according to local government regulations.

unsigned int is\_de\_vs : 1

SINCE: 1.8.0

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA

keys using a Brainpool curve.

unsigned int secret : 1

This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if GPGME\_KEYLIST\_MODE\_WITH\_SECRET is active.

gpgme\_pubkey\_algo\_t pubkey\_algo

This is the public key algorithm supported by this subkey.

unsigned int length

This is the length of the subkey (in bits).

char \*keyid

This is the key ID of the subkey in hexadecimal digits.

char \*fpr

This is the fingerprint of the subkey in hexadecimal digits, if available.

char \*keygrip

SINCE: 1.7.0

The keygrip of the subkey in hex digit form or NULL if not available.

long int timestamp

This is the creation timestamp of the subkey.

This is -1 if

the timestamp is invalid, and 0 if it is not available.

long int expires

This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

unsigned int is\_cardkey : 1

SINCE: 1.2.0

True if the secret key is stored on a smart card.

char \*card\_number  
SINCE: 1.2.0

The serial number of a smart card holding this key or NULL.

char \*curve  
For ECC algorithms the name of the curve.

-- Data type: gpgme\_user\_id\_t

A user ID is a component of a gpgme\_key\_t object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

gpgme\_user\_id\_t next  
This is a pointer to the next user ID structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1  
This is true if the user ID is revoked.

unsigned int invalid : 1  
This is true if the user ID is invalid.

gpgme\_validity\_t validity  
This specifies the validity of the user ID.

char \*uid  
This is the user ID string.

char \*name  
This is the name component of uid, if available.

char \*comment  
This is the comment component of uid, if available.

char \*email  
This is the email component of uid, if available.

char \*address;  
The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the email part of this

structure but might be slightly different. If no mail address is available NULL is stored.

gpgme\_tofu\_info\_t tofu  
SINCE: 1.7.0

If not NULL information from the TOFU database pertaining to this user id.

gpgme\_key\_sig\_t signatures  
This is a linked list with the signatures on this user ID.

unsigned int origin :  
5  
SINCE: 1.8.0

Reserved for the origin of this user ID.

unsigned long last\_update  
SINCE: 1.8.0

Reserved for the time of the last update of this user ID.

char \*uidhash;  
A string used by gpg to identify a user ID. This string can be used at certain prompts of gpgme\_op\_edit to select a user ID. Users must be prepared to see a NULL value here. The format of the value is not specified and may depend on the GPGME or GnuPG version.

-- Data type: gpgme\_tofu\_info\_t

SINCE: 1.7.0

The gpgme\_tofu\_info\_t type is a pointer to a tofu info structure. Tofu info structures are one component of a gpgme\_user\_id\_t object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

gpgme\_key\_sig\_t next  
This is a pointer to the next tofu info structure in the linked list, or NULL if this is the last element.

unsigned int validity : 3  
This is the TOFU validity. It can have the following values:

0

The value 0 indicates a conflict.

1

The value 1 indicates a key without history.

2

The value 2 indicates a key with too little history.

3

The value 3 indicates a key with enough history for basic trust.

4

The value 4 indicates a key with a lot of history.

unsigned int policy : 4

This is the TOFU policy, see `gpgme_tofu_policy_t`.

unsigned short signcount

This is the number of signatures seen for this binding (or `USHRT_MAX` if there are more than that).

unsigned short encrcount

This is the number of encryptions done with this binding (or `USHRT_MAX` if there are more than that).

unsigned long signfirst

Number of seconds since Epoch when the first signature was seen with this binding.

unsigned long signlast

Number of seconds since Epoch when the last signature was seen with this binding.

unsigned long encrfirst

Number of seconds since Epoch when the first encryption was done with this binding.

unsigned long enclast

Number of seconds since Epoch when the last encryption was done with this binding.

char \*description

A human-readable string summarizing the TOFU data (or `NULL`).



-- Data type: `gpgme_key_sig_t`

The `gpgme_key_sig_t` type is a pointer to a key signature structure. Key signatures are one component of a `gpgme_key_t` object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIGS` mode enabled, because it can be expensive to retrieve all signatures of a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIG_NOTATIONS` mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

`gpgme_key_sig_t next`

This is a pointer to the next key signature structure in the linked list, or `NULL` if this is the last element.

`unsigned int revoked : 1`

This is true if the key signature is a revocation signature.

`unsigned int expired : 1`

This is true if the key signature is expired.

`unsigned int invalid : 1`

This is true if the key signature is invalid.

`unsigned int exportable : 1`

This is true if the key signature is exportable.

`gpgme_pubkey_algo_t pubkey_algo`

This is the public key algorithm used to create the signature.

`char *keyid`

This is the key ID of the key (in hexadecimal digits) used to create the signature.

`long int timestamp`

This is the creation timestamp of the key signature. This is -1 if the timestamp is invalid, and 0 if it is not available.

`long int expires`

This is the expiration timestamp of the key signature, or 0 if the key signature does not expire.

`gpgme_error_t` status

This is the status of the signature and has the same meaning as the member of the same name in a `gpgme_signature_t` object.

`unsigned int` sig\_class

This specifies the signature class of the key signature. The meaning is specific to the crypto engine.

`char *uid`

This is the main user ID of the key used to create the signature.

`char *name`

This is the name component of uid, if available.

`char *comment`

This is the comment component of uid, if available.

`char *email`

This is the email component of uid, if available.

`gpgme_sig_notation_t` notations

This is a linked list with the notation data and policy URLs.

File: [gpgme.info](#), Node: [Listing Keys](#), Next: [Information About Keys](#), Prev: [Key objects](#), Up: [Key Management](#)

## 7.5.2 Listing Keys

-----

```
-- Function: gpgme_error_t gpgme_op_keylist_start (gpgme_ctx_t CTX,
 const char *PATTERN, int SECRET_ONLY)
```

The function `gpgme_op_keylist_start` initiates a key listing operation inside the context `CTX`. It sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys in the list.

If `PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually

accepted). The

pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `SECRET_ONLY` is not 0, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_keylist_ext_start (gpgme_ctx_t CTX,
 const char *PATTERN[], int SECRET_ONLY, int RESERVED)
```

The function `gpgme_op_keylist_ext_start` initiates an extended key listing operation inside the context `CTX`. It sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the

keys in the list.

If `PATTERN` or `*PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` is a `NULL` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `SECRET_ONLY` is not 0, the list is restricted to secret keys only.

The value of `RESERVED` must be 0.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and passes through any errors that are

reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_keylist_from_data_start
 (gpgme_ctx_t CTX, gpgme_data_t DATA, int RESERVED)
```

SINCE: 1.8.0

The function `gpgme_op_keylist_from_data_start` initiates a key listing operation inside the context `CTX`. In contrast to the other key listing operation the keys are read from the supplied `DATA` and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys from `DATA`.

The value of `RESERVED` must be 0.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation. While the context is busy `DATA` may not be released.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_keylist_next (gpgme_ctx_t CTX,
 gpgme_key_t *R_KEY)
```

The function `gpgme_op_keylist_next` returns the next key in the list created by a previous `gpgme_op_keylist_start` operation in the context `CTX`. The key will have one reference for the user.

*\*Note Manipulating Keys:.\**

This is the only way to get at `gpgme_key_t` objects in GPGME.

If the last key in the list has already been returned, `gpgme_op_keylist_next` returns `GPG_ERR_EOF`.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` or `R_KEY` is not a valid pointer, and `GPG_ERR_ENOMEM` if there is not enough memory for the operation.

-- Function: `gpgme_error_t gpgme_op_keylist_end (gpgme_ctx_t CTX)`

The function `gpgme_op_keylist_end` ends a pending key list operation in the context `CTX`.

After the operation completed successfully, the result of the key listing operation can be retrieved with `gpgme_op_keylist_result`.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

The following example illustrates how all keys containing a certain string (`g10code`) can be listed with their key ID and the name and email address of the main user ID:

```
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
{
 err = gpgme_op_keylist_start (ctx, "g10code", 0);
 while (!err)
 {
 err = gpgme_op_keylist_next (ctx, &key);
 if (err)

break;
 printf ("%s:", key->subkeys->keyid);
 if (key->uids && key->uids->name)
 printf (" %s", key->uids->name);
 if (key->uids && key->uids->email)
 printf (" <%s>", key->uids->email);
 putchar ('\n');
 gpgme_key_release (key);
 }
 gpgme_release (ctx);
}
if (gpg_err_code (err) != GPG_ERR_EOF)
{
 fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
 exit (1);
}
```

-- Data type: `gpgme_keylist_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_keylist_*` operation. After successfully ending a key

listing operation, you can retrieve the pointer to the result with `gpgme_op_keylist_result`. The structure contains the following member:

`unsigned int truncated : 1`

This is true if the crypto backend had to truncate the result, and less than the desired keys could be listed.

-- Function: `gpgme_keylist_result_t gpgme_op_keylist_result (gpgme_ctx_t CTX)`

The function `gpgme_op_keylist_result` returns a `gpgme_keylist_result_t` pointer to a structure holding the result of a `gpgme_op_keylist_*` operation. The pointer is only valid if the last operation on the context was a key listing operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

In a simple program, for which a blocking operation is acceptable, the following function can be used to retrieve a single key.

-- Function: `gpgme_error_t gpgme_get_key (gpgme_ctx_t CTX, const char *FPR, gpgme_key_t *R_KEY, int SECRET)`

The function `gpgme_get_key` gets the key with the fingerprint (or key ID) `FPR` from the crypto backend and return it in `R_KEY`. If `SECRET` is true, get the secret key. The currently active keylist mode is used to retrieve the key. The key will have one reference for the user.

If the key is not found in the keyring, `gpgme_get_key` returns the error code `GPG_ERR_EOF` and `*R_KEY` will be set to `NULL`.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` or `R_KEY` is not a valid pointer or `FPR` is not a fingerprint or key ID, `GPG_ERR_AMBIGUOUS_NAME` if the key ID was not a unique specifier for a key, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

File: `gpgme.info`, Node: Information About Keys, Next: Manipulating Keys, Prev: Listing Keys, Up: Key Management

### 7.5.3 Information About Keys

-----

Please see the beginning of this section for more information about `gpgme_key_t` objects.

-- Data type: `gpgme_validity_t`  
The `gpgme_validity_t` type is used to specify the validity of a user ID in a key. The following validities are defined:

#### `GPGME_VALIDITY_UNKNOWN`

The user ID is of unknown validity. The string representation of this validity is `?`.

#### `GPGME_VALIDITY_UNDEFINED`

The validity of the user ID is undefined. The string representation of this validity is `q`.

#### `GPGME_VALIDITY_NEVER`

The user ID is never valid. The string representation of this validity is `n`.

#### `GPGME_VALIDITY_MARGINAL`

The user ID is marginally valid. The string representation of this validity is `m`.

#### `GPGME_VALIDITY_FULL`

The user ID is fully valid. The string representation of this validity is `f`.

#### `GPGME_VALIDITY_ULTIMATE`

The user ID is ultimately valid. The string representation of this validity is `u`.

File: `gpgme.info`, Node: Manipulating Keys, Next: Generating Keys, Prev: Information About Keys, Up: Key Management

### 7.5.4 Manipulating Keys

-----  
-- Function: `void gpgme_key_ref (gpgme_key_t KEY)`

The function `gpgme_key_ref` acquires an additional reference for the key `KEY`.

-- Function: `void gpgme_key_unref (gpgme_key_t KEY)`

The function `gpgme_key_unref` releases a reference for the key `KEY`. If this was the last reference, the key will be destroyed and all resources associated to it will be released.

-- Function: `gpgme_error_t gpgme_op_setexpire (gpgme_ctx_t CTX,`

gpgme\_key\_t KEY, unsigned long EXPIRES, const char \*SUBFPRS,  
unsigned int RESERVED);

SINCE: 1.14.1

The function `gpgme_op_setexpire` sets the expiration time of the key KEY or of the specified subkeys. This function requires at least version 2.1.22 of GnuPG.

KEY specifies the key to operate on.

EXPIRES specifies the expiration time in seconds from now. To be similar to other usages where expiration times are provided in unsigned long this is similar to the key creation date and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time. Note that this parameter takes an unsigned long value and not a time\_t to avoid problems on systems which use a signed 32 bit time\_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

SUBFPRS selects the subkey(s) for which the expiration time should be set. If SUBFPRS is set to NULL, then the expiration time of the primary key is set. If SUBFPRS is an asterisk (\*), then the expiration times of all non-revoked and not yet expired subkeys are set. To select more than one subkey put all subkey fingerprints into one string separated by linefeeds characters (\n).

RESERVED is reserved for later use and must be 0.

-- Function: `gpgme_error_t gpgme_op_setexpire_start (gpgme_ctx_t CTX,  
gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS,  
unsigned int FLAGS);`

SINCE: 1.14.1

The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

-- Function: `gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX,  
gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);`

SINCE: 1.14.1



The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

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### 7.5.5 Generating Keys

-----

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the `gpgme_op_genkey` function can be used. Existing code which wants to update to the new functions or new code which shall supports older

GnuPG versions may try the new functions first and provide a fallback to the old function if the error code `GPG_ERR_NOT_SUPPORTED` is received.

```
-- Function: gpgme_error_t gpgme_op_createkey (gpgme_ctx_t CTX,
 const char *USERID, const char *ALGO, unsigned long RESERVED,
 unsigned long EXPIRES, gpgme_key_t EXTRAKEY,
 unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createkey` generates a new key for the protocol active in the context `CTX`. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

`USERID` is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`ALGO` specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see the GnuPG manual. If `ALGO` is `NULL` or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP

protocol, the specification of a default algorithm, without requesting a non-default usage via `FLAGS`, triggers the creation of a primary key plus a secondary key (subkey).

`RESERVED` must be set to zero.

`EXPIRES` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag `GPGME_CREATE_NOEXPIRE` to create keys that do not expire. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`EXTRAKEY` is currently not used and must be set to `NULL`. A future version of `GPGME` may use this parameter to create X.509 keys.

`FLAGS` can be set to the bit-wise OR of the following flags:

`GPGME_CREATE_SIGN`  
`GPGME_CREATE_ENCR`  
`GPGME_CREATE_CERT`  
`GPGME_CREATE_AUTH`  
SINCE: 1.7.0

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: signing, encryption, certification, or authentication. The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

`GPGME_CREATE_NOPASSWD`  
SINCE: 1.7.0

Request generation of the key without password protection.

`GPGME_CREATE_SELFSIGNED`  
SINCE: 1.7.0

For an X.509 key do not create a CSR but a self-signed certificate. This has not yet been implemented.

`GPGME_CREATE_NOSTORE`

SINCE: 1.7.0

Do not store the created key in the local key database. This has not yet been implemented.

GPGME\_CREATE\_WANTPUB

GPGME\_CREATE\_WANTSEC

SINCE: 1.7.0

Return the public or secret key as part of the result structure. This has not yet been implemented.

GPGME\_CREATE\_FORCE

SINCE: 1.7.0

The engine does not allow the creation of a key with a user ID already existing in the local key database. This flag can be used to override this check.

GPGME\_CREATE\_NOEXPIRE

SINCE: 1.9.0

Request generation of keys that do not expire.

After the operation completed successfully, information about the created key can be retrieved with `gpgme_op_genkey_result`.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_createkey_start (gpgme_ctx_t CTX,
 const char *USERID, const char *ALGO, unsigned long RESERVED,
 unsigned long EXPIRES, gpgme_key_t EXTRAKEY,
 unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createkey_start` initiates a `gpgme_op_createkey` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_createsubkey (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *ALGO, unsigned long RESERVED,
 unsigned long EXPIRES, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createsubkey` creates and adds a new subkey to the primary OpenPGP key given by `KEY`. The only allowed protocol in `CTX` is `GPGME_PROTOCOL_OPENPGP`. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY` specifies the key to operate on.

`ALGO` specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If `ALGO` is `NULL` or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

`RESERVED` must be set to zero.

`EXPIRES` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag `GPGME_CREATE_NOEXPIRE` to create keys that do not expire. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`FLAGS` takes the same values as described above for `gpgme_op_createkey`.

After the operation completed successfully, information about the created key can be retrieved with `gpgme_op_genkey_result`.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_createsubkey_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *ALGO,
 unsigned long RESERVED, unsigned long EXPIRES,
 unsigned int FLAGS);
```

SINCE:

## 1.7.0

The function `gpgme_op_createsubkey_start` initiates a `gpgme_op_createsubkey` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_adduid (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_adduid` adds a new user ID to the OpenPGP key given by `KEY`. Adding additional user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY` specifies the key to operate on.

`USERID` is the user ID to add to the key. A user ID is commonly the mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested.

The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`FLAGS` are currently not used and must be set to zero.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_adduid_start (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_adduid_start` initiates a `gpgme_op_adduid` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_revuid (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_revuid` revokes a user ID from the OpenPGP key given by `KEY`. Revoking user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY` specifies the key to operate on.

`USERID` is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. This is a required parameter.

`FLAGS` are currently not used and must be set to zero.

Note that the engine wont allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const
char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_revuid_start` initiates a `gpgme_op_revuid` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_set_ui_flag (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *USERID, cons char * NAME,
 cons char * VALUE);
```

SINCE: 1.8.0

The function `gpgme_op_set_uid_flag` is used to set flags on a user ID from the OpenPGP key given by `KEY`. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP.

`KEY` specifies the key to operate on. This parameters is required.

`USERID` is the user ID of the key to be manipulated. This user ID

must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object

(`gpgme_user_id_t`) is to be used. This is a required parameter.

NAME names the flag which is to be changed. The only currently supported flag is:

primary

This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. VALUE must be given as NULL. For technical reasons this functions bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_set_uid_flag_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID,
cons char * NAME, cons char * VALUE);
```

SINCE: 1.8.0

The function `gpgme_op_set_uid_flag_start` initiates a `gpgme_op_set_uid_flag` operation; see there for details. It must

be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion:.

```
-- Function: gpgme_error_t gpgme_op_genkey (gpgme_ctx_t CTX,
const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)
```

The function `gpgme_op_genkey` generates a new key pair in the context CTX. The meaning of PUBLIC and SECRET depends on the crypto backend.

GPG does not support PUBLIC and SECRET, they should be NULL. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with `gpgme_op_genkey_result`.

GpgSM requires PUBLIC to be a writable data object. GpgSM will generate a secret key (which will be stored by `gpg-agent`, and return a certificate request in PUBLIC, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument PARMS specifies parameters for the key in an string that looks something like XML. The details about the format of PARMS are specific to the crypto engine used by CTX. The first line of the parameters must be `<GnupgKeyParams format="internal">` and the last line must be `</GnupgKeyParams>`. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters `<`, `>`, or `&`.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

```
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real: Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
```

Here is an example for GpgSM as the crypto engine (all parameters of OpenPGP key generation are documented in the GPGSM manual):

```
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@foo.bar
</GnupgKeyParms>
```

Strings should be given in UTF-8 encoding. The only format supported for now is internal. The content of the GnupgKeyParms container is passed verbatim to the crypto backend. Control statements are not allowed.

After the operation completed successfully, the result can be retrieved with `gpgme_op_genkey_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if PARMS is not a well-formed string (e.g. does not have the expected tag-like headers and footers), `GPG_ERR_NOT_SUPPORTED` if PUBLIC or SECRET is not valid, and `GPG_ERR_GENERAL` if no key was created by



the backend.

-- Function: `gpgme_error_t`

```
gpgme_op_genkey_start (gpgme_ctx_t CTX,
 const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)
```

The function `gpgme_op_genkey_start` initiates a `gpgme_op_genkey` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `PARMS` is not a valid XML string, and `GPG_ERR_NOT_SUPPORTED` if `PUBLIC` or `SECRET` is not `NULL`.

-- Data type: `gpgme_genkey_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_genkey` operation. After successfully generating a key, you can retrieve the pointer to the result with `gpgme_op_genkey_result`. The structure contains the following members:

`unsigned int primary : 1`

This flag is set to 1 if a primary key was created and to 0 if not.

`unsigned int sub : 1`

This flag is set to 1 if a subkey was created and to 0 if not.

`unsigned int uid : 1`

This flag is set to 1 if a user ID was created and to 0 if not.

`char *fpr`

This is the fingerprint of the key that was created. If both a primary and a subkey were generated, the fingerprint of the primary key will be returned. If the crypto engine does not provide the fingerprint, `fpr` will be a null pointer.

`gpgme_data_t pubkey`

SINCE: 1.7.0

This will eventually be used to return the public key. It is currently not used.

`gpgme_data_t seckey`

SINCE: 1.7.0

This will eventually be used to return the secret key. It is currently not used.

-- Function: `gpgme_genkey_result_t gpgme_op_genkey_result (gpgme_ctx_t CTX)`

The function `gpgme_op_genkey_result` returns a `gpgme_genkey_result_t` pointer to a structure holding the result of a `gpgme_op_genkey` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_genkey` or `gpgme_op_genkey_start` operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

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### 7.5.6 Signing Keys

-----

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the `gpgme_op_interact` function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

-- Function: `gpgme_error_t gpgme_op_keysign (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES, unsigned int FLAGS);`

SINCE: 1.7.0

The function `gpgme_op_keysign` adds a new key signature to the public key `KEY`. This function requires at least version 2.1.12 of GnuPG.

`CTX` is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, `gpgme_signers_add` can be used. \*Note Selecting Signers::.

`KEY` specifies the key to operate on.

USERID selects the user ID or user IDs to be signed. If USERID is set to NULL all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme\_user\_id\_t) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (\n) and set the flag GPGME\_KEYSIGN\_LFSEP.

#### EXPIRES

specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag GPGME\_KEYSIGN\_NOEXPIRE is used. Note that this parameter takes an unsigned long value and not a time\_t to avoid problems on systems which use a signed 32 bit time\_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

FLAGS can be set to the bit-wise OR of the following flags:

#### GPGME\_KEYSIGN\_LOCAL

SINCE: 1.7.0

Instead of creating an exportable key signature, create a key signature which is marked as non-exportable.

#### GPGME\_KEYSIGN\_LFSEP

SINCE: 1.7.0

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that USERID may contain several linefeed separated user IDs.

#### GPGME\_KEYSIGN\_NOEXPIRE

Force the creation of a key signature without an expiration date. This overrides EXPIRE and any local configuration of the engine.

The function returns zero on success, GPG\_ERR\_NOT\_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_keysign_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES,
unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_keysign_start` initiates a `gpgme_op_keysign` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_revsig (gpgme_ctx_t CTX,
 gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID,
 unsigned int FLAGS);
```

SINCE: 1.14.1

The function `gpgme_op_revsig` revokes key signatures of the public key `KEY` made with the key `SIGNING_KEY`. This function requires at least version 2.2.24 of GnuPG.

`KEY` specifies the key to operate on.

`SIGNING_KEY` specifies the key whose signatures shall be revoked.

`USERID` selects the user ID or user IDs whose signatures shall be revoked. If `USERID` is set to `NULL` the signatures on all user IDs are revoked. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (`\n`) and set the flag `GPGME_REVSIG_LFSEP`.

`FLAGS` can be set to the bit-wise OR of the following flags:

`GPGME_REVSIG_LFSEP`

SINCE: 1.14.1

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that `USERID` may contain several linefeed separated user IDs.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_revsig_start (gpgme_ctx_t CTX,
 gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID,
 unsigned int FLAGS);
```

SINCE: 1.14.1

The function `gpgme_op_revsig_start` initiates a `gpgme_op_revsig` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

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### 7.5.7 Exporting Keys

-----

Exporting keys means the same as running `gpg` with the command `--export`. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

#### GPGME\_EXPORT\_MODE\_EXTERN

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the `KEYDATA` argument of the export function is set to `NULL`.

#### GPGME\_EXPORT\_MODE\_MINIMAL

SINCE: 1.3.1

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

#### GPGME\_EXPORT\_MODE\_SSH

SINCE: 1.4.0

If this bit is set, the latest authentication key of the requested OpenPGP key is exported in the OpenSSH public key format. This accepts just a single key; to force the export of a specific subkey a fingerprint pattern with an appended exclamation mark may be used.

#### GPGME\_EXPORT\_MODE\_SECRET

SINCE: 1.6.0

Instead of exporting the public key, the secret key is exported.

This may not be combined with `GPGME_EXPORT_MODE_EXTERN`. For X.509 the export format is PKCS#8.

## GPGME\_EXPORT\_MODE\_RAW

SINCE: 1.6.0

If this flag is used with GPGME\_EXPORT\_MODE\_SECRET for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

## GPGME\_EXPORT\_MODE\_PKCS12

SINCE: 1.6.0

If this flag is used with GPGME\_EXPORT\_MODE\_SECRET for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

## GPGME\_EXPORT\_MODE\_NOUID

SINCE: 1.12.0 - experimental Do not export user ids. Works only with certain gpg version.

-- Function: gpgme\_error\_t gpgme\_op\_export (gpgme\_ctx\_t CTX,  
const char \*PATTERN, gpgme\_export\_mode\_t MODE,  
gpgme\_data\_t KEYDATA)

The function gpgme\_op\_export extracts public keys and returns them in the data buffer KEYDATA. The output format of the key data

returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

If PATTERN is NULL, all available keys are returned. Otherwise, PATTERN contains an engine specific expression that is used to limit the list to all keys matching the pattern.

MODE is usually 0; other values are described above.

The function returns the error code GPG\_ERR\_NO\_ERROR if the operation completed successfully, GPG\_ERR\_INV\_VALUE if KEYDATA is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme\_error\_t gpgme\_op\_export\_start (gpgme\_ctx\_t CTX,  
const char \*PATTERN, gpgme\_export\_mode\_t MODE,  
gpgme\_data\_t KEYDATA)

The function gpgme\_op\_export\_start initiates a gpgme\_op\_export operation. It can be completed by calling gpgme\_wait on the context.

\*Note Waiting For Completion::.

The function returns the error code GPG\_ERR\_NO\_ERROR if the

operation could be started successfully, and GPG\_ERR\_INV\_VALUE if KEYDATA is not a valid empty data buffer.

```
-- Function: gpgme_error_t gpgme_op_export_ext (gpgme_ctx_t CTX,
 const char *PATTERN[], gpgme_export_mode_t MODE,
 gpgme_data_t KEYDATA)
```

The function `gpgme_op_export` extracts public keys and returns them in the data buffer `KEYDATA`. The output format of the key data returned is determined by the ASCII armor attribute set for the context `CTX`, or, if that is not set, by the encoding specified for `KEYDATA`.

If `PATTERN` or `*PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` is a `NULL` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim.

`MODE` is usually 0; other values are described above.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_export_ext_start (gpgme_ctx_t CTX,
 const char *PATTERN[], gpgme_export_mode_t MODE,
 gpgme_data_t KEYDATA)
```

The function `gpgme_op_export_ext_start` initiates a `gpgme_op_export_ext` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer.

```
-- Function: gpgme_error_t gpgme_op_export_keys (gpgme_ctx_t CTX,
 gpgme_key_t keys[], gpgme_export_mode_t MODE,
 gpgme_data_t KEYDATA)
```

SINCE: 1.2.0

The function `gpgme_op_export_keys` extracts public keys and returns them in the data buffer `KEYDATA`. The output format of the key data returned is determined by the ASCII armor attribute set for the context `CTX`, or, if that is not set, by the encoding specified for `KEYDATA`.

The keys to export are taken from the NULL terminated array KEYS. Only keys of the currently selected protocol of CTX which do have a fingerprint set are considered for export. Other keys specified by the KEYS are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

MODE is usually 0; other values are described above.

The function returns the error code GPG\_ERR\_NO\_ERROR if the operation completed successfully, GPG\_ERR\_INV\_VALUE if KEYDATA is not a valid empty data buffer, GPG\_ERR\_NO\_DATA if no useful keys are in KEYS and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_export_keys_start
(gpgme_ctx_t CTX,
 gpgme_key_t KEYS[], gpgme_export_mode_t MODE,
 gpgme_data_t KEYDATA)
SINCE: 1.2.0
```

The function gpgme\_op\_export\_keys\_start initiates a gpgme\_op\_export\_ext operation. It can be completed by calling gpgme\_wait on the context. \*Note Waiting For Completion::.

The function returns the error code GPG\_ERR\_NO\_ERROR if the operation could be started successfully, and GPG\_ERR\_INV\_VALUE if KEYDATA is not a valid empty data buffer, GPG\_ERR\_NO\_DATA if no useful keys are in KEYS and passes through any errors that are reported by the crypto engine support routines.

File: gpgme.info, Node: Importing Keys, Next: Deleting Keys, Prev: Exporting Keys, Up: Key Management

### 7.5.8 Importing Keys

-----

Importing keys means the same as running gpg with the command --import.

```
-- Function: gpgme_error_t gpgme_op_import (gpgme_ctx_t CTX,
 gpgme_data_t KEYDATA)
```

The function gpgme\_op\_import adds the keys in the data buffer

KEYDATA to the key ring of the crypto engine used by CTX. The format of KEYDATA can be ASCII armored, for example, but the details are specific to the crypto engine.

After the operation completed successfully, the result can be



retrieved with `gpgme_op_import_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` if `CTX` or `KEYDATA` is not a valid pointer, and `GPG_ERR_NO_DATA` if `KEYDATA` is an empty data buffer.

-- Function: `gpgme_error_t gpgme_op_import_start (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)`

The function `gpgme_op_import_start` initiates a `gpgme_op_import` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the import could be started successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEYDATA` is not a valid pointer, and `GPG_ERR_NO_DATA` if `KEYDATA` is an empty data buffer.

-- Function: `gpgme_error_t gpgme_op_import_keys (gpgme_ctx_t CTX, gpgme_key_t *KEYS)`  
SINCE: 1.2.0

The function `gpgme_op_import_keys` adds the keys described by the NULL terminated array `KEYS` to the key ring of the crypto engine used by `CTX`. It is used to actually import and make keys permanent which have been retrieved from an external source (i.e. using `GPGME_KEYLIST_MODE_EXTERN`) earlier. The external keylisting must have been made with the same context configuration (in particular the same home directory). (1) Note that for OpenPGP this may require another access to the keyserver over the network.

Only keys of the currently selected protocol of `CTX` are considered for import. Other keys specified by the `KEYS` are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully, the result can be retrieved with `gpgme_op_import_result`.

To move keys from one home directory to another, export and import the keydata using `gpgme_op_export` and `gpgme_op_import`.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for

export.

-- Function: `gpgme_error_t gpgme_op_import_keys_start (gpgme_ctx_t CTX,  
gpgme_key_t *KEYS)`  
SINCE: 1.2.0

The function `gpgme_op_import_keys_start` initiates a `gpgme_op_import_keys` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` if `CTX` or `KEYDATA` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for export.

-- Data type: `gpgme_import_status_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_import` operation. For each considered key one status is added that contains information about the result of the import. The structure contains the following members:

`gpgme_import_status_t next`

This is a pointer to the next status structure in the linked list, or `NULL` if this is the last element.

`char *fpr`

This is the fingerprint of the key that was considered.

`gpgme_error_t result`

If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is `GPG_ERR_NO_ERROR`.

`unsigned int status`

This is a bit-wise OR of the following flags that give more information about what part of the key was imported. If the key was already known, this might be 0.

`GPGME_IMPORT_NEW`

The key was new.

`GPGME_IMPORT_UID`

The key contained new user IDs.

`GPGME_IMPORT_SIG`

The key contained new signatures.

#### GPGME\_IMPORT\_SUBKEY

The key contained new sub keys.

#### GPGME\_IMPORT\_SECRET

The key contained a secret key.

-- Data type: `gpgme_import_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_import` operation. After a successful import operation, you can retrieve the pointer to the result with `gpgme_op_import_result`. The structure contains the following members:

`int considered`

The total number of considered keys.

`int no_user_id`

The number of keys without user ID.

`int imported`

The total number  
of imported keys.

`int imported_rsa`

The number of imported RSA keys.

`int unchanged`

The number of unchanged keys.

`int new_user_ids`

The number of new user IDs.

`int new_sub_keys`

The number of new sub keys.

`int new_signatures`

The number of new signatures.

`int new_revocations`

The number of new revocations.

`int secret_read`

The total number of secret keys read.

`int secret_imported`

The number of imported secret keys.

int secret\_unchanged

The number of unchanged secret keys.

int not\_imported

The number of keys not imported.

gpgme\_import\_status\_t imports

A list of gpgme\_import\_status\_t objects which contain more information about the keys for which an import was attempted.

int skipped\_v3\_keys

For security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP

2.x) and ignores them on

import. This counter provides the number of such skipped v3 keys.

-- Function: gpgme\_import\_result\_t gpgme\_op\_import\_result  
(gpgme\_ctx\_t CTX)

The function gpgme\_op\_import\_result returns a gpgme\_import\_result\_t pointer to a structure holding the result of a gpgme\_op\_import operation. The pointer is only valid if the last operation on the context was a gpgme\_op\_import or gpgme\_op\_import\_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

----- Footnotes -----

(1) Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.

File: gpgme.info, Node: Deleting Keys, Next: Changing Passphrases, Prev: Importing Keys, Up: Key Management

### 7.5.9 Deleting Keys

-----

-- Function: gpgme\_error\_t gpgme\_op\_delete\_ext  
(gpgme\_ctx\_t CTX,  
const gpgme\_key\_t KEY, unsigned int FLAGS)  
SINCE: 1.9.1

The function gpgme\_op\_delete\_ext deletes the key KEY from the key ring of the crypto engine used by CTX.

FLAGS can be set to the bit-wise OR of the following flags:

#### GPGME\_DELETE\_ALLOW\_SECRET

SINCE: 1.9.1

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

#### GPGME\_DELETE\_FORCE

SINCE: 1.9.1

If set, the user is not asked to confirm the deletion.

The function returns the error code `GPG_ERR_NO_ERROR` if the key was deleted successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer, `GPG_ERR_NO_PUBKEY` if `KEY` could not be found in the keyring, `GPG_ERR_AMBIGUOUS_NAME` if the key was not specified unambiguously, and `GPG_ERR_CONFLICT` if the secret key for `KEY` is available, but `ALLOW_SECRET` is zero.

```
-- Function: gpgme_error_t gpgme_op_delete_ext_start
(gpgme_ctx_t CTX,
 const gpgme_key_t KEY, unsigned int FLAGS)
SINCE: 1.9.1
```

The function `gpgme_op_delete_ext_start` initiates a `gpgme_op_delete` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

The following functions allow only to use one particular flag.

```
-- Function: gpgme_error_t gpgme_op_delete (gpgme_ctx_t CTX,
 const gpgme_key_t KEY, int ALLOW_SECRET)
Similar to gpgme_op_delete_ext, but only the flag
GPGME_DELETE_ALLOW_SECRET can be provided.
```

```
-- Function: gpgme_error_t gpgme_op_delete_start (gpgme_ctx_t CTX,
 const gpgme_key_t KEY, int ALLOW_SECRET)
Similar to gpgme_op_delete_ext_start, but only the flag
GPGME_DELETE_ALLOW_SECRET can be provided.
```

File: `gpgme.info`, Node:

### 7.5.10 Changing Passphrases

-----

-- Function: `gpgme_error_t gpgme_op_passwd (gpgme_ctx_t CTX,  
const gpgme_key_t KEY, unsigned int FLAGS)`

SINCE: 1.3.0

The function `gpgme_op_passwd` changes the passphrase of the private key associated with `KEY`. The only allowed value for `FLAGS` is 0. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old gpg engines (before version 2.0.15) do not support this command and will silently ignore it.

-- Function: `gpgme_error_t gpgme_op_passwd_start (gpgme_ctx_t CTX,  
const gpgme_key_t KEY, unsigned int FLAGS)`

SINCE: 1.3.0

The function `gpgme_op_passwd_start` initiates a `gpgme_op_passwd` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

File: `gpgme.info`, Node: Changing TOFU Data, Next: Advanced Key Editing, Prev: Changing Passphrases, Up: Key Management

### 7.5.11 Changing TOFU Data

-----

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

-- Data type: `enum gpgme_tofu_policy_t`

SINCE: 1.7.0

The `gpgme_tofu_policy_t` type specifies the set of possible policy values that are supported by GPGME:

`GPGME_TOFU_POLICY_AUTO`

Set the policy to auto.

`GPGME_TOFU_POLICY_GOOD`

Set the policy to good.

`GPGME_TOFU_POLICY_BAD`

Set the policy to

bad.

`GPGME_TOFU_POLICY_ASK`

Set the policy to ask.

`GPGME_TOFU_POLICY_UNKNOWN`

Set the policy to unknown.

To change the policy for a key the following functions can be used:

```
-- Function: gpgme_error_t gpgme_op_tofu_policy (gpgme_ctx_t CTX,
const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)
```

SINCE: 1.7.0

The function `gpgme_op_tofu_policy` changes the TOFU policy of `KEY`. The valid values for `POLICY` are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_tofu_policy_start (gpgme_ctx_t CTX,
const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)
```

SINCE: 1.7.0

The function `gpgme_op_tofu_policy_start` initiates a `gpgme_op_tofu_policy` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

File: `gpgme.info`, Node: Advanced Key Editing, Prev: Changing TOFU Data, Up: Key Management

## 7.5.12 Advanced Key Editing

-----  
-- Data type: `gpgme_error_t (*gpgme_interact_cb_t) (void *HANDLE, const char *STATUS, const char *ARGS, int FD)`

SINCE: 1.7.0

The `gpgme_interact_cb_t` type is the type of functions which GPGME calls if it a key interact operation is on-going. The status keyword `STATUS` and the argument line `ARGS` are passed through by GPGME from the crypto engine. An empty string represents EOF. The file descriptor `FD` is -1 for normal status messages. If `STATUS` indicates a command rather than a status message, the response to the command should be written to `FD`. The `HANDLE` is provided by the user at start of operation.

The function should return `GPG_ERR_FALSE` if it did not handle the status code, 0 for success, or any other error value.

-- Function: `gpgme_error_t gpgme_op_interact (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

SINCE: 1.7.0

The function `gpgme_op_interact` processes the key `KEY` interactively, using the interact callback function `FNC` with the handle `HANDLE`. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object `OUT`.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

`FLAGS` modifies the behaviour of the function; the only defined bit value is:

`GPGME_INTERACT_CARD`

SINCE: 1.7.0

This is used for smartcard based keys and uses `gpgs --card-edit` command.

The function returns 0 if the edit operation completes



successfully, GPG\_ERR\_INV\_VALUE if CTX or KEY is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: gpgme\_error\_t gpgme\_op\_interact\_start (gpgme\_ctx\_t CTX, gpgme\_key\_t KEY, unsigned int FLAGS, gpgme\_interact\_cb\_t FNC, void \*HANDLE, gpgme\_data\_t OUT)

SINCE: 1.7.0

The function gpgme\_op\_interact\_start initiates a gpgme\_op\_interact operation. It can be completed by calling gpgme\_wait on the context. \*Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and GPG\_ERR\_INV\_VALUE if CTX or KEY is not a valid pointer.

File: gpgme.info, Node: Crypto Operations, Next: Miscellaneous, Prev: Key Management, Up: Contexts

## 7.6 Crypto Operations

=====

Sometimes, the result of a crypto operation returns a list of invalid keys encountered in processing the request. The following structure is used to hold information about such a key.

-- Data type: gpgme\_invalid\_key\_t

This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter. The structure contains the following members:

gpgme\_invalid\_key\_t next

This is a pointer to the next invalid key structure in the linked list, or NULL if this is the last element.

char \*fpr

The fingerprint or key ID of the invalid key encountered.

gpgme\_error\_t reason

An error code describing the reason why the key was found invalid.

\* Menu:

\* Decrypt::            Decrypting a ciphertext.

\* Verify::            Verifying a signature.

- \* Decrypt and Verify::        Decrypting  
a signed ciphertext.
- \* Sign::                    Creating a signature.
- \* Encrypt::                Encrypting a plaintext.

File: gpgme.info, Node: Decrypt, Next: Verify, Up: Crypto Operations

## 7.6.1 Decrypt

-----

-- Function: `gpgme_error_t gpgme_op_decrypt (gpgme_ctx_t CTX,  
gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

The function `gpgme_op_decrypt` decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be decrypted successfully, `GPG_ERR_INV_VALUE` if CTX, CIPHER or PLAIN is not a valid pointer, `GPG_ERR_NO_DATA` if CIPHER does not contain any data to decrypt, `GPG_ERR_DECRYPT_FAILED` if CIPHER is not a valid cipher text, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_decrypt_start (gpgme_ctx_t CTX,  
gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

The function `gpgme_op_decrypt_start` initiates a `gpgme_op_decrypt` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if CIPHER or PLAIN is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_decrypt_ext ( gpgme_ctx_t CTX,  
gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER,  
gpgme_data_t PLAIN)`

SINCE: 1.8.0

The function `gpgme_op_decrypt_ext` is the same as `gpgme_op_decrypt` but has an additional argument FLAGS. If FLAGS is 0 both function behave identically.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

## GPGME\_DECRYPT\_VERIFY

SINCE: 1.8.0

The GPGME\_DECRYPT\_VERIFY symbol specifies that this function shall exactly act as `gpgme_op_decrypt_verify`.

## GPGME\_DECRYPT\_UNWRAP

SINCE: 1.8.0

The GPGME\_DECRYPT\_UNWRAP symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to GPGME\_ENCRYPT\_WRAP.

The function returns the error codes as described for `gpgme_op_decrypt`.

```
-- Function: gpgme_error_t gpgme_op_decrypt_ext_start (
 gpgme_ctx_t CTX, gpgme_decrypt_flags_t FLAGS,
 gpgme_data_t CIPHER, gpgme_data_t PLAIN)
```

SINCE: 1.8.0

The function `gpgme_op_decrypt_ext_start` initiates a `gpgme_op_decrypt_ext` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `CIPHER` or `PLAIN` is not a valid pointer.

```
-- Data type: gpgme_recipient_t
SINCE: 1.1.0
```

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a `gpgme_op_decrypt` operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

`gpgme_recipient_t next`

This is a pointer to the next recipient structure in the linked list, or `NULL` if this is the last element.

`gpgme_pubkey_algo_t`

The public key algorithm used in the encryption.

char \*keyid

This is the key ID of the key (in hexadecimal digits) used as recipient.

gpgme\_error\_t status

This is an error number with the error code GPG\_ERR\_NO\_SECKEY if the secret key for this recipient is not available, and 0 otherwise.

-- Data type: gpgme\_decrypt\_result\_t

This is a pointer to a structure used to store the result of a gpgme\_op\_decrypt operation. After successfully decrypting data, you can retrieve the pointer to the result with gpgme\_op\_decrypt\_result. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a structure on its own. The structure contains the following members:

char \*unsupported\_algorithm

If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

unsigned int wrong\_key\_usage : 1

SINCE: 0.9.0 This is true if the key was not used according to its policy.

unsigned int legacy\_cipher\_nomdc : 1

SINCE: 1.11.2 The message was made by a legacy algorithm without any integrity protection. This might be an old but

legitimate message.

unsigned int is\_mime : 1;

SINCE: 1.11.0 The message claims that the content is a MIME object.

unsigned int is\_de\_vs : 1;

SINCE: 1.10.0 The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

gpgme\_recipient\_t recipients

SINCE: 1.1.0

This is a linked list of recipients to which this message was

encrypted.

char \*file\_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

char \*session\_key

SINCE: 1.8.0

A textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session keys (see `gpgme_set_ctx_flag`, "export-session-key"), and a session key was available for the

most recent decryption operation.

Otherwise, this is a null pointer.

You must not try to access this member of the struct unless `gpgme_set_ctx_flag` (ctx, "export-session-key") returns success or `gpgme_get_ctx_flag` (ctx, "export-session-key") returns true (non-empty string).

char \*symkey\_algo

SINCE: 1.11.0

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

-- Function: `gpgme_decrypt_result_t gpgme_op_decrypt_result`  
(`gpgme_ctx_t` CTX)

The function `gpgme_op_decrypt_result` returns a `gpgme_decrypt_result_t` pointer to a structure holding the result of a `gpgme_op_decrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_decrypt` or `gpgme_op_decrypt_start` operation. If the operation failed this

might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: `gpgme.info`, Node: Verify, Next: Decrypt and Verify, Prev: Decrypt, Up: Crypto Operations

## 7.6.2 Verify

-----

-- Function: `gpgme_error_t gpgme_op_verify` (`gpgme_ctx_t` CTX,  
`gpgme_data_t` SIG, `gpgme_data_t` SIGNED\_TEXT,

gpgme\_data\_t PLAIN)

The function `gpgme_op_verify` verifies that the signature in the data object `SIG` is a valid signature. If `SIG` is a detached signature, then the signed text should be provided in `SIGNED_TEXT` and `PLAIN` should be a null pointer. Otherwise, if `SIG` is a normal (or cleartext) signature, `SIGNED_TEXT` should be a null pointer and `PLAIN` should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with `gpgme_op_verify_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be completed successfully, `GPG_ERR_INV_VALUE` if `CTX`, `SIG` or `PLAIN` is not a valid pointer, `GPG_ERR_NO_DATA` if `SIG` does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_verify_start (gpgme_ctx_t CTX, gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT, gpgme_data_t PLAIN)`

The function `gpgme_op_verify_start` initiates a `gpgme_op_verify` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `CTX`, `SIG` or `PLAIN` is not a valid pointer, and `GPG_ERR_NO_DATA` if `SIG` or `PLAIN` does not contain any data to verify.

-- Data type: `gpgme_sig_notation_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_verify` operation. The structure contains the following members:

`gpgme_sig_notation_t next`

This is a pointer to the next new signature notation structure in the linked list, or `NULL` if this is the last element.

`char *name`

The name of the notation field. If this is `NULL`, then the member value will contain a policy URL.

`int name_len`

The length of the name field. For strings the length is counted without the trailing binary zero.

char \*value

The value of the notation field. If name is NULL, then this is a policy URL.

int value\_len

The length of the value field. For strings the length is counted without the trailing binary zero.

gpgme\_sig\_notation\_flags\_t flags

The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used

as an argument to the function

gpgme\_sig\_notation\_add. The value flags is a bitwise-or combination of one or multiple of the following bit values:

GPGME\_SIG\_NOTATION\_HUMAN\_READABLE

SINCE: 1.1.0

The GPGME\_SIG\_NOTATION\_HUMAN\_READABLE symbol specifies that the notation data is in human readable form

GPGME\_SIG\_NOTATION\_CRITICAL

SINCE: 1.1.0

The GPGME\_SIG\_NOTATION\_CRITICAL symbol specifies that the notation data is critical.

unsigned int human\_readable : 1

This is true if the GPGME\_SIG\_NOTATION\_HUMAN\_READABLE flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

unsigned int critical : 1

This is true if the GPGME\_SIG\_NOTATION\_CRITICAL flag is set and false otherwise. This flag is valid for notation data and policy URLs.

-- Data type: gpgme\_signature\_t

This is a pointer to a structure used to store a part of the result of a gpgme\_op\_verify operation. The structure contains the following members:

gpgme\_signature\_t next

This is a pointer to the next new signature structure in the linked list, or NULL if this is the last element.

gpgme\_sigsum\_t summary

This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for GPGME\_SIGSUM\_VALID like this:

```
if ((sig.summary & GPGME_SIGSUM_VALID))
{
 ..do stuff if valid..
}
else
{
 ..do stuff if not fully valid..
}
```

The defined bits are:

**GPGME\_SIGSUM\_VALID**

The signature is fully valid.

**GPGME\_SIGSUM\_GREEN**

The signature is good but one might want to display some extra information. Check the other bits.

**GPGME\_SIGSUM\_RED**

The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

**GPGME\_SIGSUM\_KEY\_REVOKED**

The key or at least one certificate has been revoked.

**GPGME\_SIGSUM\_KEY\_EXPIRED**

The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

**GPGME\_SIGSUM\_SIG\_EXPIRED**

The signature has expired.

**GPGME\_SIGSUM\_KEY\_MISSING**

Cant verify due to a missing  
key or certificate.

**GPGME\_SIGSUM\_CRL\_MISSING**

The CRL (or an equivalent mechanism) is not available.



#### GPGME\_SIGSUM\_CRL\_TOO\_OLD

Available CRL is too old.

#### GPGME\_SIGSUM\_BAD\_POLICY

A policy requirement was not met.

#### GPGME\_SIGSUM\_SYS\_ERROR

A system error occurred.

#### GPGME\_SIGSUM\_TOFU\_CONFLICT

A TOFU conflict was detected.

#### char \*fpr

This is the fingerprint or key ID of the signature.

#### gpgme\_error\_t status

This is the status of the signature. In particular, the following status codes are of interest:

#### GPG\_ERR\_NO\_ERROR

This status indicates that the signature could be verified or that there is no signature. For the combined result this status means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check the summary field for that.

For example a `gpgme_op_decrypt_verify` returns a verification result with `GPG_ERR_NO_ERROR` for encrypted but unsigned data.

#### GPG\_ERR\_SIG\_EXPIRED

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

#### GPG\_ERR\_KEY\_EXPIRED

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

#### GPG\_ERR\_CERT\_REVOKED

This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures

are valid and all keys are revoked.

#### GPG\_ERR\_BAD\_SIGNATURE

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

#### GPG\_ERR\_NO\_PUBKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

#### GPG\_ERR\_GENERAL

This status indicates that there was some other error which prevented the signature verification.

#### gpgme\_sig\_notation\_t notations

This is a linked list with the notation data and policy URLs.

#### unsigned long timestamp

The creation timestamp of this signature.

#### unsigned long exp\_timestamp

The expiration timestamp of this signature, or 0 if the signature does not expire.

#### unsigned int wrong\_key\_usage : 1

This is true if the key was not used according to its policy.

#### unsigned int pka\_trust : 2

This is set to the trust information gained by means of the PKA system. Values are:

0

No PKA information available or verification not possible.

1

PKA verification failed.

2

PKA verification succeeded.

3

Reserved for future use.

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

#### unsigned int chain\_model : 1

SINCE: 1.1.6

This is true if the validity of the signature has been checked using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

`gpgme_validity_t` validity

The validity of the signature.

`gpgme_error_t` validity\_reason

If a signature is not valid, this provides a reason why.

`gpgme_pubkey_algo_t`

The public key algorithm used to create this signature.

`gpgme_hash_algo_t`

The hash algorithm used to create this signature.

`char *pka_address`

The mailbox from the PKA information or NULL.

`gpgme_key_t` key

SINCE: 1.7.0

An object describing the key used to create the signature.

This key object may be incomplete in that it only conveys information available directly with a signature. It may also be NULL if such information is not readily available.

-- Data type: `gpgme_verify_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_verify` operation. After verifying a signature, you can retrieve the pointer to the result with `gpgme_op_verify_result`. If the operation failed this might be a NULL pointer. The structure contains the following member:

`gpgme_signature_t` signatures

A linked list with information about all signatures for which a verification was attempted.

`char *file_name`

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The

filename is not covered by the signature.

unsigned int is\_mime : 1;  
SINCE: 1.11.0

The message claims that the content is a MIME object.

Warning: This flag is not covered by the signature.

-- Function: gpgme\_verify\_result\_t gpgme\_op\_verify\_result  
(gpgme\_ctx\_t CTX)

The function `gpgme_op_verify_result` returns a `gpgme_verify_result_t` pointer to a structure holding the result of a `gpgme_op_verify` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_verify`, `gpgme_op_verify_start`, `gpgme_op_decrypt_verify` or `gpgme_op_decrypt_verify_start` operation, and if this operation finished successfully (for `gpgme_op_decrypt_verify` and `gpgme_op_decrypt_verify_start`, the error code `GPG_ERR_NO_DATA` counts as successful in this context). The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Decrypt and Verify, Next: Sign, Prev: Verify, Up: Crypto Operations

### 7.6.3 Decrypt and Verify

-----  
-- Function: gpgme\_error\_t gpgme\_op\_decrypt\_verify (gpgme\_ctx\_t CTX,  
gpgme\_data\_t CIPHER, gpgme\_data\_t PLAIN)

The function `gpgme_op_decrypt_verify` decrypts the ciphertext in the data object `CIPHER` and stores it into the data object `PLAIN`.

If `CIPHER` contains signatures, they will be verified.

After the operation completed, `gpgme_op_decrypt_result` and `gpgme_op_verify_result` can be used to retrieve more information about the signatures.

If the error code `GPG_ERR_NO_DATA` is returned, `CIPHER` does not contain any data to decrypt. However, it might still be signed.

The information about detected signatures is available with `gpgme_op_verify_result` in this case.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be decrypted successfully, `GPG_ERR_INV_VALUE` if `CTX`, `CIPHER` or `PLAIN` is not a valid pointer, `GPG_ERR_NO_DATA` if `CIPHER` does not contain any data to decrypt,

GPG\_ERR\_DECRYPT\_FAILED if CIPHER is not a valid cipher text, GPG\_ERR\_BAD\_PASSPHRASE if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme\_error\_t gpgme\_op\_decrypt\_verify\_start  
(gpgme\_ctx\_t CTX, gpgme\_data\_t CIPHER, gpgme\_data\_t PLAIN)  
The function gpgme\_op\_decrypt\_verify\_start initiates a gpgme\_op\_decrypt\_verify operation. It can be completed by calling gpgme\_wait on the context. \*Note Waiting For Completion::.

The function returns the error code GPG\_ERR\_NO\_ERROR if the operation could be started successfully, GPG\_ERR\_INV\_VALUE if CTX, CIPHER, PLAIN or R\_STAT is not a valid pointer, and GPG\_ERR\_NO\_DATA if CIPHER does not contain any data to decrypt.

When processing mails it is sometimes useful to extract the actual mail address (the addr-spec) from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

-- Function: char \* gpgme\_addrspec\_from\_uid (const char \*UID)

SINCE: 1.7.1

Return the mail address (called addr-spec in RFC-5322) from the string UID which is assumed to be a user id (called address in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must free the result using gpgme\_free. Returns NULL if no valid address was found (in which case ERRNO is set to EINVAL) or for other errors.

File: gpgme.info, Node: Sign, Next: Encrypt, Prev: Decrypt and Verify, Up: Crypto Operations

#### 7.6.4 Sign

-----

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

\* Menu:

- \* **Selecting Signers::**           How to choose the keys to sign with.
- \* **Creating a Signature::**       How to create a signature.
- \* **Signature Notation Data::**   How to add notation data to a signature.

File: gpgme.info, Node: Selecting Signers, Next: Creating a Signature, Up: Sign

#### 7.6.4.1

##### Selecting Signers

.....

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list. If no signer has been set into the context a default key is used for signing.

-- Function: void gpgme\_signers\_clear (gpgme\_ctx\_t CTX)

The function gpgme\_signers\_clear releases a reference for each key on the signers list and removes the list of signers from the context CTX.

Every context starts with an empty list.

-- Function: gpgme\_error\_t gpgme\_signers\_add (gpgme\_ctx\_t CTX,  
          const gpgme\_key\_t KEY)

The function gpgme\_signers\_add adds the key KEY to the list of signers in the context CTX.

Calling this function acquires an additional reference for the key.

-- Function: unsigned int gpgme\_signers\_count (const gpgme\_ctx\_t CTX)  
SINCE: 1.4.3

The function gpgme\_signers\_count returns the number of signer keys in the context CTX.

-- Function:  
gpgme\_key\_t gpgme\_signers\_enum (const gpgme\_ctx\_t CTX,  
          int SEQ)

The function gpgme\_signers\_enum returns the SEQth key in the list of signers in the context CTX. An additional reference is acquired for the user.

If SEQ is out of range, NULL is returned.

File: gpgme.info, Node: Creating a Signature, Next: Signature Notation Data, Prev: Selecting Signers, Up: Sign

#### 7.6.4.2 Creating a Signature

.....

-- Data type: enum `gpgme_sig_mode_t`

The `gpgme_sig_mode_t` type is used to specify the desired type of a signature. The following modes are available:

`GPGME_SIG_MODE_NORMAL`

A normal signature is made, the output includes the plaintext and the signature.

`GPGME_SIG_MODE_DETACH`

A detached signature is made.

`GPGME_SIG_MODE_CLEAR`

A clear text signature is made. The ASCII armor and text mode settings of the context are ignored.

-- Function: `gpgme_error_t gpgme_op_sign`

(`gpgme_ctx_t` CTX,

`gpgme_data_t` PLAIN, `gpgme_data_t` SIG, `gpgme_sig_mode_t` MODE)

The function `gpgme_op_sign` creates a signature for the text in the data object PLAIN and returns it in the data object SIG. The type of the signature created is determined by the ASCII armor (or, if that is not set, by the encoding specified for SIG), the text mode attributes set for the context CTX and the requested signature mode MODE.

After the operation completed successfully, the result can be retrieved with `gpgme_op_sign_result`.

If an S/MIME signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with `gpgme_set_include_certs`. \*Note Included Certificates::.

The function returns the error code `GPG_ERR_NO_ERROR` if the signature could be created successfully, `GPG_ERR_INV_VALUE` if CTX, PLAIN or SIG is not a valid pointer, `GPG_ERR_NO_DATA` if the

signature could not be created, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved,

`GPG_ERR_UNUSABLE_SECKEY` if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_sign_start` (`gpgme_ctx_t` CTX,

gpgme\_data\_t PLAIN, gpgme\_data\_t SIG, gpgme\_sig\_mode\_t MODE)

The function `gpgme_op_sign_start` initiates a `gpgme_op_sign` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `CTX`, `PLAIN` or `SIG` is not a valid pointer.

-- Data type: `gpgme_new_signature_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_sign` operation. The structure contains the following members:

`gpgme_new_signature_t`

`next`

This is a pointer to the next new signature structure in the linked list, or `NULL` if this is the last element.

`gpgme_sig_mode_t` type

The type of this signature.

`gpgme_pubkey_algo_t` `pubkey_algo`

The public key algorithm used to create this signature.

`gpgme_hash_algo_t` `hash_algo`

The hash algorithm used to create this signature.

`unsigned int` `sig_class`

The signature class of this signature.

`long int` `timestamp`

The creation timestamp of this signature.

`char *``fpr`

The fingerprint of the key which was used to create this signature.

-- Data type: `gpgme_sign_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_sign` operation. After successfully generating a signature, you can retrieve the pointer to the result with `gpgme_op_sign_result`. The structure contains the following members:

`gpgme_invalid_key_t`

`invalid_signers`

A linked list with information about all invalid keys for



which a signature could not be created.

`gpgme_new_signature_t` signatures

A linked list with information about all signatures created.

-- Function: `gpgme_sign_result_t gpgme_op_sign_result (gpgme_ctx_t CTX)`

The function `gpgme_op_sign_result` returns a `gpgme_sign_result_t` pointer to a structure holding the result of a `gpgme_op_sign` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_sign`, `gpgme_op_sign_start`, `gpgme_op_encrypt_sign` or `gpgme_op_encrypt_sign_start` operation. If that operation failed, the function might return a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: `gpgme.info`, Node: Signature Notation Data, Prev: Creating a Signature, Up: Sign

### 7.6.4.3 Signature Notation Data

.....

Using the following

functions, you can attach arbitrary notation data to a signature. This information is then available to the user when the signature is verified.

-- Function: `void gpgme_sig_notation_clear (gpgme_ctx_t CTX)`

SINCE: 1.1.0

The function `gpgme_sig_notation_clear` removes the notation data from the context `CTX`. Subsequent signing operations from this context will not include any notation data.

Every context starts with an empty notation data list.

-- Function: `gpgme_error_t gpgme_sig_notation_add (gpgme_ctx_t CTX,`

`const char *NAME, const char *VALUE,`  
`gpgme_sig_notation_flags_t FLAGS)`

SINCE: 1.1.0

The function `gpgme_sig_notation_add` adds the notation data with the name `NAME` and the value `VALUE` to the context `CTX`.

Subsequent signing operations will include this notation data, as well as any other notation data that was added since the creation of the context or the last `gpgme_sig_notation_clear` operation.

The arguments NAME and VALUE must be NUL-terminated strings in human-readable form. The flag GPGME\_SIG\_NOTATION\_HUMAN\_READABLE is implied (non-human-readable notation data is currently not supported). The strings must be in UTF-8 encoding.

If NAME is NULL, then VALUE should be a policy URL.

The function `gpgme_sig_notation_add` returns the error code `GPG_ERR_NO_ERROR` if the notation data could be added successfully, `GPG_ERR_INV_VALUE` if CTX is not a valid pointer, or if NAME, VALUE and FLAGS are an invalid combination. The function also passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_sig_notation_t gpgme_sig_notation_get
 (const gpgme_ctx_t CTX)
SINCE: 1.1.0
```

The function `gpgme_sig_notation_get` returns the linked list of notation data structures that are contained in the context CTX.

If CTX is not a valid pointer, or there is no notation data added for this context, NULL is returned.

File: `gpgme.info`, Node: Encrypt, Prev: Sign, Up: Crypto Operations

## 7.6.5 Encrypt

-----

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then passed to the encryption operation.

\* Menu:

\* Encrypting a Plaintext::     How to encrypt a plaintext.

File: `gpgme.info`, Node: Encrypting a Plaintext, Up: Encrypt

### 7.6.5.1 Encrypting a Plaintext

.....

```
-- Function: gpgme_error_t gpgme_op_encrypt (gpgme_ctx_t CTX,
 gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,
 gpgme_data_t PLAIN, gpgme_data_t CIPHER)
```

The function `gpgme_op_encrypt` encrypts the plaintext in the data

object PLAIN for the recipients RECP and stores the ciphertext in the data object CIPHER. The type of the ciphertext created is determined by the ASCII armor (or, if that is not set, by the encoding specified for CIPHER) and the text mode attributes set for the context CTX.

RECP must be a NULL-terminated array of keys. The user must keep references for all keys during the whole duration of the call (but see `gpgme_op_encrypt_start` for the requirements with the asynchronous variant).

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

#### GPGME\_ENCRYPT\_ALWAYS\_TRUST

The `GPGME_ENCRYPT_ALWAYS_TRUST` symbol specifies that all the recipients in RECP should be trusted, even if the keys do not have a high enough validity in the keyring. This flag should be used with care; in general it is not a good idea to use any untrusted keys.

#### GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO

SINCE: 1.2.0

The `GPGME_ENCRYPT_NO_ENCRYPT_TO` symbol specifies that no default or hidden default recipients as configured in the crypto backend should be included. This can be useful for managing different user profiles.

#### GPGME\_ENCRYPT\_NO\_COMPRESS

SINCE: 1.5.0

The `GPGME_ENCRYPT_NO_COMPRESS` symbol specifies that the plaintext shall not be compressed before it is encrypted. This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

#### GPGME\_ENCRYPT\_PREPARE

#### GPGME\_ENCRYPT\_EXPECT\_SIGN

The `GPGME_ENCRYPT_PREPARE` symbol is used with the UI Server protocol to prepare an encryption (i.e. sending the `PREP_ENCRYPT` command). With the `GPGME_ENCRYPT_EXPECT_SIGN` symbol the UI Server is advised to also expect a sign command.

#### GPGME\_ENCRYPT\_SYMMETRIC

SINCE: 1.7.0

The `GPGME_ENCRYPT_SYMMETRIC` symbol specifies that the output should be additionally encrypted symmetrically even if recipients are provided. This feature is only supported for the OpenPGP crypto engine.

#### `GPGME_ENCRYPT_THROW_KEYIDS`

SINCE: 1.8.0

The `GPGME_ENCRYPT_THROW_KEYIDS` symbol requests that the identifiers for the decryption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

#### `GPGME_ENCRYPT_WRAP`

SINCE: 1.8.0

The `GPGME_ENCRYPT_WRAP` symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to `GPGME_DECRYPT_UNWRAP`.

#### `GPGME_ENCRYPT_WANT_ADDRESS`

SINCE: 1.11.0

The `GPGME_ENCRYPT_WANT_ADDRESS` symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code `GPG_ERR_INV_USER_ID` is returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the `RECPSTRING` argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

If `GPG_ERR_UNUSABLE_PUBKEY` is returned, some recipients in `RECP` are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in `CIPHER` (if this happens depends on the crypto engine). More information about the invalid recipients is available with `gpgme_op_encrypt_result`.

If `RECP` is `NULL`, symmetric rather than public key encryption is performed. Symmetrically encrypted cipher text can be deciphered with `gpgme_op_decrypt`. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption

is currently only supported for the OpenPGP  
crypto backend.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be created successfully, `GPG_ERR_INV_VALUE` if `CTX`, `RECP`, `PLAIN` or `CIPHER` is not a valid pointer, `GPG_ERR_UNUSABLE_PUBKEY` if `RECP` contains some invalid recipients, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_encrypt_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)`

The function `gpgme_op_encrypt_start` initiates a `gpgme_op_encrypt` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even if the operation is not yet finished.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `CTX`, `RSET`, `PLAIN` or `CIPHER` is not a valid pointer, and `GPG_ERR_UNUSABLE_PUBKEY` if `RSET` does not contain any valid recipients.

-- Function: `gpgme_error_t gpgme_op_encrypt_ext (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING, gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)`

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is removed from each line in `RECPSTRING`. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key

specification. The currently supported keywords are:

--hidden

--no-hidden

These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the gpg option -R (or -F in file mode) is used instead of -r (-f in file mode).

--file

--no-file

These keywords toggle between regular and file mode for all following key specification. In file mode the option -f or -F is passed to gpg. At least GnuPG version 2.1.14 is required to handle these options. The GPGME\_ENCRYPT\_WANT\_ADDRESS flag is ignored in file mode.

--

This keyword disables all keyword detection up to the end of the string. All keywords are treated as verbatim arguments.

To create a RECPSTRING it is often useful to employ a strconcat style function. For example this function creates a string to encrypt to two keys:

```
char *
xbuild_recstring (const char *key1, const char *key2)
{
 char *result = gpgrt_strconcat ("-\n", key1, "\n", key2, NULL);
 if (!result)
 { perror ("strconcat failed"); exit (2); }
 return result;
}
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used strconcat function is available in Libgpg-error 1.28 and later; Libgpg-error (aka Gpgrt) is a dependency of GPGME. The number of arguments to gpgrt\_strconcat is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```
char *
xbuild_long_recstring (void)
{
```

```

gpgmt_stream_t memfp;
const char *s;
void *result;

memfp = gpgmt_fopenmem (0, "w+b");
if (!memfp)
 { perror ("fopenmem failed"); exit (2); }
gpgmt_fputs ("--", memfp);
while ((s = get_next_keyspec ()))
 {
 gpgmt_fputc ('\n', memfp);
 gpgmt_fputs (s, memfp);
 }
gpgmt_fputc (0, memfp);
if (gpgmt_error (memfp))
 { perror ("writing to memstream failed"); exit (2); }
if (gpgmt_fclose_snatch (memfp, &result, NULL))
 { perror ("fclose_snatch failed"); exit (2); }
return result;
}

```

In this example `get_next_keyspec` is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to `gpg` which has as a platform specific length limitation.

```
-- Function: gpgme_error_t gpgme_op_encrypt_ext_start (gpgme_ctx_t CTX,
gpgme_key_t RECP[], const char *RECPSTRING,
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)
```

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_start` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

```
-- Data type: gpgme_encrypt_result_t
This is a pointer to a structure used to store the result of a
gpgme_op_encrypt
```

operation. After successfully encrypting data, you can retrieve the pointer to the result with `gpgme_op_encrypt_result`. The structure contains the following members:

`gpgme_invalid_key_t invalid_recipients`

A linked list with information about all invalid keys for which the data could not be encrypted.

-- Function: `gpgme_encrypt_result_t gpgme_op_encrypt_result (gpgme_ctx_t CTX)`

The function `gpgme_op_encrypt_result` returns a `gpgme_encrypt_result_t` pointer to a structure holding the result of a `gpgme_op_encrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_encrypt`, `gpgme_op_encrypt_start`, `gpgme_op_sign` or `gpgme_op_sign_start` operation. If this operation failed, this might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)`

The function `gpgme_op_encrypt_sign` does a combined encrypt and sign operation. It is used like `gpgme_op_encrypt`, but the ciphertext also contains signatures for the signers listed in CTX.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)`

The function `gpgme_op_encrypt_sign_start` initiates a `gpgme_op_encrypt_sign` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if CTX, RSET, PLAIN or CIPHER is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_ext (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING, gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)`

SINCE: 1.11.0



This is an extended version of `gpgme_op_encrypt_sign` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

```
-- Function: gpgme_error_t gpgme_op_encrypt_sign_ext_start
 (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING,
 gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
 gpgme_data_t CIPHER)
```

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_sign_start` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

File: `gpgme.info`, Node: Miscellaneous, Next: Run Control, Prev: Crypto Operations, Up: Contexts

## 7.7 Miscellaneous operations

=====

Here are some support functions which are sometimes useful.

\* Menu:

- \* Running other Programs:: Running other Programs
- \* Using the Assuan protocol:: Using the Assuan protocol
- \* Checking for updates:: How to check for software updates

File: `gpgme.info`, Node: Running other Programs, Next: Using the Assuan protocol, Up: Miscellaneous

### 7.7.1 Running other Programs

-----

GPGME features an internal subsystem to run the actual backend engines.  
Along

with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

```
-- Function: gpgme_error_t gpgme_op_spawn (gpgme_ctx_t CTX,
 const char *FILE, const char *ARGV[], gpgme_data_t DATAIN,
 gpgme_data_t DATAOUT, gpgme_data_t DATAERR,
 unsigned int FLAGS)
```

SINCE: 1.5.0

The function `gpgme_op_spawn` runs the program `FILE` with the arguments taken from the NULL terminated array `ARGV`. If no arguments are required `ARGV` may be given as NULL. In the latter case or if `argv[0]` is the empty string, GPGME uses the basename of `FILE` for `argv[0]`. The file descriptors `stdin`, `stdout`, and `stderr` are connected to the data objects `DATAIN`, `DATAOUT`, and `DATAERR`. If NULL is passed for one of these data objects the corresponding file descriptor is connected to `/dev/null`.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_SPAWN_DETACHED`

SINCE: 1.5.0

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

`GPGME_SPAWN_ALLOW_SET_FG`

SINCE: 1.5.0

Under Windows this flag allows the called program to put itself into the foreground.

```
-- Function: gpgme_error_t gpgme_op_spawn_start (gpgme_ctx_t CTX,
 const char *FILE, const char *ARGV[], gpgme_data_t DATAIN,
 gpgme_data_t DATAOUT, gpgme_data_t DATAERR,
 unsigned int FLAGS)
```

SINCE: 1.5.0

This is the asynchronous variant of `gpgme_op_spawn`.

## 7.7.2

### Using the Assuan protocol

-----

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using `gpgme_ctx_set_engine_info`, passing the location of the servers socket as `FILE_NAME` argument, and an empty string as `HOME_DIR` argument.

The Assuan protocol functions use three kinds of callbacks to transfer data:

-- Data type: `gpgme_error_t (*gpgme_assuan_data_cb_t) (void *OPAQUE, const void *DATA, size_t DATALEN)`

SINCE: 1.2.0

This callback receives any data sent by the server. `OPAQUE` is the pointer passed to `gpgme_op_assuan_transact_start`, `DATA` of length `DATALEN` refers to the data sent.

-- Data type: `gpgme_error_t (*gpgme_assuan_inquire_cb_t) (void *OPAQUE, const char *NAME, const char *ARGS, gpgme_data_t *R_DATA)`

SINCE: 1.2.0

This callback is used to provide additional data to the Assuan server. `OPAQUE` is the pointer passed to `gpgme_op_assuan_transact_start`, `NAME` and `ARGS` specify what kind of data the server requested, and `R_DATA` is used to return the actual data.

Note: Returning data is currently not implemented in GPGME.

-- Data type: `gpgme_error_t (*gpgme_assuan_status_cb_t) (void *OPAQUE, const char *STATUS, const char *ARGS)`

SINCE: 1.2.0

This callback receives any status lines sent by the server. `OPAQUE` is the pointer passed to `gpgme_op_assuan_transact_start`, `STATUS` and `ARGS` denote the status update sent.

-- Function: `gpgme_error_t gpgme_op_assuan_transact_start`  
(`gpgme_ctx_t CTX`, `const char *COMMAND`,  
`gpgme_assuan_data_cb_t DATA_CB`, `void * DATA_CB_VALUE`,  
`gpgme_assuan_inquire_cb_t INQUIRE_CB`, `void * INQUIRE_CB_VALUE`,  
`gpgme_assuan_status_cb_t STATUS_CB`, `void * STATUS_CB_VALUE`)

SINCE: 1.2.0

Send the Assuan `COMMAND` and return results via the callbacks. Any callback may be `NULL`. The result of the operation may be retrieved using `gpgme_wait_ext`.

Asynchronous variant.

-- Function: `gpgme_error_t gpgme_op_assuan_transact_ext`  
(`gpgme_ctx_t CTX`, `const char *COMMAND`,  
`gpgme_assuan_data_cb_t DATA_CB`, `void * DATA_CB_VALUE`,  
`gpgme_assuan_inquire_cb_t INQUIRE_CB`, `void * INQUIRE_CB_VALUE`,  
`gpgme_assuan_status_cb_t STATUS_CB`, `void * STATUS_CB_VALUE`,  
`gpgme_error_t *OP_ERR`)

Send the Assuan `COMMAND` and return results via the callbacks. The result of the operation is returned in `OP_ERR`.

Synchronous variant.

File: `gpgme.info`, Node: Checking for updates, Prev: Using the Assuan protocol, Up: Miscellaneous

### 7.7.3 How to check for software updates

-----  
The GnuPG Project operates a server to query the current versions of software packages related to GnuPG. GPGME can be used to access this online database and check whether a new version of a software package is available.

-- Data type: `gpgme_query_swdb_result_t`  
SINCE: 1.8.0

This is a pointer to a structure used to store the result of a `gpgme_op_query_swdb` operation. After success full call to that function, you can retrieve the pointer to the result with `gpgme_op_query_swdb_result`. The structure contains the following member:

name

This is the name of the package.

iversion

The currently installed version or an empty string. This value is either a copy of the argument given to `gpgme_op_query_swdb` or the version of the installed software as figured out by GPGME or GnuPG.

created

This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

retrieved

This gives the date the file was downloaded.

warning

If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could not be figured out, the update flag may not reflect a required update status.

update

If this flag is set an update of the software is available.

urgent

If this flag is set an available update is important.

noinfo

If this flag is set, no valid information could be retrieved.

unknown

If this flag is set the given name is not known.

toold

If this flag is set the available information is not fresh enough.

error

If this flag is set some other error has occurred.

version

The version string of the latest released version.

reldate

The release date of the latest released version.

-- Function: `gpgme_error_t gpgme_op_query_swdb (gpgme_ctx_t CTX,  
const char *NAME, const char *IVERSION, gpgme_data_t RESERVED)`

SINCE: 1.8.0

Query the software version database for software package NAME and check against the installed version given by IVERSION. If IVERSION is given as NULL a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If NULL is used for NAME the current gpgme version is checked. RESERVED must be set to 0.

-- Function: `gpgme_query_swdb_result_t gpgme_op_query_swdb_result (gpgme_ctx_t CTX)`

SINCE: 1.8.0

The function `gpgme_op_query_swdb_result` returns a `gpgme_query_swdb_result_t` pointer to a structure holding the result of a `gpgme_op_query_swdb` operation. The pointer is only valid if the last operation on the context was a successful call to `gpgme_op_query_swdb`. If that call failed, the result might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context CTX.

Here is an example on  
how to check whether GnuPG is current:

```
#include <gpgme.h>

int
main (void)
{
 gpg_error_t err;
 gpgme_ctx_t ctx;
 gpgme_query_swdb_result_t result;

 gpgme_check_version (NULL);
 err = gpgme_new (&ctx);
 if (err)
 fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
 else
 {
 gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

 err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
 if (err)
```

```

 fprintf(stderr, "error querying swdb: %s\n", gpg_strerror(err));
else
{
 result = gpgme_op_query_swdb_result(ctx);
 if(!result)
 fprintf(stderr, "error querying swdb\n");
 if(!result->warning && !result->update)
 printf("GnuPG version %s is current\n",
 result->iversion);
 else if(!result->warning && result->update)

 printf("GnuPG version %s can be updated to %s\n",
 result->iversion, result->version);
 else
 fprintf(stderr, "error finding the update status\n");
}
gpgme_release(ctx);
}
return 0;
}

```

File: gpgme.info, Node: Run Control, Prev: Miscellaneous, Up: Contexts

## 7.8 Run Control

=====

GPGME supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when GPGME runs. This ensures that GPGME only runs when necessary and also prevents it from blocking for a long time.

\* Menu:

- \* Waiting For Completion::    Waiting until an operation is completed.
- \* Using External Event Loops::   Advanced control over what happens when.
- \* Cancellation::                How to  
end pending operations prematurely.

File: gpgme.info, Node: Waiting For Completion, Next: Using External Event Loops, Up: Run Control

### 7.8.1 Waiting For Completion

-----

-- Function: `gpgme_ctx_t gpgme_wait (gpgme_ctx_t CTX,  
gpgme_error_t *STATUS, int HANG)`

The function `gpgme_wait` continues the pending operation within the context `CTX`. In particular, it ensures the data exchange between GPGME and the crypto backend and watches over the run time status of the backend process.

If `HANG` is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in `STATUS` if `gpgme_wait` does not return `NULL`.

The `CTX` argument can be `NULL`. In that case, `gpgme_wait` waits for any context to complete its operation.

`gpgme_wait` can be used only in conjunction with any context that has a pending operation initiated with one of the `gpgme_op_*_start` functions except `gpgme_op_keylist_start` and `gpgme_op_trustlist_start` (for which you should use the corresponding `gpgme_op_*_next` functions). If `CTX` is `NULL`, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect `gpgme_wait`.

In a multi-threaded environment, only one thread should ever call `gpgme_wait` at any time, regardless of whether `CTX` is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

The function returns the `CTX` of the context which has finished the operation. If `HANG` is false, and the timeout expires, `NULL` is returned and `*status` will be set to 0. If an error occurs, `NULL` is returned and the error is returned in `*status`.

File: `gpgme.info`, Node: Using External Event Loops, Next: Cancellation, Prev: Waiting For Completion, Up: Run Control

### 7.8.2 Using External Event Loops

-----

GPGME hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling



thread can block arbitrary long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if `gpgme_wait` is used without the HANG option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. GPGME will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading

or writing. It is then the users responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, GPGME will never block. This gives the user more control over the program flow, and allows to perform other tasks when GPGME would block otherwise.

By using this advanced mechanism, GPGME can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

\* Menu:

- \* I/O Callback Interface:: How I/O callbacks are registered.
- \* Registering I/O Callbacks:: How to use I/O callbacks for a context.
- \* I/O Callback Example:: An example how to use I/O callbacks.
- \* I/O Callback Example GTK+:: How to use GPGME with GTK+.
- \* I/O Callback Example GDK:: How to use GPGME with GDK.
- \* I/O Callback Example Qt:: How to use GPGME with Qt.

File: `gpgme.info`, Node: I/O Callback Interface, Next: Registering I/O Callbacks, Up: Using External Event Loops

### 7.8.2.1 I/O Callback Interface

.....

-- Data type: `gpgme_error_t (*gpgme_io_cb_t) (void *DATA, int FD)`

The `gpgme_io_cb_t` type is the type of functions which GPGME wants to register as I/O callback handlers using the `gpgme_register_io_cb_t` functions provided by the user.

DATA and FD are provided by GPGME when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor FD.

The callback handler always returns 0, but you should consider the return value to be reserved for later use.

-- Data type: `gpgme_error_t (*gpgme_register_io_cb_t) (void *DATA, int FD, int DIR, gpgme_io_cb_t FNC, void *FNC_DATA, void **TAG)`

The `gpgme_register_io_cb_t` type is the type of functions which

can be called by GPGME to register an I/O callback function FNC for the file descriptor FD with the user. FNC\_DATA should be passed as the first argument to FNC when the handler is invoked (the second argument should be FD). If DIR is 0, FNC should be called by the user when FD is ready for writing. If DIR is 1, FNC should be called when FD is ready for reading.

DATA was provided by the user when registering the `gpgme_register_io_cb_t` function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the event loop to which the file descriptor should be added.

GPGME will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with `gpgme_set_io_cbs`. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The user should return a unique handle in TAG identifying this I/O callback registration, which will be passed to the `gpgme_register_io_cb_t` function without interpretation when the file descriptor should not be monitored anymore.

-- Data type: `void (*gpgme_remove_io_cb_t) (void *TAG)`

The `gpgme_remove_io_cb_t` type is the type of functions which can be called by GPGME to remove an I/O callback handler that was registered before. TAG is the handle that was returned by the `gpgme_register_io_cb_t` for this I/O callback.

GPGME can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

-- Data type: `enum gpgme_event_io_t`

The `gpgme_event_io_t` type specifies the type of an event that is reported to the user by GPGME as a consequence of an I/O operation. The following events

are defined:

#### GPGME\_EVENT\_START

The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled. TYPE\_DATA is NULL and reserved for later use.

#### GPGME\_EVENT\_DONE

The operation is finished, the last I/O callback for this operation was removed. The accompanying TYPE\_DATA points to a struct gpgme\_io\_event\_done\_data variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

#### GPGME\_EVENT\_NEXT\_KEY

In a gpgme\_op\_keylist\_start operation, the next key was received from the crypto engine. The accompanying TYPE\_DATA is a gpgme\_key\_t variable that contains the key with one reference for the user.

-- Data type: void (\*gpgme\_event\_io\_cb\_t)

(void \*DATA,

gpgme\_event\_io\_t TYPE, void \*TYPE\_DATA)

The gpgme\_event\_io\_cb\_t type is the type of functions which can be called by GPGME to signal an event for an operation running in a context which has I/O callback functions registered by the user.

DATA was provided by the user when registering the gpgme\_event\_io\_cb\_t function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the context in which this event has occurred.

TYPE will specify the type of event that has occurred. TYPE\_DATA specifies the event further, as described in the above list of possible gpgme\_event\_io\_t types.

GPGME can call this function in an I/O callback handler.

File: gpgme.info, Node: Registering I/O Callbacks, Next: I/O Callback Example, Prev: I/O Callback Interface, Up: Using External Event Loops

#### 7.8.2.2 Registering I/O Callbacks

.....

-- Data type: struct gpgme\_io\_cbs

This structure is used to store the I/O callback interface functions described in the previous section. It has the following members:

gpgme\_register\_io\_cb\_t add

This is the function called by GPGME to register an I/O callback handler. It must be specified.

void \*add\_priv

This is passed as the first argument to the add function when it is called by GPGME. For example, it can be used to determine the event loop to which the file descriptor should be added.

gpgme\_remove\_io\_cb\_t remove

This is the function called by GPGME to remove an I/O callback handler. It must be specified.

gpgme\_event\_io\_cb\_t event

This is the function called by GPGME to signal an event for an operation. It must be specified, because at least the start event must be processed.

void \*event\_priv

This is passed as the first argument to the event function when it is called by GPGME. For example, it can be used to determine the context in which the event has occurred.

-- Function: void gpgme\_set\_io\_cbs (gpgme\_ctx\_t CTX,  
struct gpgme\_io\_cbs \*IO\_CBS)

The function gpgme\_set\_io\_cbs enables the I/O callback interface for the context CTX. The I/O callback functions are specified by IO\_CBS.

If IO\_CBS->add is NULL, the I/O callback interface is disabled for the context, and normal operation is restored.

-- Function: void gpgme\_get\_io\_cbs (gpgme\_ctx\_t CTX,  
struct gpgme\_io\_cbs \*IO\_CBS)

The function gpgme\_get\_io\_cbs returns the I/O callback functions set with gpgme\_set\_io\_cbs in IO\_CBS.

File: gpgme.info, Node: I/O Callback Example, Next: I/O Callback Example GTK+, Prev: Registering I/O Callbacks, Up: Using External Event Loops

7.8.2.3 I/O Callback Example

.....  
To

actually use an external event loop, you have to implement the I/O callback functions that are used by GPGME to register and unregister file descriptors. Furthermore, you have to actually monitor these file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in GPGME is not predictable.

```
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>

/* The following structure holds the result of a crypto operation. */
struct op_result
{
 int done;
 gpgme_error_t err;
};

/* The following structure holds the
data associated with one I/O
callback. */
struct one_fd
{
 int fd;
 int dir;
 gpgme_io_cb_t fnc;
 void *fnc_data;
 void *loop;
};

struct event_loop
{
 pthread_mutex_t lock;
#define MAX_FDS 32
 /* Unused slots are marked with FD being -1. */
 struct one_fd fds[MAX_FDS];
};
```

The following functions implement the I/O callback interface.

```
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
 void **r_tag)
{
 struct event_loop *loop = data;
 struct one_fd *fds = loop->fds;
 int i;

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS; i++)
 {
 if (fds[i].fd == -1)
 {
 fds[i].fd = fd;
 fds[i].dir = dir;
 fds[i].fnc = fnc;
 fds[i].fnc_data = fnc_data;
 fds[i].loop = loop;
 break;
 }
 }
 pthread_mutex_unlock (&loop->lock);
 if (i == MAX_FDS)
 return gpg_error (GPG_ERR_GENERAL);
 *r_tag = &fds[i];
 return 0;
}
```

```
void
remove_io_cb (void *tag)
{
 struct one_fd *fd = tag;
 struct event_loop *loop = fd->loop;

 pthread_mutex_lock (&loop->lock);
 fd->fd = -1;
 pthread_mutex_unlock (&loop->lock);
}
```

```
void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
{
 struct op_result *result = data;

 /* We don't support list operations here. */
}
```

```

if (type == GPGME_EVENT_DONE)
{
 result->done = 1;
 result->err = *type_data;
}
}

```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```

int
do_select (struct event_loop *loop)
{
 fd_set rfd;
 fd_set wfd;
 int i, n;
 int any = 0;
 struct timeval tv;
 struct one_fd *fdlist
= loop->fds;

 pthread_mutex_lock (&loop->lock);
 FD_ZERO (&rfd);
 FD_ZERO (&wfd);
 for (i = 0; i < MAX_FDS; i++)
 if (fdlist[i].fd != -1)
 FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfd);
 pthread_mutex_unlock (&loop->lock);

 tv.tv_sec = 0;
 tv.tv_usec = 1000;

 do
 {
 n = select (FD_SETSIZE, &rfd, &wfd, NULL, &tv);
 }
 while (n < 0 && errno == EINTR);

 if (n < 0)
 return n; /* Error or timeout. */

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS && n; i++)
 {
 if (fdlist[i].fd != -1)
 {
 if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfd))
 {

```

```

 assert (n);
 n--;
 any = 1;
 /* The I/O callback handler can register/remove callbacks,
 so we have to unlock the file descriptor list. */
 pthread_mutex_unlock (&loop->lock);
 (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
 pthread_mutex_lock (&loop->lock);
}
}
}
pthread_mutex_unlock (&loop->lock);
return any;
}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
{
 int ret;

 do
 {
 ret = do_select (loop);
 }
 while (ret >= 0 && !result->done);
}

```

The main function shows how to put it all together.

```

int
main (int argc, char *argv[])
{
 struct event_loop loop;
 struct op_result result;
 gpgme_ctx_t ctx;
 gpgme_error_t err;
 gpgme_data_t sig, text;
 int i;
 pthread_mutexattr_t attr;
 struct gpgme_io_cbs io_cbs =
 {
 add_io_cb,
 &loop,
 remove_io_cb,
 event_io_cb,
 &result
 };
}

```



```

init_gpgme ();

/* Initialize the loop structure. */

/* The mutex must be
recursive, since remove_io_cb (which acquires a
lock) can be called while holding a lock acquired in do_select. */
pthread_mutexattr_init (&attr);
pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
pthread_mutex_init (&loop.lock, &attr);
pthread_mutexattr_destroy (&attr);

for (i = 0; i < MAX_FDS; i++)
 loop.fds[i].fd = -1;

/* Initialize the result structure. */
result.done = 0;

err = gpgme_data_new_from_file (&sig, "signature", 1);
if (!err)
 err = gpgme_data_new_from_file (&text, "text", 1);
if (!err)
 err = gpgme_new (&ctx);
if (!err)
 {
 gpgme_set_io_cbs (ctx, &io_cbs);
 err = gpgme_op_verify_start (ctx, sig, text, NULL);
 }
if (err)
 {
 fprintf (stderr, "gpgme error: %s: %s\n",
 gpgme_strerror (err), gpgme_strerror (err));
 exit (1);
 }

wait_for_op (&loop,
&result);
if (!result.done)
 {
 fprintf (stderr, "select error\n");
 exit (1);
 }
if (!result.err)
 {
 fprintf (stderr, "verification failed: %s: %s\n",
 gpgme_strerror (result.err), gpgme_strerror (result.err));
 exit (1);
 }

```

```

/* Evaluate verify result. */
...
return 0;
}

```

File: gpgme.info, Node: I/O Callback Example GTK+, Next: I/O Callback Example GDK, Prev: I/O Callback Example, Up: Using External Event Loops

#### 7.8.2.4 I/O Callback Example GTK+

.....

The I/O callback interface can be used to integrate GPGME with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific setup.

```

#include <gtk/gtk.h>

struct my_gpgme_io_cb
{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 guint input_handler_id
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
 struct my_gpgme_io_cb *iocb = data;
 gtk_input_remove (data->input_handler_id);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
 void *fnc_data, void **tag)
{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));

```

```

iocb->fnc = fnc;
iocb->data = fnc_data;
iocb->input_handler_id = gtk_input_add_full (fd, dir
 ? GDK_INPUT_READ
 : GDK_INPUT_WRITE,
 my_gpgme_io_callback,
 0, iocb, NULL);

*tag = iocb;
return 0;
}

```

File: gpgme.info, Node: I/O Callback Example GDK, Next: I/O Callback Example Qt, Prev: I/O Callback Example GTK+, Up: Using External Event Loops

### 7.8.2.5 I/O Callback Example GDK

.....

The I/O callback interface can also be used to integrate GPGME with the GDK event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```

#include <gdk/gdk.h>

struct my_gpgme_io_cb
{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 gint tag;
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
 struct my_gpgme_io_cb *iocb = data;
}

```

```

 gdk_input_remove (data->tag);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
 void *fnc_data, void **tag)
{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
 my_gpgme_io_callback, iocb, NULL);
 *tag = iocb;
 return 0;
}

```

File: gpgme.info, Node: I/O Callback Example Qt, Prev: I/O Callback Example GDK, Up: Using External Event Loops

#### 7.8.2.6 I/O Callback Example Qt

.....

The

I/O callback interface can also be used to integrate GPGME with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any Qt specific setup.

```

#include <qsocketnotifier.h>
#include <qapplication.h>

struct IOCB {
 IOCB(GpgmeIOCb f, void * d, QSocketNotifier * n)
 : func(f), data(d), notifier(n) {}
 GpgmeIOCb func;
 void * data;
 QSocketNotifier * notifier;
}

class MyApp : public QApplication {

 // ...

 static void registerGpgmeIOCallback(void * data, int fd, int dir,
 GpgmeIOCb func, void * func_data,

```

```

 void ** tag) {
 QSocketNotifier * n =
 new QSocketNotifier(
fd, dir ? QSocketNotifier::Read
 : QSocketNotifier::Write);
 connect(n, SIGNAL(activated(int)),
 qApp, SLOT(slotGpgmeIOCallback(int)));
 qApp->mIOCBs.push_back(IOCB(func, func_data, n));
 tag = (void)n;
}

static void removeGpgmeIOCallback(void * tag) {
 if (!tag) return;
 QSocketNotifier * n = static_cast<QSocketNotifier*>(tag);
 for (QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
 it != qApp->mIOCBs.end() ; ++it)
 if (it->notifier == n) {
 delete it->notifier;
 qApp->mIOCBs.erase(it);
 return;
 }
}

public slots:
void slotGpgmeIOCallback(int fd) {
 for (QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
 it != mIOCBs.end() ; ++it)
 if (it->notifier && it->notifier->socket() == fd)
 (*(it->func))
(it->func_data, fd);
}

// ...

private:
 QValueList<IOCB> mIOCBs;
 // ...
};

```

File: gpgme.info, Node: Cancellation, Prev: Using External Event Loops, Up: Run Control

### 7.8.3 Cancellation

-----

Sometimes you do not want to wait for an operation to finish. GPGME provides two different functions to achieve that. The function `gpgme_cancel` takes effect immediately. When it returns, the operation

is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function `gpgme_cancel_async` can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

-- Function: `gpgme_ctx_t gpgme_cancel (gpgme_ctx_t CTX)`  
SINCE: 0.4.5

The function `gpgme_cancel` attempts to cancel a pending operation in the context `CTX`. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call `gpgme_wait` during cancellation. After successful cancellation, you can call `gpgme_wait` (optionally waiting on `CTX`), and the context `CTX` will appear as if it had finished with the error code `GPG_ERR_CANCEL`.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a `GPGME_EVENT_DONE` event with the error code `GPG_ERR_CANCEL` will be signalled.

The function returns an error code if the cancellation failed (in this case the state of `CTX` is not modified).

-- Function: `gpgme_ctx_t gpgme_cancel_async (gpgme_ctx_t CTX)`  
SINCE: 1.1.7

The function `gpgme_cancel_async` attempts to cancel a pending operation in the context `CTX`. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of `CTX` is not modified).

File: `gpgme.info`, Node: UI Server Protocol, Next: Debugging, Prev: Contexts, Up: Top

Appendix A The GnuPG UI Server Protocol

\*\*\*\*\*

This section specifies the protocol used between clients and a User Interface Server (UI server). This protocol helps to build a system where all cryptographic operations are done by a server and the server is responsible for all dialogs. Although GPGME has no direct support for this protocol it is believed that servers will utilize the GPGME library; thus having the specification included in this manual is an appropriate choice. This protocol should be referenced as The GnuPG UI Server Protocol.

A server needs to implement these commands:(1)

\* Menu:

- \* UI Server Encrypt:: Encrypt a message.
- \* UI Server Sign:: Sign a message.
- \* UI Server Decrypt:: Decrypt a message.
- \* UI Server Verify:: Verify a message.
- \* UI Server Set Input Files:: Specifying the input files to operate on.
- \* UI Server Sign/Encrypt Files:: Encrypting and signing files.
- \* UI Server Verify/Decrypt Files:: Decrypting and verifying files.
- \* UI Server Import/Export Keys:: Managing certificates.
- \* UI Server Checksum Files:: Create and verify checksums for files.
- \* Miscellaneous UI Server Commands:: Commands not related to a specific operation.

----- Footnotes -----

(1) In all examples we assume that the connection has already been established; see the Assuan manual for details.

File: gpgme.info, Node: UI Server Encrypt, Next: UI Server Sign, Up: UI Server Protocol

#### A.1 UI Server: Encrypt a Message

=====

Before encryption can be done the recipients must be set using the command:

-- Command: RECIPIENT STRING

Set the recipient for the encryption. STRING is an RFC-2822 recipient name ("mailbox" as per section 3.4). This command may or may not check the recipient for validity right away; if it does not all recipients are expected to be checked at the time of the ENCRYPT command. All RECIPIENT commands are cumulative until a

successful ENCRYPT command or until a RESET command. Linefeeds are obviously not allowed in STRING and should be folded into spaces (which are equivalent).

To tell the server the source and destination of the data, the next two commands are to be used:

-- Command: INPUT FD=N

Set the file descriptor for the message to be encrypted to N. The message send to the server is binary encoded.

GpgOL is a Windows only program,  
thus N is not a libc file

descriptor but a regular system handle. Given that the Assuan connection works over a socket, it is not possible to use regular inheritance to make the file descriptor available to the server. Thus DuplicateHandle needs to be used to duplicate a handle to the server process. This is the reason that the server needs to implement the GETINFO pid command. Sending this command a second time replaces the file descriptor set by the last one.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output (i.e. the encrypted message) to N. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

The setting of the recipients, the data source and destination may happen in any order, even intermixed. If this has been done the actual encryption operation is called using:

-- Command: ENCRYPT --protocol=NAME

This command reads the plaintext from the file descriptor set by the INPUT command, encrypts it and writes the ciphertext to the file descriptor set by the OUTPUT command. The server may (and should) overlap reading and writing. The recipients used for the encryption are all the recipients set so far. If any recipient is not usable the server should take appropriate measures to notify the user about the problem and may cancel the operation by returning an error code. The used file descriptors are void after this command; the recipient list is only cleared if the server returns success.

Because GpgOL uses a streaming mode of operation the server is not allowed to auto select the protocol and must obey to the mandatory



PROTOCOL parameter:

OpenPGP

Use the OpenPGP protocol (RFC-2440).

CMS

Use the CMS

(PKCS#7) protocol (RFC-3852).

To support automatically selection of the protocol depending on the selected keys, the server MAY implement the command:

-- Command: PREP\_ENCRYPT [--protocol=NAME] [--expect-sign]

This command considers all recipients set so far and decides whether it is able to take input and start the actual encryption. This is kind of a dry-run ENCRYPT without requiring or using the input and output file descriptors. The server shall cache the result of any user selection to avoid asking this again when the actual ENCRYPT command is sent. The --protocol option is optional; if it is not given, the server should allow the user to select the protocol to be used based on the recipients given or by any other means.

If --expect-sign is given the server should expect that the message will also be signed and use this hint to present a unified recipient and signer selection dialog if possible and desired.

A

selected signer should then be cached for the expected SIGN command (which is expected in the same session but possible on another connection).

If this command is given again before a successful ENCRYPT command, the second one takes effect.

Before sending the OK response the server shall tell the client the protocol to be used (either the one given by the argument or the one selected by the user) by means of a status line:

-- Status line: PROTOCOL NAME

Advise the client to use the protocol NAME for the ENCRYPT command. The valid protocol names are listed under the description of the ENCRYPT command. The server shall emit exactly one PROTOCOL status line.

Here is an example of a complete encryption sequence; client lines are indicated by a C:, server responses by C::

C: RESET

S: OK  
C: RECIPIENT foo@example.net  
S: OK  
C: RECIPIENT bar@example.com  
S: OK  
C: PREP\_ENCRYPT  
S: S PROTOCOL OpenPGP  
S: OK  
C: INPUT FD=17  
S: OK  
C: OUTPUT FD=18  
S: OK  
C: ENCRYPT  
S: OK

File: gpgme.info, Node: UI Server Sign, Next: UI Server Decrypt, Prev: UI Server Encrypt, Up: UI Server Protocol

## A.2 UI Server: Sign a Message

=====

The server needs to implement opaque signing as well as detached signing. Due to the nature of OpenPGP messages it is always required to send the entire message to the server; sending just the hash is not possible. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N

Set the file descriptor for the message to be signed to N. The message send to the server is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output. The output is either the complete signed message or in case of a detached signature just that detached signature. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

To allow the server the selection of a non-default signing key the client may optionally use the SENDER command, see \*note command SENDER::.

The signing operation is then initiated by:

```
-- Command: SIGN --protocol=NAME [--detached]
 Sign the data set with the INPUT command and write it to the sink
 set by OUTPUT. NAME is the signing protocol used for the message.
 For a description of the allowed protocols see the ENCRYPT
 command. With option --detached given, a detached signature is
 created; this is actually the usual way the command is used.
```

The client expects the server to send at least this status information before the final OK response:

```
-- Status line: MICALG STRING
 The STRING represents the hash algorithm used to create the
 signature. It is used with RFC-1847 style signature messages and
 defined by PGP/MIME (RFC-3156) and S/MIME (RFC-3851). The GPGME
 library has a supporting function gpgme_hash_algo_name to return
 the algorithm name as a string. This string needs to be lowercased
 and for OpenPGP prefixed with "pgp-".
```

```
{
 "op": "export",
 "keys": "victor@example.org",
 "armor": true
}
```

-----BEGIN PGP PRIVATE KEY BLOCK-----

```
IQOYBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLU1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJIO1s0N2c
PSht98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRjLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAEAB/wLJ0gyMjs2ffFT83wM
5Lzz2yQIwV4t3bbIBAUjdHTqeN5Zmsm/oakFyjSokULK96Kv0R4ej9eoIgmFvxFk
HRkrngxTrbsNJ7I6QcKYHTPeIj318yNL6fj0WJUcdPIENukX15jbqNyk3/4D2y
TTDySyq6jHTgvMH4K4KJUSpglvSJPntTk9RhuFGHAF+sNR9atygdYctAaERMRtSg
LCoSt/AoX5GRMIQjXT9oqQjwSQoZyF4s8HMC8wdTFIE/E0L4IVdHVp8sz2UzNtT
W/evmCA+KVruKjRH/Fhrq4hHkEamW28+j4L6uAyagONP7BONs+S5Oo2zTT9+tV2R
ILTZBADdgLuAgF6C5Lu9jCF6DfFgaT/uafMyQNkEGNlxOHMWHtGLHe475V2eG9gA
amd4yXKyEFKU1PWnvlGuicQSGdzVcwmq61msvXgYD0FK3LP3yWzKnE4X1tzc9Vp
/uHJxKjewCuyt1f5in919v+T8TbUxBYKC0zX/qWtX+10cTx77QA6leqhToJ95Yc
u4UBrKMEO+y2v8Svb3LG7yI5oY8tkw0EkJ/kpZ8xTafZYCe6fXdVVE3PHg2lrxyc
Wv/EU3QY/qA3G82mbXYeJ2jNzaTNYo4MylMrt4Mx25x4ke7JlsE8SVrQ+4CrHkqp
OjSIa7fppLrQ78uW980AtN8NNQGrlTsD/A9aoA60IgxY1Q3K2uSyDCyjLknv57ym
ZSBD3/t7m0l6Q6gdbfhNGosT+Hd4y3actqEqzXZHW2VG4dKZ/wRNkxtSm9adU9vs
EHyzxjb6mKIH32zAG5TafT20hC+NK6lsyHr9UE2ZrS6ma2sLxGW2O40hqNsdD+5m
NrqeBc2I/js1PMK0EHRlc3RAZXhhbXBsZS5vcmeJAVQEEwEIAD4WIQTUFzW5Ejb9
uIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8JnAAULCQgHAgYVCgkICwIEFgIDAQIe
```

AQIXgAAKCRAjAWNe7/DLbF9kB/wOQ/S60HGwFq07W9N01HWULyhHKoMmcHL6rfZ6  
4oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6kaBe+wF6Kqir6udFSBW9rPcFg6/V  
ZXPtT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rNgkYo1JCBR0XdRJYCSX3yB4TWv/eX  
nZ37/WjmiTOIzh35rjs+NuU/S5JPDfAp2/k70DevQeBsv+UjVXjWpNTZmPbvDnd9  
95uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6UunOf9Rlp1oMzdxMool/d1MICxg2h  
3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ1J8Nsv87SZeEnQOYBFrsKEKBCADj  
oEBhG/QPqZHg8VyoD1xYRAWGxyDjkX/GrSs6yE+x2hk5FoQCajxKa/d4AVxOnJpd  
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9Mmd7bM1+UyPgbPER0iWMeyctYsuOLEUyQKMscDT

=hkUm

-----END

PGP PRIVATE KEY BLOCK-----

```
{
 "manifest_version": 2,

 "name": "Browsertests for gpgmejs",
 "description": "Run the browsertests.",
 "version": "0.1",
 "content_security_policy": "default-src 'self' filesystem:",
 "browser_action": {
 "default_icon": "testicon.png",
 "default_popup": "popup.html"
 },
 "permissions": ["nativeMessaging", "activeTab"]
}
```

```

from __future__ import absolute_import

import cython
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

if cython.compiled is True:
 cc = "Powered by Cython compiled C code."
else:
 cc = "Powered by Python."

print("""
Number of secret keys: {0}
Number of public keys: {1}

{2}
""".format(secnum, pubnum, cc))
{
 "info": {
 "is_mime": false,
 "signatures": [{
 "summary": {
 "sigsum": [],
 "valid": false,
 "green": false,
 "red": false,
 "revoked": false,
 "key-expired": false,
 "sig-expired": false,
 "key-missing": false,
 "crl-missing": false,
 "crl-too-old": false,
 "bad-policy": false,
 "sys-error": false
 },
 "wrong_key_usage": false,
 "chain_model": false,
 "is_de_vs": false,
 "status_string": "Success",

```



INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

\* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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gpgme.info-1: 1688

gpgme.info-2: 301751

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End Tag Table

Local Variables:

coding: utf-8

End:

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Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 \*H  
certify@pca.dfn.de0

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Deutsches Forschungsnetz10UDFN-PCA1+0)U"DFN Server Certification Authority1!0 \*H  
certify@pca.dfn.de0"0

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+<[A|F)F%

ZiRaW=OC,,meKW@J-\*<,L}:Bnm-kv

EYBmu tt[-%,R+n0j0U00U0U{upz\*D\

v0Ux0v09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfnpca.crx09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfn  
pca.cr10 `HB0) `HBhttps://mystic.pca.dfn.de/0A `HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html0 `HB

This certificate was issued by the DFN-PCA, the Top  
Level Certification Authority of the German Research  
Network (Deutsches Forschungsnetz, DFN).

The key owner's identity was authenticated in  
accordance with the DFN World Wide Web Policy, v1.00! `HBcgi/check-rev.cgi?0

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,}h?c(MeM44=Qe/\_^^JyYN/61&jPFXifP&#;/KZ

1 xOK?ps

\input texinfo @c -\* mode: texinfo; coding: utf-8; -\*-

@documentencoding UTF-8

@setfilename gpgme.info

@include defs.inc

@settitle The `GnuPG Made Easy' Reference Manual

```
@dircategory GNU Libraries
@direntry
* @acronym{GPGME}: (gpgme). Adding support for cryptography to your program.
@end direntry
```

```
@c Unify some of the indices.
@syncodeindex tp fn
@syncodeindex pg fn
```

```
@copying
Copyright @copyright{ } 2002--2008, 2010, 2012--2018 g10 Code GmbH.
```

```
@quotation
Permission is granted to copy, distribute and/or modify this document
under the terms of the GNU General Public License as published by the
Free Software Foundation; either version 3 of the License, or (at your
option) any later version. The text of the license can be found in the
section entitled ``Copying".
@end quotation
```

```
This document is distributed in the hope that it will be useful, but
WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See
the GNU
General Public License for more details.
@end copying
```

```
@c Macros used by the description of the UI server protocol
@macro clnt{string}
@sc{c:} \string\
@end macro
@macro srvr{string}
@sc{s:} \string\
@end macro
```

```
@c API version.
@macro since{string}
@sc{Since:} \string\
@end macro
```

```
@c
@c T I T L E P A G E
@c
@ifinfo
This file documents the @acronym{GPGME} library.
```

This is Edition @value{EDITION}, last updated @value{UPDATED}, of  
@cite{The `GnuPG Made Easy' Reference Manual}, for Version  
@value{VERSION}.

@c NOTE: Don't forget to update the year for the TeX version, too.  
@insertcopying

@end ifinfo

@c We do not want that bastard short titlepage.

@c @iftex

@c @shorttitlepage The `GnuPG Made Easy' Reference Manual

@c @end iftex

@titlepage

@center @titlefont{The `GnuPG Made Easy'}

@sp 1

@center @titlefont{Reference Manual}

@sp 6

@center Edition @value{EDITION}

@sp 1

@center last updated @value{UPDATED}

@sp 1

@center for version @value{VERSION}

@page

@vskip 0pt plus 1filll

Published

by The GnuPG Project@\* c/o g10 Code GmbH@\* Httenstr. 61@\* 40699 Erkrath, Germany

@insertcopying

@end titlepage

@page

@summarycontents

@contents

@ifnottex

@node Top

@top Main Menu

This is Edition @value{EDITION}, last updated @value{UPDATED}, of

@cite{The `GnuPG Made Easy' Reference Manual}, for Version

@value{VERSION} of the @acronym{GPGME} library.

@end ifnottex

@menu

- \* Introduction:: How to use this manual.
- \* Preparation:: What you should do before using the library.
- \* Protocols and Engines:: Supported crypto protocols.
- \* Algorithms:: Supported algorithms.

- \* Error Handling:: Error numbers and their meanings.
- \* Exchanging Data:: Passing data to and from @acronym{GPGME}.
- \* Contexts:: Handling @acronym{GPGME} contexts.

## Appendices

- \* UI Server Protocol:: The GnuPG UI Server Protocol.
- \* Debugging:: How to solve problems.
- \* Deprecated Functions:: Documentation of deprecated functions.
- \* Library Copying:: The GNU Lesser General Public License says how you can copy and share `GnuPG Made Easy'.
- \* Copying:: The GNU General Public License says how you can copy and share this manual.

## Indices

- \* Concept Index:: Index of concepts and programs.
- \* Function and Data Index:: Index of functions, variables and data types.

## @detailmenu

--- The Detailed Node Listing ---

## Introduction

- \* Getting Started:: Purpose of the manual, and how to use it.
- \* Features:: Reasons to install and use @acronym{GPGME}.
- \* Overview:: Basic architecture of the @acronym{GPGME} library.

## Preparation

- \* Header:: What header file you need to include.
- \* Building the Source:: Compiler options to be used.
- \* Largefile Support (LFS)::  
How to use @acronym{GPGME} with LFS.
- \* Using Automake:: Compiler options to be used the easy way.
- \* Using Libtool:: Avoiding compiler options entirely.
- \* Library Version Check:: Getting and verifying the library version.
- \* Signal Handling:: How @acronym{GPGME} affects signal handling.
- \* Multi-Threading:: How @acronym{GPGME} can be used in an MT environment.

## Protocols and Engines

- \* Engine Version Check:: Verifying the engine version.
- \* Engine Information:: Obtaining more information about the engines.
- \* Engine Configuration:: Changing the engine configuration.
- \* OpenPGP:: Support for the OpenPGP protocol.

- \* Cryptographic Message Syntax:: Support for the CMS.

## Algorithms

- \* Public Key Algorithms:: A list of all public key algorithms.
- \* Hash Algorithms:: A list of all hash algorithms.

## Error Handling

- \* Error Values:: The error value and what it means.
- \* Error Codes:: A list of important error codes.
- \* Error Sources:: A list of important error sources.
- \* Error Strings:: How to get a descriptive string from a value.

## Exchanging Data

- \* Creating Data Buffers:: Creating new data buffers.
- \* Destroying Data Buffers:: Releasing data buffers.
- \* Manipulating Data Buffers:: Operations on data buffers.

## Creating Data Buffers

- \* Memory Based Data Buffers:: Creating memory based data buffers.
- \* File Based Data Buffers:: Creating file based data buffers.
- \* Callback Based Data Buffers:: Creating callback based data buffers.

## Manipulating Data Buffers

- \* Data Buffer I/O Operations:: I/O operations on data buffers.
- \* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- \* Data Buffer Convenience:: Convenience function for data buffers.

## Contexts

- \* Creating Contexts:: Creating new @acronym{GPGME} contexts.  
\*
- \* Destroying Contexts:: Releasing @acronym{GPGME} contexts.
- \* Result Management:: Managing the result of crypto operations.
- \* Context Attributes:: Setting properties of a context.
- \* Key Management:: Managing keys with @acronym{GPGME}.
- \* Crypto Operations:: Using a context for cryptography.
- \* Miscellaneous:: Miscellaneous operations.
- \* Run Control:: Controlling how operations are run.

## Context Attributes

- \* Protocol Selection:: Selecting the protocol used by a context.

- \* Crypto Engine::           Configuring the crypto engine.
- \* Setting the Sender::       How to tell the engine the sender.
- \* ASCII Armor::            Requesting @acronym{ASCII} armored output.
- \* Text Mode::               Choosing canonical text mode.
- \* Offline Mode::            Choosing offline mode.
- \* Included Certificates::   Including a number of certificates.
- \* Key Listing Mode::  
    Selecting key listing mode.
- \* Passphrase Callback::     Getting the passphrase from the user.
- \* Progress Meter Callback::  Being informed about the progress.
- \* Status Message Callback::  Status messages received from gpg.
- \* Locale::                  Setting the locale of a context.

## Key Management

- \* Key objects::             Description of the key structures.
- \* Listing Keys::            Browsing the list of available keys.
- \* Information About Keys::  Requesting detailed information about keys.
- \* Manipulating Keys::      Operations on keys.
- \* Generating Keys::        Creating new key pairs.
- \* Signing Keys::            Adding key signatures to public keys.
- \* Exporting Keys::         Retrieving key data from the key ring.
- \* Importing Keys::         Adding keys to the key ring.
- \* Deleting Keys::          Removing keys from the key ring.
- \* Changing Passphrases::    Change the passphrase of  
a key.
- \* Changing TOFU Data::     Changing data pertaining to TOFU.
- \* Advanced Key Editing::    Advanced key edit operation.

## Crypto Operations

- \* Decrypt::                Decrypting a ciphertext.
- \* Verify::                 Verifying a signature.
- \* Decrypt and Verify::     Decrypting a signed ciphertext.
- \* Sign::                    Creating a signature.
- \* Encrypt::                Encrypting a plaintext.

## Sign

- \* Selecting Signers::      How to choose the keys to sign with.
- \* Creating a Signature::    How to create a signature.
- \* Signature Notation Data:: How to add notation data to a signature.

## Encrypt

- \* Encrypting a Plaintext::  How to encrypt a plaintext.

## Miscellaneous

- \* Running other Programs:: Running other Programs.
- \* Using the Assuan protocol:: Using the Assuan protocol.
- \* Checking for updates:: How to check for software updates.

## Run Control

- \* Waiting For Completion:: Waiting until an operation is completed.
- \* Using External Event Loops:: Advanced control over what happens when.
- \* Cancellation:: How to end pending operations prematurely.

## Using External Event Loops

- \* I/O Callback Interface:: How I/O callbacks are registered.
- \* Registering I/O Callbacks:: How to use I/O callbacks for a context.
- \* I/O Callback Example:: An example how to use I/O callbacks.
- \* I/O Callback Example GTK+:: How to integrate @acronym{GPGME} in GTK+.
- \* I/O Callback Example GDK:: How to integrate @acronym{GPGME} in GDK.
- \* I/O Callback Example Qt:: How to integrate @acronym{GPGME} in Qt.

@end detailmenu

@end menu

@node Introduction

@chapter Introduction

`GnuPG Made Easy' (@acronym{GPGME}) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. @acronym{GPGME} provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

@acronym{GPGME} uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

@menu

- \* Getting Started:: Purpose of the manual, and how to use it.
- \* Features:: Reasons to install and use @acronym{GPGME}.
- \* Overview:: Basic architecture of the @acronym{GPGME} library.

@end menu

@node Getting Started

@section Getting Started



This manual documents the @acronym{GPGME} library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to @acronym{GPGME} or its users.

This manual

can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those languages bindings follow the general programming model of @acronym{GPGME} but may provide some extra high level abstraction on top of the @acronym{GPGME} style API. For now please see the README files in the @file{lang/} directory of the source distribution.

@node Features

@section Features

@acronym{GPGME} has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

@table @asis

@item it's free software

Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (@pxref{Library Copying}).

@item it's flexible

@acronym{GPGME} provides transparent support for several cryptographic protocols by different engines. Currently, @acronym{GPGME} supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

@item it's easy

@acronym{GPGME} hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for @acronym{GPGME} has been added to a program, it is easy to add support for other crypto protocols once @acronym{GPGME} backends provide them.

@item it's language friendly

@acronym{GPGME}

comes with languages bindings for several common programming languages: Common Lisp, C++, Python 2, and Python 3.

@end table

@node Overview

@section Overview

@acronym{GPGME} provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, @acronym{GPGME} has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, @acronym{GPGME} can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

@node Preparation

@chapter Preparation

To use @acronym{GPGME}, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

```

@menu
* Header:: What header file you need to include.
* Building the Source:: Compiler options to be used.
* Largefile Support (LFS):: How to use @acronym{GPGME} with LFS.
* Using Automake:: Compiler options to be used the easy way.
* Using Libtool:: Avoiding compiler options entirely.
* Library Version Check:: Getting and verifying the library version.
* Signal Handling::
 How @acronym{GPGME} affects signal handling.
* Multi-Threading:: How @acronym{GPGME} can be used in an MT environment.
@end menu

```

```

@node Header
@section Header
@cindex header file
@cindex include file

```

All interfaces (data types and functions) of the library are defined in the header file ``gpgme.h'`. You must include this in all programs using the library, either directly or through some other header file, like this:

```

@example
#include <gpgme.h>
@end example

```

The name space of @acronym{GPGME} is @code{gpgme\_\*} for function names and data types and @code{GPGME\_\*} for other symbols. Symbols internal to @acronym{GPGME} take the form @code{\_gpgme\_\*} and @code{\_GPGME\_\*}.

Because @acronym{GPGME} makes use of the GPG Error library, using @acronym{GPGME} will also use the @code{GPG\_ERR\_\*} name space directly, and the @code{gpg\_err\*}, @code{gpg\_str\*}, and @code{gpgtr\_\*} name space indirectly.

```

@node Building the Source
@section Building the Source
@cindex compiler options
@cindex
 compiler flags

```

If you want to compile a source file including the ``gpgme.h'` header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the @option{-I} option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, gpgme ships with a small helper program `@command{gpgme-config}` that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the `@option{--cflags}` option to `@command{gpgme-config}`. The following example shows how it can be used at the command line:

```
@example
gcc -c foo.c `gpgme-config --cflags`
@end example
```

Adding the output of `@samp{gpgme-config --cflags}` to the compiler command line will ensure that the compiler can find the `@acronym{GPGME}` header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the `@option{-L}` option). For this, the option `@option{--libs}` to `@command{gpgme-config}` can be used. For convenience, this option also outputs all other options that are required to link the program with `@acronym{GPGME}` (in particular, the `@samp{-lgpgme}` option). The example shows how to link `@file{foo.o}` with the `@acronym{GPGME}` library to a program `@command{foo}`.

```
@example
gcc -o foo foo.o `gpgme-config --libs`
@end example
```

Of course you can also combine both examples to a single command by specifying both options to `@command{gpgme-config}`:

```
@example
gcc -o foo foo.c `gpgme-config --cflags --libs`
@end example
```

If you need to detect the installed language bindings you can use list them using:

```
@example
gpgme-config --print-lang
@end example
```

or

test for the availability using

```
@example
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
@end example
```

```
@node Largefile Support (LFS)
@section Largefile Support (LFS)
@cindex largefile support
@cindex LFS
```

@acronym{GPGME} is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type @code{off\_t} is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type @code{off64\_t} is provided, which is 64 bit wide. Or you can replace the existing @code{off\_t} data type with its 64 bit wide counterpart. All occurrences of @code{off\_t} are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for @acronym{GPGME}, because some data types it uses in its interfaces are affected by that. For example, the @code{off\_t} data type is used in the @code{gpgme\_data\_seek} function, to match its @acronym{POSIX} counterpart. This affects the call-frame of the

function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms `@acronym{GPGME}` is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the `@file{gpgme.h}` header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms `@code{off_t}` is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (`@code{CreateFile}` et al.) for large files. Released binary versions of `@acronym{GPGME}` (`libgpgme-11.dll`) have always been build with a 32 bit `@code{off_t}`. To avoid an ABI break we stick to this convention for 32 bit Windows by using `@code{long}` there. `@acronym{GPGME}` versions for 64 bit Windows have never been released and thus we are able to use `@code{int64_t}` instead of `@code{off_t}` there. For easier migration the typedef `@code{gpgme_off_t}` has been defined. The reason we cannot use `@code{off_t}` directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for `@code{off_t}`. Some widely used toolkits make use of this hack and in turn `@acronym{GPGME}` would need to use it also. However, this would introduce an ABI break and existing software making use of `libgpgme` might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using `@code{off_t}` to use `@code{gpgme_off_t}` which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in `@acronym{GPGME}` is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro `@code{AC_SYS_LARGEFILE}`. If you do this, then you don't need to worry about anything else: It will just work. In this case you might also want to use `@code{AC_FUNC_FSEEKO}` to take advantage of some new interfaces, and `@code{AC_TYPE_OFF_T}` (just in case).

If you do not use Autoconf, you can define the preprocessor symbol `_FILE_OFFSET_BITS` to 64 *before* including any header files, for example by specifying the option `-D_FILE_OFFSET_BITS=64` on the compiler command line. You will also want to define the preprocessor symbol `LARGEFILE_SOURCE` to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the `GPGME` header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (`_LARGEFILE64_SOURCE`).

`@node Using Automake`  
`@section Using Automake`  
`@cindex automake`  
`@cindex autoconf`

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the `gpgme-config` script at all. `GPGME` provides an extension to Automake that does all the work for you.

`@c A simple macro for optional variables.`  
`@macro ovar{varname}`  
`@r{[]@var{\varname}@r{}}`  
`@end`  
`macro`  
`@defmac AM_PATH_GPGME (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})`  
`@defmacx AM_PATH_GPGME_PTH (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})`  
`@defmacx AM_PATH_GPGME_PTHREAD (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})`  
Check whether `GPGME` (at least version `@var{minimum-version}`, if given) exists on the host system. If it is found, execute `@var{action-if-found}`, otherwise do `@var{action-if-not-found}`, if given.

Additionally, the function defines `GPGME_CFLAGS` to the flags needed for compilation of the program to find the `gpgme.h` header file, and `GPGME_LIBS` to the linker flags needed to link the program to the `GPGME` library. If the used helper script does not match the target type you are building for a warning is printed and the string `libgcrypt` is appended to the variable `gpg_config_script_warn`.

`AM_PATH_GPGME_PTH` checks for the version of `GPGME` that can be used with GNU Pth, and defines `GPGME_PTH_CFLAGS` and `GPGME_PTH_LIBS`.

`AM_PATH_GPGME_PTHREAD` checks for the version of `GPGME` that can be used with the native pthread implementation, and defines `GPGME_PTHREAD_CFLAGS` and `GPGME_PTHREAD_LIBS`. Since version 1.8.0 this is no longer required to `GPGME_PTHREAD` as `GPGME` itself is thread safe.

This macro searches for `gpgme-config` along the PATH. If you are cross-compiling, it is useful to set the environment variable `SYSROOT` to the top directory of your target. The macro will then first look for the helper program in the `bin` directory below that top directory. An absolute directory name must be used for `SYSROOT`. Finally, if the configure command line option `--with-gpgme-prefix` is used, only its value is used for the top directory below which the helper script is expected.

`@end defmac`

You can use the defined Autoconf variables like this in your `Makefile.am`:

```
@example
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
@end example
```

`@node Using Libtool`  
`@section Using Libtool`  
`@cindex libtool`

The easiest way is to just use GNU Libtool. If you use libtool, and link to `libgpgme.la`, `libgpgme-pth.la` or `libgpgme-pthread.la` respectively, everything will be done automatically by Libtool.

`@node Library Version Check`  
`@section Library Version Check`  
`@cindex version check, of the library`

```
@deftypedefun {const char *} gpgme_check_version (@w{const char *}@var{required_version})
```



The function `gpgme_check_version` has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems, and for this reason alone it must be invoked early in your program, before you make use of the other functions in `GPGME`. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If `required_version` is `NULL`, the function returns a pointer to a statically allocated string containing the version number of the library.

If `required_version` is not `NULL`, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If `REQUIRED_VERSION` is not a valid version number, or if the version requirement is not met, the function returns `NULL`.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking `gpgme_new` or `gpgme_data_new`, so that a detailed error code can be returned (historically, `gpgme_check_version` does not return a detailed error code).

`@end deftypefun`

```
@deftypefun {int} gpgme_set_global_flag @
 (@w{const char *@var{name}}, @
 @w{const char *@var{value}})
```

`@since{1.4.0}`

On some systems it is not easy to set environment variables and thus hard to use `GPGME`'s internal trace facility for debugging.

This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses `@acronym{GPGME}` functions between a call to this function and after the return from the call to `@code{gpgme_check_version}`.

All currently supported features require that this function is called as early as possible

--- even before `@code{gpgme_check_version}`. The features are identified by the following values for `@var{name}`:

`@table @code`

`@item debug`

To enable debugging use the string ```debug"` for `@var{name}` and `@var{value}` identical to the value used with the environment variable `@code{GPGME_DEBUG}`.

`@item disable-gpgconf`

Using this feature with any `@var{value}` disables the detection of the `gpgconf` program and thus forces GPGME to fallback into the simple OpenPGP only mode. It may be used to force the use of GnuPG-1 on systems which have both GPG versions installed. Note that in general the use of `@code{gpgme_set_engine_info}` is a better way to select a specific engine version.

`@item gpgconf-name`

`@itemx gpg-name`

Set the name of the `gpgconf` respective `gpg` binary. The defaults are `@code{GNU/GnuPG/gpgconf}` and `@code{GNU/GnuPG/gpg}`. Under Unix the leading directory part is ignored. Under Windows the leading directory part is used as the default installation directory; the `@code{.exe}` suffix is added by GPGME. Use forward slashed even under Windows.

`@item require-gnupg`

Set the minimum version of the required GnuPG engine. If that version is not met, GPGME fails early instead of trying to use the existent version. The given version must be a string with major, minor, and micro number. Example: "2.1.0".

`@item w32-inst-dir`

On Windows GPGME needs to know its installation directory to find its spawn helper. This is in general no problem because a DLL has this information. Some applications however link statically to GPGME and thus GPGME can only figure out the installation directory of this application which may be wrong in certain cases. By supplying an installation directory as value to this flag, GPGME will assume that

that directory is the installation directory. This flag has no effect on non-Windows platforms.

@end table

This function returns @code{0} on success. In contrast to other functions the non-zero return value on failure does not convey any error

code. For setting ``debug" the only possible error cause is an out of memory condition; which would exhibit itself later anyway. Thus the return value may be ignored.

@end deftypefun

After initializing @acronym{GPGME}, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

@example

```
#include <locale.h>
```

```
#include <gpgme.h>
```

```
void
```

```
init_gpgme (void)
```

```
@ {
```

```
/* Initialize the locale environment. */
```

```
setlocale (LC_ALL, "");
```

```
gpgme_check_version (NULL);
```

```
gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
```

```
#ifdef LC_MESSAGES
```

```
gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
```

```
#endif
```

```
@ }
```

```
@end example
```

Note that you are highly recommended to initialize the locale settings like this. @acronym{GPGME} can not do this for you because it would not be thread safe. The conditional on LC\_MESSAGES is only necessary for portability to W32 systems.

@node Signal Handling

@section Signal Handling

@cindex signals

@cindex signal handling

The `gpgme` library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a `SIGPIPE` signal will be delivered to the application. The default action is to abort the program. To protect against this, `gpgme_check_version` sets the `SIGPIPE` signal action to `SIG_IGN`, which means that the signal will be ignored.

`gpgme` will only do that if the signal action for `SIGPIPE` is `SIG_DEF` at the time `gpgme_check_version` is called. If it is something different, `gpgme` will take no action.

This means that if your application does not install any signal handler for `SIGPIPE`, you don't need to take any precautions. If you do install a signal handler for `SIGPIPE`, you must be prepared to handle any `SIGPIPE` events that occur due to `gpgme` writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for `SIGPIPE`, you must make sure you do this either before `gpgme_check_version` is called or afterwards.

`Multi-Threading`  
`Multi-Threading`  
`thread-safeness`  
`multi-threading`

The `gpgme` library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

`bullet`  
`item`

The function `gpgme_check_version` must be called before any other function in the library, because it initializes the thread support subsystem in `gpgme`. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use `gpgme`. For this, it is sufficient to call `gpgme_check_version` before creating the other threads using `gpgme`.  
At least this is true for  
POSIX threads, as `pthread_create` is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term "Memory Synchronization". For other thread

packages other, more relaxed or more strict rules may apply.}).

@item

Any @code{gpgme\_data\_t} and @code{gpgme\_ctx\_t} object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

@item

Only one thread at any time is allowed to call @code{gpgme\_wait}. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

@item

The function @code{gpgme\_strerror} is not thread safe. You have to use @code{gpgme\_strerror\_r} instead.  
@end itemize

@node Protocols and Engines

@chapter Protocols and Engines

@cindex protocol

@cindex engine

@cindex crypto engine

@cindex backend

@cindex crypto backend

@acronym{GPGME} supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. @acronym{GPGME} uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by @acronym{GPGME}. Where an exchange of information between the application and the backend is necessary, @acronym{GPGME} provides the necessary callback function hooks and further interfaces.

@deftp {Data type} {enum gpgme\_protocol\_t}

@tindex gpgme\_protocol\_t

The @code{gpgme\_protocol\_t} type specifies the set of possible protocol values that are supported by @acronym{GPGME}. The following protocols are supported:

@table @code

@item GPGME\_PROTOCOL\_OpenPGP  
@itemx GPGME\_PROTOCOL\_OPENPGP

This specifies the OpenPGP protocol.

@item GPGME\_PROTOCOL\_CMS

This specifies the Cryptographic Message Syntax.

@item GPGME\_PROTOCOL\_GPGCONF

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME\_PROTOCOL\_ASSUAN

@since{1.2.0}

This specifies the raw Assuan protocol.

@item GPGME\_PROTOCOL\_G13

@since{1.3.0}

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME\_PROTOCOL\_UISERVER

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME\_PROTOCOL\_SPAWN

@since{1.5.0}

Special protocol for use with @code{gpgme\_op\_spawn}.

@item GPGME\_PROTOCOL\_UNKNOWN

Reserved for future extension. You may use this to indicate that the used protocol is not known to the application. Currently, @acronym{GPGME} does not accept this value in any operation, though, except for @code{gpgme\_get\_protocol\_name}.

@end

table

@end deftp

@deftypefun {const char \*} gpgme\_get\_protocol\_name (@w{gpgme\_protocol\_t} @var{protocol})

The function @code{gpgme\_get\_protocol\_name} returns a statically allocated string describing the protocol @var{protocol}, or @code{NULL} if the protocol number is not valid.

@end deftypefun

@menu

- \* Engine Version Check:: Verifying the engine version.
- \* Engine Information:: Obtaining more information about the engines.
- \* Engine Configuration:: Changing the engine configuration.

\* OpenPGP:: Support for the OpenPGP protocol.  
\* Cryptographic Message Syntax:: Support for the CMS.  
\* Assuan:: Support for the raw Assuan protocol.  
@end menu

@node Engine Version Check  
@section Engine Version Check  
@cindex version check, of the engines

@deftypefun @w{const char \*} gpgme\_get\_dirinfo (@w{cons char \*}@var{what})  
@since{1.5.0}

The function @code{gpgme\_get\_dirinfo} returns a statically allocated string with the value associated to @var{what}. The returned values are the defaults and won't change even after @code{gpgme\_set\_engine\_info} has been used to configure a different engine. @code{NULL} is returned if no value is available. Commonly supported values for @var{what} are:

@table @code  
@item homedir  
Return the default home directory.

@item sysconfdir  
Return the name of the system configuration directory

@item bindir  
Return the name of the directory with GnuPG program files.

@item libdir  
Return the name of the directory with GnuPG related library files.

@item libexecdir  
Return the name of the directory with GnuPG helper program files.

@item datadir  
Return the name of the directory with GnuPG shared data.

@item localedir  
Return the name of the directory with GnuPG locale data.

@item agent-socket  
Return the name of the socket to connect to the gpg-agent.

@item agent-ssh-socket  
Return the name of the socket to connect to the ssh-agent component of

gpg-agent.

@item

dirmngr-socket

Return the name of the socket to connect to the dirmngr.

@item uiserver-socket

Return the name of the socket to connect to the user interface server.

@item gpgconf-name

Return the file name of the engine configuration tool.

@item gpg-name

Return the file name of the OpenPGP engine.

@item gpgsm-name

Return the file name of the CMS engine.

@item g13-name

Return the name of the file container encryption engine.

@item gpg-wks-client-name

Return the name of the Web Key Service tool.

@end table

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_engine\_check\_version (@w{gpgme\_protocol\_t @var{protocol}})

The function @code{gpgme\_engine\_check\_version} verifies that the engine implementing the protocol @var{PROTOCOL} is installed in the expected path and meets the version requirement of @acronym{GPGME}.

This function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the engine is available and @code{GPG\_ERR\_INV\_ENGINE} if it is not.

@end deftypefun

@node Engine

Information

@section Engine Information

@cindex engine, information about

@deftp {Data type} {gpgme\_engine\_info\_t}

@tindex gpgme\_protocol\_t

The @code{gpgme\_engine\_info\_t} type specifies a pointer to a structure describing a crypto engine. The structure contains the following



elements:

@table @code

@item gpgme\_engine\_info\_t next

This is a pointer to the next engine info structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme\_protocol\_t protocol

This is the protocol for which the crypto engine is used. You can convert this to a string with @code{gpgme\_get\_protocol\_name} for printing.

@item const char \*file\_name

This is a string holding the file name of the executable of the crypto engine. Currently, it is never @code{NULL}, but using @code{NULL} is reserved for future use, so always check before you use it.

@item const char \*home\_dir

This is a string holding the directory name of the crypto engine's configuration directory. If it is @code{NULL}, then the default directory is used. See @code{gpgme\_get\_dirinfo} on how to get the default directory.

@item const char \*version

This is a string containing the version number of the crypto engine. It might be @code{NULL} if the version number can not be determined, for example because the executable doesn't exist or is invalid.

@item const char \*req\_version

This is a string containing the minimum required version number of the crypto engine for @acronym{GPGME} to work correctly. This is the version number that @code{gpgme\_engine\_check\_version} verifies against. Currently, it is never @code{NULL}, but using @code{NULL} is reserved for future use, so always check before you use it.

@end table

@end deftp

@deftypefun gpgme\_error\_t gpgme\_get\_engine\_info (@w{gpgme\_engine\_info\_t \*}@var{info})

The function @code{gpgme\_get\_engine\_info} returns a linked list of engine info structures in @var{info}. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code @code{GPG\_ERR\_NO\_ERROR} if

successful, and a system error if the memory could not be allocated.

```
@end deftypefun
```

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

```
@example
```

```
gpgme_ctx_t ctx;
```

```
gpgme_error_t err;
```

```
[...]
```

```
if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
```

```
@{
```

```
 gpgme_engine_info_t info;
```

```
 err = gpgme_get_engine_info (&info);
```

```
 if (!err)
```

```
 @{
```

```
 while (info && info->protocol != gpgme_get_protocol (ctx))
```

```
 info = info->next;
```

```
 if (!info)
```

```
 fprintf (stderr, "GPGME compiled without support for protocol %s",
```

```
 gpgme_get_protocol_name (info->protocol));
```

```
 else if (info->file_name && !info->version)
```

```
 fprintf (stderr, "Engine %s not installed properly",
```

```
 info->file_name);
```

```
 else if (info->file_name && info->version && info->req_version)
```

```
 fprintf (stderr, "Engine %s version %s installed, "
```

```
 "but at least version %s required", info->file_name,
```

```
 info->version, info->req_version);
```

```
 else
```

```
 fprintf (stderr, "Unknown problem with engine for protocol %s",
```

```
 gpgme_get_protocol_name (info->protocol));
```

```
 @}
```

```
@}
```

```
@end example
```

```
@node Engine Configuration
```

```
@section Engine Configuration
```

```
@cindex engine, configuration of
```

```
@cindex configuration of crypto backend
```

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

```
@deftypefun gpgme_error_t gpgme_set_engine_info (@w{gpgme_protocol_t @var{proto}}, @w{const char
*@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}
```

The function `gpgme_set_engine_info` changes the default configuration of the crypto engine implementing the protocol `@var{proto}`.

`@var{file_name}` is the file name of the executable program implementing this protocol, and `@var{home_dir}` is the directory name of the configuration directory for this crypto engine. If `@var{home_dir}` is `NULL`, the engine's default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

```
@end deftypefun
```

The functions `gpgme_ctx_get_engine_info` and `gpgme_ctx_set_engine_info` can be used to change the engine configuration per context. [@xref{Crypto Engine}](#).

```
@node OpenPGP
@section OpenPGP
@cindex OpenPGP
@cindex GnuPG
@cindex protocol, GnuPG
@cindex engine, GnuPG
```

OpenPGP is implemented by GnuPG, the [@acronym{GNU} Privacy Guard](#). This is the first protocol that was supported by [@acronym{GPGME}](#).

The OpenPGP protocol is specified by `GPGME_PROTOCOL_OpenPGP`.

```
@node
Cryptographic Message Syntax
@section Cryptographic Message Syntax
@cindex CMS
@cindex cryptographic message syntax
@cindex GpgSM
@cindex protocol, CMS
@cindex engine, GpgSM
@cindex S/MIME
@cindex protocol, S/MIME
```

@acronym{CMS} is implemented by GpgSM, the S/MIME implementation for GnuPG.

The @acronym{CMS} protocol is specified by @code{GPGME\_PROTOCOL\_CMS}.

@node Assuan

@section Assuan

@cindex ASSUAN

@cindex protocol, ASSUAN

@cindex engine, ASSUAN

Assuan is the RPC library used by the various @acronym{GnuPG} components. The Assuan protocol allows one to talk to arbitrary Assuan servers using @acronym{GPGME}. @xref{Using the Assuan protocol}.

The ASSUAN protocol is specified by @code{GPGME\_PROTOCOL\_ASSUAN}.

@node Algorithms

@chapter Algorithms

@cindex algorithms

The crypto backends support a variety of algorithms used in public key cryptography. @footnote{Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.} The following sections list the identifiers used to denote such an algorithm.

@menu

\* Public Key Algorithms:: A list of all public key algorithms.

\* Hash Algorithms:: A list of all hash algorithms.

@end menu

@node Public Key Algorithms

@section Public Key Algorithms

@cindex algorithms, public key

@cindex public key algorithms

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

@deftp {Data type} {enum gpgme\_pubkey\_algo\_t}

@tindex gpgme\_pubkey\_algo\_t

The `{gpgme_pubkey_algo_t}` type specifies the set of all public key algorithms that are supported by `{GPGME}`. Possible values are:

`{table}` `{code}`

`{item}` `GPGME_PK_RSA`

This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

`{item}` `GPGME_PK_RSA_E`

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

`{item}` `GPGME_PK_RSA_S`

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

`{item}` `GPGME_PK_DSA`

This value indicates DSA, the Digital Signature Algorithm.

`{item}` `GPGME_PK_ELG`

This value indicates ElGamal.

`{item}` `GPGME_PK_ELG_E`

This value also indicates ElGamal and is used specifically in GnuPG.

`{item}` `GPGME_PK_ECC`

`{since}`{1.5.0}

This value is a generic indicator for elliptic curve algorithms.

`{item}` `GPGME_PK_ECDSA`

`{since}`{1.3.0}

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

`{item}` `GPGME_PK_ECDH`

`{since}`{1.3.0}

This value indicates ECDH, the Elliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

`{item}` `GPGME_PK_EDDSA`

`{since}`{1.7.0}

This value indicates the EdDSA algorithm.

@end table

@end deftp

@deftypefun {const char \*} gpgme\_pubkey\_algo\_name (@w{gpgme\_pubkey\_algo\_t @var{algo}})

The function @code{gpgme\_pubkey\_algo\_name} returns a pointer to a statically allocated string containing a description of the public key algorithm

@var{algo}. This string can be used to output the name of the public key algorithm to the user.

If @var{algo} is not a valid public key algorithm, @code{NULL} is returned.

@end deftypefun

@deftypefun {char \*} gpgme\_pubkey\_algo\_string (@w{gpgme\_subkey\_t @var{key}})

@since{1.7.0}

The function @code{gpgme\_pubkey\_algo\_string} is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. ``rsa2048" or ``ed25519"). The caller must free the result using @code{gpgme\_free}. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets @code{ERRNO}.

@end deftypefun

@node Hash Algorithms

@section Hash Algorithms

@cindex algorithms, hash

@cindex algorithms, message digest

@cindex hash algorithms

@cindex message digest algorithms

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

@defntp {Data type} {enum gpgme\_hash\_algo\_t}

@tindex gpgme\_hash\_algo\_t

The

@code{gpgme\_hash\_algo\_t} type specifies the set of all hash algorithms that are supported by @acronym{GPGME}. Possible values are:

@table @code

@item GPGME\_MD\_MD5

@item GPGME\_MD\_SHA1

@item GPGME\_MD\_RMD160

@item GPGME\_MD\_MD2

@item GPGME\_MD\_TIGER

@item GPGME\_MD\_HAVAL

```
@item GPGME_MD_SHA256
@item GPGME_MD_SHA384
@item GPGME_MD_SHA512
@item GPGME_MD_SHA224
@since{1.5.0}
```

```
@item GPGME_MD_MD4
@item GPGME_MD_CRC32
@item GPGME_MD_CRC32_RFC1510
@item GPGME_MD_CRC24_RFC2440
@end table
@end deftp
```

```
@deftypefun {const char *} gpgme_hash_algo_name (@w{gpgme_hash_algo_t @var{algo}})
```

The function `gpgme_hash_algo_name` returns a pointer to a statically allocated string containing a description of the hash algorithm `@var{algo}`. This string can be used to output the name of the hash algorithm to the user.

If `@var{algo}` is not a valid hash algorithm, `NULL` is returned.

```
@end deftypefun
```

```
@node Error Handling
@chapter Error Handling
@cindex error handling
```

Many functions in `@acronym{GPGME}` can return an error if they fail.

For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

`@acronym{GPGME}` uses the `libgpg-error` library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no

information is lost. As a consequence, `@acronym{GPGME}` does not use its own identifiers for error codes, but uses those provided by `@code{libgpg-error}`. They usually start with `@code{GPG_ERR_}`.

However, `@acronym{GPGME}` does provide aliases for the functions defined in `libgpg-error`, which might be preferred for name space consistency.

`@menu`

- \* Error Values::           The error value and what it means.
- \* Error Sources::         A list of important error sources.
- \* Error Codes::           A list of important error codes.
- \* Error Strings::         How to get a descriptive string from a value.

`@end menu`

`@node Error Values`

`@section Error Values`

`@cindex error values`

`@cindex error codes`

`@cindex error sources`

`@deftp {Data type} {gpgme_err_code_t}`

The `@code{gpgme_err_code_t}` type is an alias for the `@code{libgpg-error}` type `@code{gpg_err_code_t}`. The error code indicates the type of an error, or the reason why an operation failed.

A list of important error codes can be found in the next section.

`@end deftp`

`@deftp {Data type} {gpgme_err_source_t}`

The `@code{gpgme_err_source_t}` type is an alias for the `@code{libgpg-error}` type `@code{gpg_err_source_t}`. The error source has not a precisely defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.

`@end deftp`

`@deftp {Data type} {gpgme_error_t}`

The `@code{gpgme_error_t}` type is an alias for the `@code{libgpg-error}` type `@code{gpg_error_t}`. An error value like this has always two components, an error code and an error source. Both together form the error value.



Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used. However, it is guaranteed that only 0 is used to indicate success (`GPG_ERR_NO_ERROR`), and that in this case all other parts of the error value are set to 0, too.

Note that in `GPGME`, the error source is used purely for diagnostical purposes. Only the error code should be checked to test for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

`@end deftp`

```
@deftypefun {static inline gpgme_err_code_t} gpgme_err_code (@w{gpgme_error_t @var{err}})
```

The static inline function `gpgme_err_code` returns the `gpgme_err_code_t` component of the error value `@var{err}`. This function must be used to extract the error code from an error value in order to compare it with the `GPG_ERR_*` error code macros.

`@end deftypefun`

```
@deftypefun {static inline gpgme_err_source_t}
gpgme_err_source (@w{gpgme_error_t @var{err}})
```

The static inline function `gpgme_err_source` returns the `gpgme_err_source_t` component of the error value `@var{err}`. This function must be used to extract the error source from an error value in order to compare it with the `GPG_ERR_SOURCE_*` error source macros.

`@end deftypefun`

```
@deftypefun {static inline gpgme_error_t} gpgme_err_make (@w{gpgme_err_source_t @var{source}},
@w{gpgme_err_code_t @var{code}})
```

The static inline function `gpgme_err_make` returns the error value consisting of the error source `@var{source}` and the error code `@var{code}`.

This function can be used in callback functions to construct an error value to return it to the library.

`@end deftypefun`

```
@deftypefun {static inline gpgme_error_t} gpgme_error (@w{gpgme_err_code_t @var{code}})
```

The static inline function `gpgme_error` returns the error value consisting of the default error source and the error code `@var{code}`.

For `GPGME`

applications, the default error source is

`GPG_ERR_SOURCE_USER_1`. You can define

`GPGME_ERR_SOURCE_DEFAULT` before including `gpgme.h` to

change this default.

This function can be used in callback functions to construct an error value to return it to the library.

```
@end deftypefun
```

The `libgpg-error` library provides error codes for all system error numbers it knows about. If `err` is an unknown error number, the error code `GPG_ERR_UNKNOWN_ERRNO` is used. The following functions can be used to construct error values from system error numbers.

```
@deftypefun {gpgme_error_t} gpgme_err_make_from_errno (@w{gpgme_err_source_t @var{source}}, @w{int @var{err}})
```

The function `gpgme_err_make_from_errno` is like `gpgme_err_make`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

```
@end deftypefun
```

```
@deftypefun {gpgme_error_t} gpgme_error_from_errno (@w{int @var{err}})
```

The function `gpgme_error_from_errno` is like `gpgme_error`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

```
@end deftypefun
```

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

```
@deftypefun {gpgme_err_code_t} gpgme_err_code_from_errno (@w{int @var{err}})
```

The function `gpgme_err_code_from_errno` returns the error code for the system error `err`. If `err` is not a known system error, the function returns `GPG_ERR_UNKNOWN_ERRNO`.

```
@end deftypefun
```

```
@deftypefun {int} gpgme_err_code_to_errno (@w{gpgme_err_code_t @var{err}})
```

The function `gpgme_err_code_to_errno` returns the system error for the error code `err`. If `err` is not an error code representing a system error, or if this system error is not defined on this system, the function returns `0`.

```
@end deftypefun
```

```
@node Error Sources
```

```
@section
```

Error Sources

```
@cindex error codes, list of
```

The library `libpgp-error` defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is `{0}`, the whole error value will be `{0}`. In this case the error source part is of course `GPG_ERR_SOURCE_UNKNOWN`.

The list of error sources that might occur in applications using `GPGME` is:

`@table @code`

`@item GPG_ERR_SOURCE_UNKNOWN`

The error source is not known. The value of this error source is `{0}`.

`@item GPG_ERR_SOURCE_GPGME`

The error source is `GPGME` itself. This is the default for errors that occur in the `GPGME` library.

`@item GPG_ERR_SOURCE_GPG`

The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

`@item GPG_ERR_SOURCE_GPGSM`

The error source is GPGSM, which is the crypto engine used for the CMS protocol.

`@item GPG_ERR_SOURCE_GCRYPT`

The error source is `libgcrypt`, which is used by crypto engines to perform cryptographic operations.

`@item GPG_ERR_SOURCE_GPGAGENT`

The error source is `gpg-agent`, which is used by crypto engines to perform operations with the secret key.

`@item GPG_ERR_SOURCE_PINENTRY`

The error source is `pinentry`, which is used by `gpg-agent` to query the passphrase to unlock a secret key.

`@item GPG_ERR_SOURCE_SCD`

The error source is the SmartCard Daemon, which is used by `gpg-agent` to delegate operations with the secret key to a SmartCard.

@item GPG\_ERR\_SOURCE\_KEYBOX

The error source is @code{libkbx}, a library used by the crypto engines to manage local keyrings.

@item GPG\_ERR\_SOURCE\_USER\_1

@item GPG\_ERR\_SOURCE\_USER\_2

@item GPG\_ERR\_SOURCE\_USER\_3

@item GPG\_ERR\_SOURCE\_USER\_4

These error sources are not used by any GnuPG component and can be used by other software. For example, applications

using

@acronym{GPGME} can use them to mark error values coming from callback handlers. Thus @code{GPG\_ERR\_SOURCE\_USER\_1} is the default for errors created with @code{gpgme\_error} and @code{gpgme\_error\_from\_erno}, unless you define @code{GPGME\_ERR\_SOURCE\_DEFAULT} before including @file{gpgme.h}.

@end table

@node Error Codes

@section Error Codes

@cindex error codes, list of

The library @code{libpgp-error} defines many error values. Most of them are not used by @code{GPGME} directly, but might be returned by @acronym{GPGME} because it received them from the crypto engine. The below list only includes such error codes that have a specific meaning in @code{GPGME}, or which are so common that you should know about them.

@table @code

@item GPG\_ERR\_EOF

This value indicates the end of a list, buffer or file.

@item GPG\_ERR\_NO\_ERROR

This value indicates success. The value of this error code is @code{0}. Also, it is guaranteed that an error value made from the error code @code{0}

will be @code{0} itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

@item GPG\_ERR\_GENERAL

This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

@item GPG\_ERR\_ENOMEM

This value means that an out-of-memory condition occurred.

@item GPG\_ERR\_E...

System errors are mapped to GPG\_ERR\_FOO where FOO is the symbol for the system error.

@item GPG\_ERR\_INV\_VALUE

This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty

@code{gpgme\_data\_t} object was expected, but one containing data was provided, this error value is returned.

@item GPG\_ERR\_UNUSABLE\_PUBKEY

This value means that some recipients for a message were invalid.

@item GPG\_ERR\_UNUSABLE\_SECKEY

This

value means that some signers were invalid.

@item GPG\_ERR\_NO\_DATA

This value means that a @code{gpgme\_data\_t} object which was expected to have content was found empty.

@item GPG\_ERR\_CONFLICT

This value means that a conflict of some sort occurred.

@item GPG\_ERR\_NOT\_IMPLEMENTED

This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

@item GPG\_ERR\_DECRYPT\_FAILED

This value indicates that a decryption operation was unsuccessful.

@item GPG\_ERR\_BAD\_PASSPHRASE

This value means that the user did not provide a correct passphrase when requested.

@item GPG\_ERR\_CANCELED

This value means that the operation was canceled.

@item GPG\_ERR\_INV\_ENGINE

This value means that the engine that implements the desired protocol is currently not available. This can either be because

the sources

were configured to exclude support for this engine, or because the

engine is not installed properly.

@item GPG\_ERR\_AMBIGUOUS\_NAME

This value indicates that a user ID or other specifier did not specify a unique key.

@item GPG\_ERR\_WRONG\_KEY\_USAGE

This value indicates that a key is not used appropriately.

@item GPG\_ERR\_CERT\_REVOKED

This value indicates that a key signature was revoked.

@item GPG\_ERR\_CERT\_EXPIRED

This value indicates that a key signature expired.

@item GPG\_ERR\_NO\_CRL\_KNOWN

This value indicates that no certificate revocation list is known for the certificate.

@item GPG\_ERR\_NO\_POLICY\_MATCH

This value indicates that a policy issue occurred.

@item GPG\_ERR\_NO\_SECKEY

This value indicates that no secret key for the user ID is available.

@item GPG\_ERR\_MISSING\_CERT

This value indicates that a key could not be imported because the issuer certificate is missing.

@item GPG\_ERR\_BAD\_CERT\_CHAIN

This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

@item GPG\_ERR\_UNSUPPORTED\_ALGORITHM

This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

@item GPG\_ERR\_BAD\_SIGNATURE

This value means a verification failed because the signature is bad.

@item GPG\_ERR\_NO\_PUBKEY

This value means a verification failed because the public key is not available.

@item GPG\_ERR\_USER\_1

@item GPG\_ERR\_USER\_2

@item ...

@item GPG\_ERR\_USER\_16

These error codes are not used by any GnuPG component and can be freely used by other software. Applications using @acronym{GPGME} might use them to mark specific errors returned by callback handlers if no suitable error codes (including the system errors) for these errors exist already.

@end table

@node Error Strings

@section Error Strings

@cindex error values, printing of

@cindex error codes, printing of

@cindex error sources, printing of

@cindex error strings

@deftypefun {const char \*} gpgme\_strerror

(@w{gpgme\_error\_t @var{err}})

The function @code{gpgme\_strerror} returns a pointer to a statically allocated string containing a description of the error code contained in the error value @var{err}. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use @code{gpgme\_strerror\_r} in multi-threaded programs.

@end deftypefun

@deftypefun {int} gpgme\_strerror\_r (@w{gpgme\_error\_t @var{err}}, @w{char \*@var{buf}}, @w{size\_t @var{buflen}})

The function @code{gpgme\_strerror\_r} returns the error string for @var{err} in the user-supplied buffer @var{buf} of size @var{buflen}.

This function is, in contrast to @code{gpgme\_strerror}, thread-safe if a thread-safe @code{strerror\_r} function is provided by the system.

If the function succeeds, 0 is returned and @var{buf} contains the string describing the error. If the buffer was not large enough, ERANGE is returned and @var{buf} contains as much of the beginning of the error string as fits into the buffer.

@end deftypefun

@deftypefun {const char \*} gpgme\_strsource (@w{gpgme\_error\_t @var{err}})

The function @code{gpgme\_strsource} returns a pointer to a statically allocated string containing a description of the error source contained in the error value @var{err}. This string can be used to output a diagnostic message to the user.

@end deftypefun

The following example illustrates the use of `gpgme_strerror`:

```
@example
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
@{
 fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
 argv[0], gpgme_strerror (err), gpgme_strerror (err));
 exit (1);
@}
@end example
```

```
@node Exchanging Data
@chapter Exchanging Data
@cindex data, exchanging
```

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by `GPGME`.

The

user provides and receives the data via `gpgme_data_t` objects, regardless of the communication protocol between `GPGME` and the crypto engine in use.

```
@deftp {Data type} {gpgme_data_t}
The gpgme_data_t type is a handle for a container for generic data, which is used by GPGME to exchange data with the user.
@end deftp
```

`gpgme_data_t` objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all `GPGME` data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

```
@deftp {Data type} {gpgme_off_t}
@since{1.4.1}
```

On POSIX platforms the `gpgme_off_t` type is an alias for `off_t`; it may be used interchangeably. On Windows platforms `gpgme_off_t` is defined as



a long (i.e. 32 bit) for 32 bit  
Windows and as a 64 bit signed integer for 64 bit Windows.

@end deftp

@deftp {Data type} {gpgme\_ssize\_t}

The @code{gpgme\_ssize\_t} type is an alias for @code{ssize\_t}. It has only been introduced to overcome portability problems pertaining to the declaration of @code{ssize\_t} by different toolchains.

@end deftp

@menu

- \* Creating Data Buffers::      Creating new data buffers.
- \* Destroying Data Buffers::    Releasing data buffers.
- \* Manipulating Data Buffers::  Operations on data buffers.

@end menu

@node Creating Data Buffers

@section Creating Data Buffers

@cindex data buffer, creation

Data objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

@menu

- \* Memory Based Data Buffers::  Creating memory based data buffers.
- \* File Based Data Buffers::    Creating file based data buffers.
- \* Callback Based Data Buffers:: Creating callback based data buffers.

@end menu

@node

Memory Based Data Buffers

@subsection Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source and to its destination, which can often be avoided by using one of the other data object

@deftypefun gpgme\_error\_t gpgme\_data\_new (@w{gpgme\_data\_t \*}@var{dh})

The function @code{gpgme\_data\_new} creates a new @code{gpgme\_data\_t} object and returns a handle for it in @var{dh}. The data object is memory based and initially empty.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `dh` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_mem (@w{gpgme_data_t *@var{dh}}, @w{const char
*@var{buffer}}, @w{size_t @var{size}},
@w{int @var{copy}})
```

The function `gpgme_data_new_from_mem` creates a new `gpgme_data_t` object and fills it with `size` bytes starting from `buffer`.

If `copy` is not zero, a private copy of the data is made. If `copy` is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains valid for the whole life span of the data object.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `dh` or `buffer` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_file (@w{gpgme_data_t *@var{dh}}, @w{const char
*@var{filename}}, @w{int @var{copy}})
```

The function `gpgme_data_new_from_file` creates a new `gpgme_data_t` object and fills it with the content of the file `filename`.

If `copy` is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for `copy` might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `dh` or `filename` is not a valid pointer, `GPG_ERR_NOT_IMPLEMENTED` if `code` is zero, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_filepart (@w{gpgme_data_t *@var{dh}}, @w{const char
*@var{filename}}, @w{FILE *@var{fp}}, @w{off_t @var{offset}}, @w{size_t @var{length}})
```

The function `gpgme_data_new_from_filepart` creates a new

@code{gpgme\_data\_t} object and fills it with a part of the file specified by @var{filename} or @var{fp}.

Exactly one of @var{filename} and @var{fp} must be non-zero, the other must be zero. The argument that is not zero specifies the file from which @var{length} bytes are read into the data object, starting from @var{offset}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the data object was successfully created, @code{GPG\_ERR\_INV\_VALUE} if @var{dh} and exactly one of @var{filename} and @var{fp} is not a valid pointer, and @code{GPG\_ERR\_ENOMEM} if not enough memory is available.  
@end deftypefun

@node File Based Data Buffers

@subsection File Based Data Buffers

File based data objects operate directly on file descriptors or streams. Only a small amount of data is stored in core at any time, so the size of the data objects is not limited by @acronym{GPGME}.

@deftypefun gpgme\_error\_t gpgme\_data\_new\_from\_fd (@w{gpgme\_data\_t \*}@var{dh}), @w{int @var{fd}})

The function @code{gpgme\_data\_new\_from\_fd} creates a new @code{gpgme\_data\_t} object and uses the file descriptor @var{fd} to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the data object was successfully created, and @code{GPG\_ERR\_ENOMEM} if not enough memory is available.  
@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_data\_new\_from\_stream (@w{gpgme\_data\_t \*}@var{dh}), @w{FILE \*}@var{stream})

The function @code{gpgme\_data\_new\_from\_stream} creates a new @code{gpgme\_data\_t} object and uses the I/O stream @var{stream} to read from (if used as an input data object) and write to (if used as an

output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_estream (@w{gpgme_data_t *}@var{dh}),
@w{gpgme_stream_t @var{stream}})
```

The function `gpgme_data_new_from_estream` creates a new `gpgme_data_t` object and uses the `gpgme_stream_t` `@var{stream}` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

@node Callback Based Data Buffers

@subsection Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your application, you can implement the functions a data object provides yourself and create a data object from these callback functions.

```
@defpt {Data type} {ssize_t (*gpgme_data_read_cb_t) (@w{void *}@var{handle}), @w{void @var{*buffer}},
@w{size_t @var{size}})}
```

@tindex gpgme\_data\_read\_cb\_t

The `gpgme_data_read_cb_t` type is the type of functions which `GPGME` calls if it wants to read data from a user-implemented data object. The function should read up to `size` bytes from the current read position into the space starting at `buffer`. The `handle` is provided by the user at data object creation time.

Note that `GPGME` assumes that the read blocks until data is available. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, `errno` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {ssize_t (*gpgme_data_write_cb_t) (@w{void *@var{handle}}, @w{const void @var{*buffer}}, @w{size_t @var{size}})}
```

```
@tindex gpgme_data_write_cb_t
```

The `gpgme_data_write_cb_t` type is the type of functions which `GPGME` calls if it wants to write data to a user-implemented data object. The function should write up to `size` bytes to the current write position from the space starting at `buffer`. The `handle` is provided by the user at data object creation time.

Note that `GPGME` assumes that the write blocks until data is available.

Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, `errno` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {off_t (*gpgme_data_seek_cb_t) (@w{void *@var{handle}}, @w{off_t @var{offset}}, @w{int @var{whence}})}
```

```
@tindex gpgme_data_seek_cb_t
```

The `gpgme_data_seek_cb_t` type is the type of functions which `GPGME` calls if it wants to change the current read/write position in a user-implemented data object, just like the `lseek` function.

The function should return the new read/write position, and -1 on error. If an error occurs, `errno` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {void (*gpgme_data_release_cb_t) (@w{void *@var{handle}})}
@tindex gpgme_data_release_cb_t
The @code{gpgme_data_release_cb_t} type is the type of functions which
@acronym{GPGME}
calls if it wants to destroy a user-implemented data
object. The @var{handle} is provided by the user at data object
creation time.
@end deftp
```

```
@deftp {Data type} {struct gpgme_data_cbs}
This structure is used to store the data callback interface functions
described above. It has the following members:
```

```
@table @code
@item gpgme_data_read_cb_t read
This is the function called by @acronym{GPGME} to read data from the
data object. It is only required for input data object.
```

```
@item gpgme_data_write_cb_t write
This is the function called by @acronym{GPGME} to write data to the
data object. It is only required for output data object.
```

```
@item gpgme_data_seek_cb_t seek
This is the function called by @acronym{GPGME} to change the current
read/write pointer in the data object (if available). It is optional.
```

```
@item gpgme_data_release_cb_t release
This is the function called by @acronym{GPGME} to release a data
object. It is optional.
@end table
@end deftp
```

```
@deftypefun gpgme_error_t gpgme_data_new_from_cbs
(@w{gpgme_data_t *@var{dh}}, @w{gpgme_data_cbs_t @var{cbs}}, @w{void *@var{handle}})
The function @code{gpgme_data_new_from_cbs} creates a new
@code{gpgme_data_t} object and uses the user-provided callback functions
to operate on the data object.
```

The handle @var{handle} is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the data object was successfully created, and @code{GPG\_ERR\_ENOMEM} if not enough memory is available.

```
@end deftypefun
```

```
@node Destroying Data Buffers
```

@section Destroying Data Buffers

@cindex data buffer, destruction

```
@deftypefun void gpgme_data_release (@w{gpgme_data_t @var{dh}})
```

The function @code{gpgme\_data\_release} destroys the data object with the handle @var{dh}. It releases all associated resources that were not provided by the user in the first place.

```
@end deftypefun
```

```
@deftypefun {char *} gpgme_data_release_and_get_mem (@w{gpgme_data_t @var{dh}}, @w{size_t *@var{length}})
```

The function @code{gpgme\_data\_release\_and\_get\_mem} is like @code{gpgme\_data\_release}, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with @code{gpgme\_free}. In case the user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return @code{NULL}. In any case, the data object @var{dh} is destroyed.

```
@end deftypefun
```

```
@deftypefun void gpgme_free (@w{void *@var{buffer}})
```

```
@since{1.1.1}
```

The function @code{gpgme\_free} releases the memory returned by @code{gpgme\_data\_release\_and\_get\_mem} and @code{gpgme\_pubkey\_algo\_string}. It should be used instead of the system libraries @code{free} function in case different allocators are used by a program. This is often the case if gpgme is used under Windows as a DLL.

```
@end deftypefun
```

@node

Manipulating Data Buffers

@section Manipulating Data Buffers

@cindex data buffer, manipulation

Data buffers contain data and meta-data. The following operations can be used to manipulate both.

@menu

\* Data Buffer I/O Operations:: I/O operations on data buffers.

\* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.

\* Data Buffer Convenience:: Convenience function for data buffers.

@end menu

@node Data Buffer I/O Operations

@subsection Data Buffer I/O Operations

@cindex data buffer, I/O operations

@cindex data buffer, read

@cindex data buffer, write

@cindex data buffer, seek

@deftypefun ssize\_t gpgme\_data\_read (@w{gpgme\_data\_t @var{dh}}, @w{void \*@var{buffer}}, @w{size\_t @var{length}})

The function @code{gpgme\_data\_read} reads up to @var{length} bytes from the data object with the handle @var{dh} into the space starting at @var{buffer}.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets @var{errno}.

@end deftypefun

@deftypefun ssize\_t gpgme\_data\_write (@w{gpgme\_data\_t @var{dh}}, @w{const void \*@var{buffer}}, @w{size\_t @var{size}})

The function @code{gpgme\_data\_write} writes up to @var{size} bytes starting from @var{buffer} into the data object with the handle @var{dh} at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, @var{errno} is set.

@end deftypefun

@deftypefun off\_t gpgme\_data\_seek (@w{gpgme\_data\_t @var{dh}}, @w{off\_t @var{offset}}, @w{int @var{whence}})

The function @code{gpgme\_data\_seek} changes the current read/write position.

The @var{whence} argument specifies how the @var{offset} should be interpreted. It must be one of the following symbolic constants:

@table @code

@item SEEK\_SET

Specifies that @var{offset} is a count of characters from the beginning of the data object.



@item SEEK\_CUR

Specifies that @var{offset}

is a count of characters from the current file position. This count may be positive or negative.

@item SEEK\_END

Specifies that @var{offset} is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

@end table

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with @code{SEEK\_CUR} to read the current read/write position.

If the function fails, -1 is returned and @var{errno} is set.

@end deftypefun

@node Data Buffer Meta-Data

@subsection Data Buffer Meta-Data

@cindex data buffer, meta-data

@cindex data buffer, file name

@cindex data buffer, encoding

@deftypefun {char \*} gpgme\_data\_get\_file\_name

(@w{gpgme\_data\_t} @var{dh})

@since{1.1.0}

The function @code{gpgme\_data\_get\_file\_name} returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned.

Otherwise, @code{NULL} will be returned.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_data\_set\_file\_name (@w{gpgme\_data\_t} @var{dh}, @w{const char} \*@var{file\_name})

@since{1.1.0}

The function `gpgme_data_set_file_name` sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code `GPG_ERR_INV_VALUE` if `dh` is not a valid pointer and `GPG_ERR_ENOMEM` if not enough memory is available.

`@end`  
`deftypefun`

`@deftp {Data type} {enum gpgme_data_encoding_t}`  
`@tindex gpgme_data_encoding_t`

The `gpgme_data_encoding_t` type specifies the encoding of a `gpgme_data_t` object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

`@table @code`

`@item GPGME_DATA_ENCODING_NONE`

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

`@item GPGME_DATA_ENCODING_BINARY`

This specifies that the data is encoding in binary form; i.e. there is no special encoding.

`@item GPGME_DATA_ENCODING_BASE64`

This specifies that the data is encoded using the Base-64 encoding scheme as used by `MIME` and other protocols.

`@item`

`GPGME_DATA_ENCODING_ARMOR`

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

`@item GPGME_DATA_ENCODING_MIME`

`@since{1.7.0}`

This specifies that the data is encoded as a MIME part.

`@item GPGME_DATA_ENCODING_URL`

`@since{1.2.0}`

The data is a list of linefeed delimited URLs. This is only useful with `gpgme_op_import`.

`GPGME_DATA_ENCODING_URL0`  
@since{1.2.0}

The data is a list of binary zero delimited URLs. This is only useful with `gpgme_op_import`.

`GPGME_DATA_ENCODING_URLESC`  
@since{1.2.0}

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is not yet implemented.

@end table  
@end deftp

`gpgme_data_encoding_t gpgme_data_get_encoding (@w{gpgme_data_t} @var{dh})`  
The function `gpgme_data_get_encoding` returns the encoding of the data object with the handle `@var{dh}`. If `@var{dh}` is not a valid pointer (e.g. `NULL`) `GPGME_DATA_ENCODING_NONE` is returned.  
@end deftypefun

`gpgme_error_t gpgme_data_set_encoding (@w{gpgme_data_t} @var{dh}, gpgme_data_encoding_t @var{enc})`  
The function `gpgme_data_set_encoding` changes the encoding of the data object with the handle `@var{dh}` to `@var{enc}`.  
@end deftypefun

`{gpgme_error_t} gpgme_data_set_flag (@w{gpgme_data_t} @var{dh}, @w{const char *} @var{name}, @w{const char *} @var{value})`

@since{1.7.0}

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for `@var{name}`:

@table @code  
@item size-hint

The value is a decimal number with the length `gpgme` shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the application knows the total size of

the data. If this is set the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

@end table

This function returns @code{0} on success.

@end deftypefun

@node Data Buffer Convenience

@subsection Data Buffer Convenience Functions

@cindex data buffer, convenience

@cindex type of data

@cindex identify

@deftp {Data type} {enum gpgme\_data\_type\_t}

@tindex gpgme\_data\_type\_t

@since{1.4.3}

The @code{gpgme\_data\_type\_t} type is used to return the detected type of the content of a data buffer.

@end deftp

@table @code

@item GPGME\_DATA\_TYPE\_INVALID

This is returned by @code{gpgme\_data\_identify} if it was not possible to identify the data. Reasons for this might be a non-seekable stream or a memory problem. The value is 0.

@item GPGME\_DATA\_TYPE\_UNKNOWN

The type of the data is not known.

@item GPGME\_DATA\_TYPE\_PGP\_SIGNED

The data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.

@item GPGME\_DATA\_TYPE\_PGP\_ENCRYPTED

@since{1.7.0}

The data is an OpenPGP encrypted message.

@item GPGME\_DATA\_TYPE\_PGP\_SIGNATURE

@since{1.7.0}

The

data is an OpenPGP detached signature.

@item GPGME\_DATA\_TYPE\_PGP\_OTHER

This is a generic OpenPGP message. In most cases this will be encrypted data.

@item GPGME\_DATA\_TYPE\_PGP\_KEY

This is an OpenPGP key (private or public).

```
@item GPGME_DATA_TYPE_CMS_SIGNED
```

This is a CMS signed message.

```
@item GPGME_DATA_TYPE_CMS_ENCRYPTED
```

This is a CMS encrypted (enveloped data) message.

```
@item GPGME_DATA_TYPE_CMS_OTHER
```

This is used for other CMS message types.

```
@item GPGME_DATA_TYPE_X509_CERT
```

The data is a X.509 certificate

```
@item GPGME_DATA_TYPE_PKCS12
```

The data is a PKCS#12 message. This is commonly used to exchange private keys for X.509.

```
@end table
```

```
@deftypefun gpgme_data_type_t gpgme_data_identify (@w{gpgme_data_t @var{dh}})
```

```
@since{1.4.3}
```

The function `gpgme_data_identify` returns the type of the data with the handle `dh`. If it is not possible to perform the identification, the function returns zero

(`GPGME_DATA_TYPE_INVALID`). Note that depending on how the data

object has been created the identification may not be possible or the data object may change its internal state (file pointer moved). For file or memory based data object, the state should not change.

```
@end deftypefun
```

```
@c
```

```
@c Chapter Contexts
```

```
@c
```

```
@node Contexts
```

```
@chapter Contexts
```

```
@cindex context
```

All cryptographic operations in `GPGME` are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

```
@deftp {Data type} {gpgme_ctx_t}
```

The `gpgme_ctx_t` type is a handle for a `GPGME` context, which is used to hold the configuration, status and result of cryptographic operations.

```
@end deftp
```

```
@menu
```

- \* Creating Contexts::           Creating new @acronym{GPGME} contexts.
  - \* Destroying Contexts::       Releasing @acronym{GPGME} contexts.
  - \* Result Management::         Managing the  
result of crypto operations.
  - \* Context Attributes::         Setting properties of a context.
  - \* Key Management::            Managing keys with @acronym{GPGME}.
  - \* Crypto Operations::         Using a context for cryptography.
  - \* Miscellaneous::            Miscellaneous operations
  - \* Run Control::               Controlling how operations are run.
- @end menu

@node Creating Contexts  
@section Creating Contexts  
@cindex context, creation

@deftypefun gpgme\_error\_t gpgme\_new (@w{gpgme\_ctx\_t \*}@var{ctx})  
The function @code{gpgme\_new} creates a new @code{gpgme\_ctx\_t} object and returns a handle for it in @var{ctx}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the context was successfully created, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} is not a valid pointer, and @code{GPG\_ERR\_ENOMEM} if not enough memory is available. Also, it returns @code{GPG\_ERR\_NOT\_OPERATIONAL} if @code{gpgme\_check\_version} was not called to initialize GPGME, and @code{GPG\_ERR\_SELFTEST\_FAILED} if a selftest failed. Currently, the only selftest is for Windows MingW32 targets to see if @code{-mms-bitfields} was used (as required).  
@end deftypefun

@node Destroying Contexts  
@section Destroying Contexts  
@cindex context, destruction

@deftypefun void gpgme\_release (@w{gpgme\_ctx\_t @var{ctx}})  
The function @code{gpgme\_release} destroys the context with the handle @var{ctx} and releases all associated resources.  
@end deftypefun

@node Result Management  
@section Result Management  
@cindex context, result of operation

The detailed result of an operation is returned in operation-specific structures such as @code{gpgme\_decrypt\_result\_t}. The corresponding

retrieval functions such as `gpgme_op_decrypt_result` provide static access to the results after an operation completes. Those structures shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context and give it a lifetime beyond that of the current operation or context.

```
@deftypefun void gpgme_result_ref (@w{void *}@var{result})
@since{1.2.0}
```

The function `gpgme_result_ref` acquires an additional reference for the result `@var{result}`, which may be of any type `gpgme_*_result_t`. As long as the user holds a reference, the result structure is guaranteed to be valid and unmodified.

```
@end deftypefun
```

```
@deftypefun void gpgme_result_unref (@w{void *}@var{result})
@since{1.2.0}
```

The function `gpgme_result_unref` releases a reference for the result `@var{result}`. If this was the last reference, the result structure will be destroyed and all resources associated to it will be released.

```
@end deftypefun
```

Note that a context may hold its own references to result structures, typically until the context is destroyed or the next operation is started. In fact, these references are accessed through the `gpgme_op_*_result` functions.

```
@node Context Attributes
@section
Context Attributes
@cindex context, attributes
```

```
@menu
```

- \* Protocol Selection::        Selecting the protocol used by a context.
- \* Crypto Engine::            Configuring the crypto engine.
- \* Setting the Sender::        How to tell the engine the sender.
- \* ASCII Armor::              Requesting `ASCII` armored output.
- \* Text Mode::                Choosing canonical text mode.
- \* Offline Mode::             Choosing offline mode.
- \* Pinentry Mode::            Choosing the pinentry mode.
- \* Included Certificates::    Including a number of certificates.
- \* Key Listing Mode::         Selecting key listing mode.

- \* Passphrase Callback:: Getting the passphrase from the user.
- \* Progress Meter Callback:: Being informed about the progress.
- \* Status Message Callback:: Status messages received from gpg.
- \* Context Flags:: Additional flags for a context.
- \* Locale:: Setting the locale of a context.
- \*
- Additional Logs:: Additional logs of a context.

@end menu

@node Protocol Selection  
 @subsection Protocol Selection  
 @cindex context, selecting protocol  
 @cindex protocol, selecting

@deftypefun gpgme\_error\_t gpgme\_set\_protocol (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_protocol\_t @var{proto}})

The function @code{gpgme\_set\_protocol} sets the protocol used within the context @var{ctx} to @var{proto}. All crypto operations will be performed by the crypto engine configured for that protocol. @xref{Protocols and Engines}.

Setting the protocol with @code{gpgme\_set\_protocol} does intentionally not check if the crypto engine for that protocol is available and installed correctly. @xref{Engine Version Check}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the protocol could be set successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{protocol} is not a valid protocol.  
 @end deftypefun

@deftypefun gpgme\_protocol\_t gpgme\_get\_protocol (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_get\_protocol} retrieves the protocol currently use with the context @var{ctx}.  
 @end deftypefun

@node Crypto Engine  
 @subsection Crypto Engine  
 @cindex context, configuring engine  
 @cindex engine, configuration per context

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context. @xref{Engine Information}. The default can also be changed globally. @xref{Engine Configuration}.



```
@deftypefun gpgme_engine_info_t gpgme_ctx_get_engine_info (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}
```

The function `gpgme_ctx_get_engine_info` returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context `@var{ctx}`.

The result is valid until the next invocation of `gpgme_ctx_set_engine_info` for this particular context.

This function can not fail.  
`@end deftypefun`

```
@deftypefun
gpgme_error_t gpgme_ctx_set_engine_info (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t
@var{proto}}, @w{const char *@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}
```

The function `gpgme_ctx_set_engine_info` changes the configuration of the crypto engine implementing the protocol `@var{proto}` for the context `@var{ctx}`.

`@var{file_name}` is the file name of the executable program implementing this protocol, and `@var{home_dir}` is the directory name of the configuration directory for this crypto engine. If `@var{home_dir}` is `NULL`, the engine's default will be used.

Currently this function must be used before starting the first crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context `@var{ctx}`.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

```
@end deftypefun
```

`@node` Setting the Sender

`@subsection` How to tell  
the engine the sender.

`@cindex` context, sender

`@cindex` sender

`@cindex` From:

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification

and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. @acronym{GPGME} provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not supported.

```
@deftypefun gpgme_error_t gpgme_set_sender @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{int @var{address}})
```

```
@since{1.8.0}
```

The function @code{gpgme\_set\_sender} specifies the sender address for use in sign and verify operations. @var{address} is expected to be the ``addr-spec" part of an address but may also be a complete mailbox address, in which case this function extracts the ``addr-spec" from it. Using @code{NULL} for @var{address} clears the sender address.

The function returns 0 on success or an error code on failure. The most likely failure is that no valid ``addr-spec" was found in @var{address}.

```
@end deftypefun
```

```
@deftypefun @w{const char *} gpgme_get_sender @
 (@w{gpgme_ctx_t @var{ctx}})
```

```
@since{1.8.0}
```

The function @code{gpgme\_get\_sender} returns the current sender address from the context, or NULL if none was set. The returned value is valid as long as the @var{ctx} is valid and @code{gpgme\_set\_sender} has not been called again.

```
@end deftypefun
```

@c FIXME: Unfortunately, using @acronym here breaks texi2dvi.

@node ASCII Armor

@subsection @acronym{ASCII} Armor

@cindex context, armor mode

@cindex @acronym{ASCII} armor

@cindex armor mode

```
@deftypefun void gpgme_set_armor (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
```

The function @code{gpgme\_set\_armor} specifies if the output should be @acronym{ASCII} armored. By default, output is not @acronym{ASCII}

armored.

@acronym{ASCII} armored output is disabled if @var{yes} is zero, and enabled otherwise.

@end deftypefun

@deftypefun int gpgme\_get\_armor (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_get\_armor} returns 1 if the output is @acronym{ASCII} armored, and @code{0} if it is not, or if @var{ctx} is not a valid pointer.

@end deftypefun

@node Text Mode

@subsection Text Mode

@cindex context, text mode

@cindex text mode

@cindex canonical text mode

@deftypefun void gpgme\_set\_textmode (@w{gpgme\_ctx\_t @var{ctx}}, @w{int @var{yes}})

The function @code{gpgme\_set\_textmode} specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if @var{yes} is zero, and enabled otherwise.

@end deftypefun

@deftypefun int gpgme\_get\_textmode (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_get\_textmode} returns 1 if canonical text mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a valid pointer.

@end deftypefun

@node Offline Mode

@subsection Offline Mode

@cindex context, offline mode

@cindex offline mode

```
@deftypefun void gpgme_set_offline (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
@since{1.6.0}
```

The function `gpgme_set_offline` specifies if offline mode should be used. Offline mode is disabled if `@var{yes}` is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode `GPGME_KEYLIST_MODE_VALIDATE`.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

```
@end deftypefun
```

```
@deftypefun int gpgme_get_offline (@w{gpgme_ctx_t @var{ctx}})
@since{1.6.0}
```

The function `gpgme_get_offline` returns 1 if offline mode is enabled, and `0` if it is not, or if `@var{ctx}` is not a valid pointer.

```
@end deftypefun
```

```
@node Pinentry Mode
```

```
@subsection Pinentry Mode
```

```
@cindex context, pinentry mode
```

```
@cindex pinentry mode
```

```
@deftypefun gpgme_error_t gpgme_set_pinentry_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_pinentry_mode_t @var{mode}})
```

```
@since{1.4.0}
```

The function `gpgme_set_pinentry_mode` specifies the pinentry mode to be used.

For GnuPG  $\geq$  2.1 this option is required to be set to `GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback mechanism in GPGME through `gpgme_set_passphrase_cb`.

```
@deftypefun gpgme_pinentry_mode_t gpgme_get_pinentry_mode (@w{gpgme_ctx_t @var{ctx}})
@since{1.4.0}
```

The function `gpgme_get_pinentry_mode` returns the mode set for the context.

```
@deftp {Data type} {enum gpgme_pinentry_mode_t}
@tindex gpgme_pinentry_mode_t
@since{1.4.0}
```

The `gpgme_minentry_mode_t` type specifies the set of possible pinentry modes that are supported by `GPGME` if GnuPG  $\geq$  2.1 is used. The following modes are supported:

```
@table @code
@item GPGME_PINENTRY_MODE_DEFAULT
@since{1.4.0}
```

Use the default of the agent, which is ask.

```
@item GPGME_PINENTRY_MODE_ASK
@since{1.4.0}
```

Force the use of the Pinentry.

```
@item GPGME_PINENTRY_MODE_CANCEL
@since{1.4.0}
```

Emulate use of Pinentry's cancel button.

```
@item GPGME_PINENTRY_MODE_ERROR
@since{1.4.0}
```

Return a Pinentry error `No Pinentry`.

```
@item GPGME_PINENTRY_MODE_LOOPBACK
@since{1.4.0}
```

Redirect Pinentry queries to the caller. This enables

the use of `gpgme_set_passphrase_cb` because pinentry queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires `allow-loopback-pinentry` to be enabled in the `gpg-agent.conf` or an agent started with that option.

`@end table`  
`@end deftp`

`@node Included Certificates`  
`@subsection Included Certificates`  
`@cindex certificates, included`

`@deftypefun void gpgme_set_include_certs (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{nr_of_certs}})`  
The function `gpgme_set_include_certs` specifies how many certificates should be included in an S/MIME signed message. By default, only the sender's certificate is included. The possible values of `@var{nr_of_certs}` are:

`@table @code`  
`@item GPGME_INCLUDE_CERTS_DEFAULT`  
`@since{1.0.3}`

Fall back to the default of the crypto backend. This is the default for GPGME.

`@item -2`

Include all certificates except the root certificate.

`@item -1`

Include all certificates.

`@item 0`

Include no certificates.

`@item 1`

Include the sender's certificate only.

`@item n`

Include the first n certificates of the certificates path, starting from the sender's certificate. The number `@code{n}` must be positive.

`@end table`

Values of `@var{nr_of_certs}` smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by all other engines.

`@end deftypefun`

`@deftypefun int gpgme_get_include_certs (@w{gpgme_ctx_t @var{ctx}})`  
The function `gpgme_get_include_certs` returns the number of

certificates to include into an S/MIME signed message.

@end deftypefun

@node Key Listing Mode

@subsection Key Listing Mode

@cindex key listing mode

@cindex key listing, mode of

@deftypefun gpgme\_error\_t gpgme\_set\_keylist\_mode (@w{gpgme\_ctx\_t @var{ctx}},  
@w{gpgme\_keylist\_mode\_t @var{mode}})

The function @code{gpgme\_set\_keylist\_mode} changes the default behaviour of the key listing functions. The value in @var{mode} is a bitwise-or combination of one or multiple of the following bit values:

@table @code

@item GPGME\_KEYLIST\_MODE\_LOCAL

The

@code{GPGME\_KEYLIST\_MODE\_LOCAL} symbol specifies that the local keyring should be searched for keys in the keylisting operation. This is the default.

Using only this option results in a @code{--list-keys}.

@item GPGME\_KEYLIST\_MODE\_EXTERN

The @code{GPGME\_KEYLIST\_MODE\_EXTERN} symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with @code{GPGME\_KEYLIST\_MODE\_LOCAL}. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a @code{--search-keys} for

@code{GPGME\_PROTOCOL\_OpenPGP} and something similar to

@code{--list-external-keys} for @code{GPGME\_PROTOCOL\_CMS}.

@item GPGME\_KEYLIST\_MODE\_LOCATE

This is a shortcut for the combination of

@code{GPGME\_KEYLIST\_MODE\_LOCAL} and @code{GPGME\_KEYLIST\_MODE\_EXTERN}, which results in a @code{--locate-keys} for @code{GPGME\_PROTOCOL\_OpenPGP}.

@item

GPGME\_KEYLIST\_MODE\_SIGS

The @code{GPGME\_KEYLIST\_MODE\_SIGS} symbol specifies that the key signatures should be included in the listed keys.

@item GPGME\_KEYLIST\_MODE\_SIG\_NOTATIONS

@since{1.1.1}

The `{GPGME_KEYLIST_MODE_SIG_NOTATIONS}` symbol specifies that the signature notations on key signatures should be included in the listed keys. This only works if `{GPGME_KEYLIST_MODE_SIGS}` is also enabled.

@item GPGME\_KEYLIST\_MODE\_WITH\_TOFU

@since{1.7.0}

The `{GPGME_KEYLIST_MODE_WITH_TOFU}` symbol specifies that information pertaining to the TOFU trust model should be included in the listed keys.

@item GPGME\_KEYLIST\_MODE\_WITH\_KEYGRIP

@since{1.14.0}

The `{GPGME_KEYLIST_MODE_WITH_KEYRIP}` symbol specifies that the keygrip is always included in the listing. The default depends on the version of the backend and the used protocol.

@item GPGME\_KEYLIST\_MODE\_WITH\_SECRET

@since{1.5.1}

The `{GPGME_KEYLIST_MODE_WITH_SECRET}` returns information about the presence of a corresponding secret key in a public key listing. A public key listing with this mode is slower than a standard listing but can be used instead of a second run to list the secret keys. This is only supported for GnuPG versions  $\geq 2.1$ . Note that using this option also makes sure that the keygrip is available in the output.

@item GPGME\_KEYLIST\_MODE\_EPHEMERAL

@since{1.2.0}

The `{GPGME_KEYLIST_MODE_EPHEMERAL}` symbol specifies that keys flagged as ephemeral are included in the listing.

@item GPGME\_KEYLIST\_MODE\_VALIDATE

@since{0.4.5}

The `{GPGME_KEYLIST_MODE_VALIDATE}` symbol specifies that the backend should do key or certificate validation and not just get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

@end table

At least one of `{GPGME_KEYLIST_MODE_LOCAL}` and



`GPGME_KEYLIST_MODE_EXTERN` must be specified. For future binary compatibility, you should get the current mode with `gpgme_get_keylist_mode` and modify it by setting or clearing the appropriate bits, and then using that calculated value in the `gpgme_set_keylisting_mode` operation. This will leave all other bits in the mode value intact (in particular those that are not used in the current version of the library).

The function returns the error code `GPG_ERR_NO_ERROR` if the mode could be set correctly, and `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer or `mode` is not a valid mode.

`@end deftypefun`

`@deftypefun gpgme_keylist_mode_t gpgme_get_keylist_mode (@w{gpgme_ctx_t @var{ctx}})`

The function `gpgme_get_keylist_mode` returns the current key listing mode of the context `ctx`. This value can then be modified and used in a subsequent `gpgme_set_keylisting_mode` operation to only affect the desired bits (and leave all others intact).

The function returns 0 if `ctx` is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

`@end deftypefun`

`@node` Passphrase Callback  
`@subsection` Passphrase Callback  
`@cindex` callback, passphrase  
`@cindex` passphrase callback

`@defpt` {Data type} `{gpgme_error_t (*gpgme_passphrase_cb_t)(void *@var{hook}, const char *@var{uid_hint}, const char *@var{passphrase_info}, @w{int @var{prev_was_bad}}, @w{int @var{fd}})}`  
`@tindex` `gpgme_passphrase_cb_t`

The `gpgme_passphrase_cb_t` type is the type of functions usable as passphrase callback function.

The argument `uid_hint` might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), `uid_hint` will be `NULL`.

The argument `passphrase_info`, if not `NULL`, will give further information about the context in which the passphrase is required. This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then `@var{prev_was_bad}` is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor `@var{fd}`. The function `@code{gpgme_io_writen}` should be used for the write operation. Note that if the user returns 0 to indicate success, the user must at least write a newline character before returning from the callback.

If an error occurs, return the corresponding `@code{gpgme_error_t}` value. You can use the error code `@code{GPG_ERR_CANCELED}` to abort the operation. Otherwise, return `@code{0}`.

Note: The `passphrase_cb` only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See `@code{gpgme_set_pinentry_mode}` for more details on 2.1.x usage.

`@end deftp`

```
@deftypefun void gpgme_set_passphrase_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t @var{passfunc}}, @w{void *@var{hook_value}})
```

The function `@code{gpgme_set_passphrase_cb}` sets the function that is used

when a passphrase needs to be provided by the user to `@var{passfunc}`. The function `@var{passfunc}` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `@var{hook_value}`. By default, no passphrase callback function is set.

Not all crypto engines require this callback to retrieve the passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not even support an external passphrase callback at all, in this case the error code `@code{GPG_ERR_NOT_SUPPORTED}` is returned.

For GnuPG  $\geq$  2.1 the pinentry mode has to be set to `@code{GPGME_PINENTRY_MODE_LOOPBACK}` to enable the passphrase callback. See `@code{gpgme_set_pinentry_mode}`.

The user can disable the use of a passphrase callback function by calling `@code{gpgme_set_passphrase_cb}` with `@var{passfunc}` being `@code{NULL}`.

`@end deftypefun`

```
@deftypefun void gpgme_get_passphrase_cb
```

```
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t *@var{passfunc}}, @w{void
**@var{hook_value}})
```

The function `gpgme_get_passphrase_cb` returns the function that is used when a passphrase needs to be provided by the user in `*passfunc`, and the first argument for this function in `*hook_value`. If no passphrase callback is set, or `ctx` is not a valid pointer, `NULL` is returned in both variables.

`passfunc` or `hook_value` can be `NULL`. In this case, the corresponding value will not be returned.

```
@end deftypefun
```

```
@node Progress Meter Callback
```

```
@subsection Progress Meter Callback
```

```
@cindex callback, progress meter
```

```
@cindex progress meter callback
```

```
@deftp {Data type} {void (*gpgme_progress_cb_t)(void *@var{hook}, const char *@var{what}, int @var{type},
int @var{current}, int @var{total})}
```

```
@tindex gpgme_progress_cb_t
```

The `gpgme_progress_cb_t` type is the type of functions usable as progress callback function.

The arguments are

specific to the crypto engine. More information about the progress information returned from the GnuPG engine can be found in the GnuPG source code in the file `doc/DETAILS` in the section `PROGRESS`.

```
@end deftp
```

```
@deftypefun void gpgme_set_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t
@var{profunc}}, @w{void *@var{hook_value}})
```

The function `gpgme_set_progress_cb` sets the function that is used when progress information about a cryptographic operation is available. The function `profunc` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `hook_value`. By default, no progress callback function is set.

Setting a callback function allows an interactive program to display progress information about a long operation to the user.

The user can disable the use of a progress callback function by calling `gpgme_set_progress_cb` with `profunc` being `NULL`.

```
@end deftypefun
```

```
@deftypefun void
gpgme_get_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t *@var{progfunc}},
@w{void **@var{hook_value}})
```

The function `gpgme_get_progress_cb` returns the function that is used to inform the user about the progress made in `*progfunc`, and the first argument for this function in `*hook_value`. If no progress callback is set, or `ctx` is not a valid pointer, `NULL` is returned in both variables.

`*progfunc` or `*hook_value` can be `NULL`. In this case, the corresponding value will not be returned.

```
@end deftypefun
```

```
@node Status Message Callback
@subsection Status Message Callback
@cindex callback, status message
@cindex status message callback
```

```
@deftp {Data type} {gpgme_error_t (*gpgme_status_cb_t)(void *@var{hook}, const char *@var{keyword}, const
char *@var{args})}
```

```
@tindex gpgme_status_cb_t
```

The `gpgme_status_cb_t` type is the type of function usable as a status message callback function.

The argument `keyword` is the name of the status message while the `args` argument contains any arguments for the status message.

If an error occurs, return the corresponding `gpgme_error_t` value. Otherwise, return `0`.

```
@end deftp
```

```
@deftypefun void gpgme_set_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t
@var{statusfunc}}, @w{void **@var{hook_value}})
@since{1.6.0}
```

The function `gpgme_set_status_cb` sets the function that is used when a status message is received from gpg to `statusfunc`. The function `statusfunc` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `*hook_value`. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling `gpgme_set_status_cb` with `statusfunc` being `NULL`.

```
@end deftypefun
```

```
@deftypefun void gpgme_get_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t
```

```
*@var{statusfunc}}, @w{void **@var{hook_value}})
@since{1.6.0}
```

The

function `gpgme_get_status_cb` returns the function that is used to process status messages from gpg in `*statusfunc`, and the first argument for this function in `*hook_value`. If no status message callback is set, or `ctx` is not a valid pointer, `NULL` is returned in both variables.

```
@end deftypefun
```

```
@node Context Flags
```

```
@subsection Context Flags
```

```
@cindex flags, of a context
```

```
@deftypefun {gpgme_error_t} gpgme_set_ctx_flag @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const char *@var{name}}, @
 @w{const char *@var{value}})
```

```
@since{1.7.0}
```

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for `name`:

```
@table @code
```

```
@item "redraw"
```

This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a Pinentry.

A Curses based application may use this information to redraw the screen; for example:

```
@example
```

```
err = gpgme_op_keylist_start (ctx, "foo@@example.org", 0);
while (!err)
 @{
 err = gpgme_op_keylist_next (ctx, &key);
 if (err)
 break;
 show_key (key);
 gpgme_key_release (key);
 @}
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
 redraw_screen ();
gpgme_release (ctx);
```

@end example

@item "full-status"

Using a `@var{value}` of "1" the status callback set by `gpgme_set_status_cb` returns all status lines with the exception of PROGRESS lines. With the default of "0" the status callback is only called in certain situations.

@item "raw-description"

Setting the `@var{value}` to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the `@code{description}` field of the `@code{gpgme_tofu_info_t}` object.

@item "export-session-key"

Using a `@var{value}` of "1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for `@var{value}`, session keys are not exported.

@item "override-session-key"

The string given in `@var{value}` is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via `ps(1)`.

@item "auto-key-retrieve"

Setting the `@var{value}` to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can see which keys you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

@item "auto-key-import"

Setting the `@var{value}` to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

@item "include-key-block"

Setting the `@var{value}` to "1" forces the GPG backend to embed the signing key as well as an encryption subkey into the the signature.

@item "request-origin"

The string given in @var{value} is passed to the GnuPG engines to request restrictions based on the origin of the request. Valid values are documented in the GnuPG manual and the gpg man page under the option @option{--request-origin}. Requires at least GnuPG 2.2.6 to have an effect.

@item "no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

@item "ignore-mdc-error"

This flag passes the option @option{--ignore-mdc-error} to gpg. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag @code{legacy\_cipher\_nomdc} set. For failsafe reasons this flag is reset after each operation.

@item "auto-key-locate"

The string given in @var{value} is passed to gpg. This can be used to change the behavior of a @code{GPGME\_KEYLIST\_MODE\_LOCATE} keylisting. Valid values are documented in the GnuPG manual and the gpg man page under the option @option{--auto-key-locate}. Requires at least GnuPG 2.1.18.

Note: Keys retrieved through @code{auto-key-locate} are automatically imported in the keyring.

@item trust-model

@since{1.11.2}

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default. If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail. Example: "tofu+pgp".

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future operations. A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

@item "extended-edit"

This flag passes the option `@option{--expert}` to `gpg key edit`. This can be used to get additional callbacks in `@code{gpgme_op_edit}`.

@end table

This function returns `@code{0}` on success.

@end dectyfefun

```
@dectyfefun {const char *} gpgme_get_ctx_flag @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const char *@var{name}})
```

@since{1.8.0}

The value of flags settable by `@code{gpgme_set_ctx_flag}` can be retrieved by this function. If `@var{name}` is unknown the function returns `@code{NULL}`. For boolean flags an empty string is returned for False and the string "1" is returned for True; either `atoi(3)` or a test for an empty string can be used to get the boolean value.

@end dectyfefun

@node Locale

@subsection Locale

@cindex locale, default

@cindex locale, of a context

A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

```
@dectyfefun gpgme_error_t gpgme_set_locale (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{category}},
 @w{const char *@var{value}})
@since{0.4.3}
```

The function `@code{gpgme_set_locale}` sets the locale of the context `@var{ctx}`, or the default locale if `@var{ctx}` is a null pointer.

The locale settings that should be changed are specified by `@var{category}`. Supported categories are `@code{LC_CTYPE}`, `@code{LC_MESSAGES}`, and `@code{LC_ALL}`, which is a wildcard you can use



if you want to change  
all the categories at once.

The value to be used for the locale setting is `@var{value}`, which will be copied to `@acronym{GPGME}`'s internal data structures. `@var{value}` can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default value at startup.

The function returns an error if not enough memory is available.  
`@end dectypedefun`

`@node Additional Logs`  
`@subsection Additional Logs`  
`@cindex auditlog, of the engine`  
`@cindex auditlog`

Additional logs can be associated with a context. These logs are engine specific and can be obtained with `@code{gpgme_op_getauditlog}`.

```
@deftypedefun gpgme_error_t gpgme_op_getauditlog @
 (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}},
 @
 @w{unsigned int @var{flags}})
@since{1.1.1}
```

The function `@code{gpgme_op_getauditlog}` is used to obtain additional logs as specified by `@var{flags}` into the `@var{output}` data. If

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if a log could be queried from the engine, and `@code{GPG_ERR_NOT_IMPLEMENTED}` if the log specified in `@var{flags}` is not available for this engine. If no log is available `@code{GPG_ERR_NO_DATA}` is returned.

The value in `@var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

```
@table @code
@item GPGME_AUDITLOG_DIAG
@since{1.11.2}
```

Obtain diagnostic output which would be written to `@code{stderr}` in

interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and `{GPG_ERR_NO_DATA}` will be returned.

Implemented for: `{GPGME_PROTOCOL_OpenPGP}`

`@item`  
`GPGME_AUDITLOG_DEFAULT`  
`@since{1.11.2}`

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the `{GETAUDITLOG}` command. For `{GPGME_PROTOCOL_CMS}` this provides additional information about the X509 certificate chain.

Implemented for: `{GPGME_PROTOCOL_CMS}`

`@item GPGME_AUDITLOG_HTML`  
`@since{1.1.1}`

Same as `{GPGME_AUDITLOG_DEFAULT}` but in HTML.

Implemented for: `{GPGME_PROTOCOL_CMS}`  
`@end table`  
`@end deftypefun`

`@deftypefun gpgme_error_t gpgme_op_getauditlog_start @`  
`(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}}, @`  
`@w{unsigned int @var{flags}})`  
`@since{1.1.1}`

This is the asynchronous variant of `{gpgme_op_getauditlog}`.  
`@end deftypefun`

`@node Key Management`  
`@section Key Management`  
`@cindex key management`

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

`@menu`

- \* Key objects:: Description of the key structures.
- \* Listing Keys:: Browsing the list of available keys.
- \* Information About Keys:: Requesting detailed information about keys.
- \* Manipulating Keys:: Operations on keys.
- \* Generating Keys:: Creating new key pairs.
- \* Signing Keys:: Adding key signatures to public keys.
- \* Exporting Keys:: Retrieving key data from the key ring.
- \* Importing Keys:: Adding keys to the key ring.
- \* Deleting Keys:: Removing keys from the key ring.
- \* Changing Passphrases:: Change the passphrase of a key.
- \* Changing TOFU Data:: Changing data pertaining to TOFU.
- \* Advanced Key Editing:: Advanced key edit operation.

@end menu

@node Key objects

@subsection Key objects

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

@deftp {Data type} gpgme\_key\_t

The @code{gpgme\_key\_t} type is a pointer to a key object. It has the following members:

@table @code

@item gpgme\_keylist\_mode\_t keylist\_mode

@since{0.9.0}

The keylist mode that was active when the key was retrieved.

@item unsigned int revoked : 1

This is true if the key is revoked.

@item unsigned int expired : 1

This is true if the key is expired.

@item unsigned int disabled : 1

This is true if the key is disabled.

@item unsigned int invalid : 1

This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

@item unsigned int can\_encrypt : 1

This is true if the key (ie one of its subkeys) can be used for encryption.

@item unsigned int can\_sign

: 1

This is true if the key (ie one of its subkeys) can be used to create data signatures.

@item unsigned int can\_certify : 1

This is true if the key (ie one of its subkeys) can be used to create key certificates.

@item unsigned int can\_authenticate : 1

@since{0.4.5}

This is true if the key (ie one of its subkeys) can be used for authentication.

@item unsigned int is\_qualified : 1

@since{1.1.0}

This is true if the key can be used for qualified signatures according to local government regulations.

@item unsigned int secret : 1

This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if @code{GPGME\_KEYLIST\_MODE\_WITH\_SECRET} is active.

@item unsigned int origin : 5

@since{1.8.0}

Reserved for the origin of this key.

@item gpgme\_protocol\_t protocol

This is the protocol supported by this key.

@item char \*issuer\_serial

If

@code{protocol} is @code{GPGME\_PROTOCOL\_CMS}, then this is the issuer serial.

@item char \*issuer\_name

If @code{protocol} is @code{GPGME\_PROTOCOL\_CMS}, then this is the issuer name.

@item char \*chain\_id

If @code{protocol} is @code{GPGME\_PROTOCOL\_CMS}, then this is the chain ID, which can be used to build the certificate chain.

@item gpgme\_validity\_t owner\_trust

If @code{protocol} is @code{GPGME\_PROTOCOL\_OpenPGP}, then this is the owner trust.

@item gpgme\_subkey\_t subkeys

This is a linked list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

@item gpgme\_user\_id\_t uids

This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

@item char \*fpr

@since{1.7.0}

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

@item unsigned long last\_update

@since{1.8.0}

Reserved for the time of the last update of this key.

@end table

@end deftp

@deftp {Data type} gpgme\_subkey\_t

@since{1.5.0}

The @code{gpgme\_subkey\_t} type is a pointer to a subkey structure. Subkeys are one component of a @code{gpgme\_key\_t} object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One @code{gpgme\_key\_t} can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

@table @code

@item gpgme\_subkey\_t next

This is a pointer to the next subkey structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1

This is true if the subkey is revoked.

@item unsigned int expired : 1

This is true if the subkey is expired.

@item unsigned int disabled : 1

This is true if the subkey is disabled.

@item unsigned int invalid : 1

This is true if the subkey is invalid.

@item unsigned int can\_encrypt : 1

This is true if the subkey can be used for encryption.

@item unsigned int can\_sign : 1

This is true if the subkey can be used to create data signatures.

@item unsigned int can\_certify : 1

This is true if the subkey can be used to create key certificates.

@item unsigned int can\_authenticate : 1

@since{0.4.5}

This is true if the subkey can be used for authentication.

@item unsigned int is\_qualified : 1

@since{1.1.0}

This is true if the subkey can be used for qualified signatures according to local government regulations.

@item unsigned int is\_de\_vs : 1

@since{1.8.0}

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a Brainpool curve.

@item unsigned int secret : 1

This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation

is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if `{GPGME_KEYLIST_MODE_WITH_SECRET}` is active.

`@item gpgme_pubkey_algo_t pubkey_algo`

This is the public key algorithm supported by this subkey.

`@item unsigned int length`

This is the length of the subkey (in bits).

`@item char *keyid`

This is the key ID of the subkey in hexadecimal digits.

`@item char *fpr`

This is the fingerprint of the subkey in hexadecimal digits, if available.

`@item char *keygrip`

`@since{1.7.0}`

The keygrip of the subkey in hex digit form or `{NULL}` if not available.

`@item long int timestamp`

This is the creation timestamp of the subkey. This is -1 if the timestamp is invalid, and 0 if it is not available.

`@item long int expires`

This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

`@item unsigned int is_cardkey : 1`

`@since{1.2.0}`

True if

the secret key is stored on a smart card.

`@item char *card_number`

`@since{1.2.0}`

The serial number of a smart card holding this key or `{NULL}`.

`@item char *curve`

For ECC algorithms the name of the curve.

`@end table`

`@end deftp`

@deftp {Data type} gpgme\_user\_id\_t

A user ID is a component of a @code{gpgme\_key\_t} object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

@table @code

@item gpgme\_user\_id\_t next

This is a pointer to the next user ID structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1

This is true if the user ID is revoked.

@item unsigned int invalid : 1

This is true if the user ID is invalid.

@item gpgme\_validity\_t validity

This specifies the validity of the user ID.

@item char \*uid

This is the user ID string.

@item char \*name

This is the name component of @code{uid}, if available.

@item char \*comment

This is the comment component of @code{uid}, if available.

@item char \*email

This is the email component of @code{uid}, if available.

@item char \*address;

The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the @code{email} part of this structure but might be slightly different. If no mail address is available @code{NULL} is stored.

@item gpgme\_tofu\_info\_t tofu

@since{1.7.0}

If not @code{NULL} information from the TOFU database pertaining to this user id.

@item gpgme\_key\_sig\_t signatures



This is a linked list with the signatures on this user ID.

```
@item unsigned int origin : 5
@since{1.8.0}
```

Reserved for the origin of this user ID.

```
@item unsigned long last_update
@since{1.8.0}
```

Reserved for the time of the last update of this user ID.

```
@item char *uidhash;
```

A string used by gpg to identify a user ID. This string can be used at certain prompts of `@code{gpgme_op_edit}` to select a user ID. Users must be prepared to see a `@code{NULL}` value here. The format of the value is not specified and may depend on the GPGME or GnuPG version.

```
@end table
@end deftp
```

```
@deftp {Data type} gpgme_tofu_info_t
```

```
@since{1.7.0}
```

The `@code{gpgme_tofu_info_t}` type is a pointer to a tofu info structure. Tofu info structures are one component of a `@code{gpgme_user_id_t}` object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

```
@table @code
@item gpgme_key_sig_t next
```

This is a pointer to the next tofu info structure in the linked list, or `@code{NULL}` if this is the last element.

```
@item unsigned int validity : 3
```

This is the TOFU validity. It can have the following values:

```
@table @code
@item 0
```

The value `@code{0}` indicates a conflict.

```
@item 1
```

The value `@code{1}` indicates a key without history.

@item 2

The value @code{2} indicates a key with too little history.

@item 3

The value @code{3} indicates a key with enough history for basic trust.

@item 4

The value @code{4} indicates a key  
with a lot of history.

@end table

@item unsigned int policy : 4

This is the TOFU policy, see @code{gpgme\_tofu\_policy\_t}.

@item unsigned short signcount

This is the number of signatures seen for this binding (or  
@code{USHRT\_MAX} if there are more than that).

@item unsigned short encrcount

This is the number of encryptions done with this binding (or  
@code{USHRT\_MAX} if there are more than that).

@item unsigned long signfirst

Number of seconds since Epoch when the first signature was seen with  
this binding.

@item unsigned long signlast

Number of seconds since Epoch when the last signature was seen with  
this binding.

@item unsigned long encrfirst

Number of seconds since Epoch when the first encryption was done with  
this binding.

@item unsigned long enclast

Number of seconds since Epoch when the last encryption was done with  
this binding.

@item char \*description

A human-readable string summarizing the TOFU data (or NULL).

@end table

@end deftp

@deftp {Data type} gpgme\_key\_sig\_t

The

`gpgme_key_sig_t` type is a pointer to a key signature structure. Key signatures are one component of a `gpgme_key_t` object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIGS` mode enabled, because it can be expensive to retrieve all signatures of a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIG_NOTATIONS` mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

`gpgme_key_sig_t`

`next`

This is a pointer to the next key signature structure in the linked list, or `NULL` if this is the last element.

`revoked` : 1

This is true if the key signature is a revocation signature.

`expired` : 1

This is true if the key signature is expired.

`invalid` : 1

This is true if the key signature is invalid.

`exportable` : 1

This is true if the key signature is exportable.

`pubkey_algo`

This is the public key algorithm used to create the signature.

`keyid`

This is the key ID of the key (in hexadecimal digits) used to create the signature.

`timestamp`

This is the creation timestamp of the key signature. This is -1 if the timestamp is invalid, and 0 if it is not available.

`expires`

This is the expiration timestamp of the key signature, or 0 if the key signature does not expire.

@item gpgme\_error\_t status

This is the status of the signature and has the same meaning as the member of the same name in a @code{gpgme\_signature\_t} object.

@item unsigned int sig\_class

This specifies the signature class of the key signature. The meaning is specific to the crypto engine.

@item char \*uid

This is the main user ID of the key used to create the signature.

@item char \*name

This is the name component of @code{uid}, if available.

@item char \*comment

This is the comment component of @code{uid}, if available.

@item char \*email

This is the email component of @code{uid}, if available.

@item gpgme\_sig\_notation\_t notations

This is a linked list with the notation data and policy URLs.

@end table

@end deftp

@node Listing Keys

@subsection Listing Keys

@cindex listing keys

@cindex key listing

@cindex key listing, start

@cindex key ring, list

@cindex key ring, search

@deftypefun gpgme\_error\_t gpgme\_op\_keylist\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{pattern}}, @w{int @var{secret\_only}})

The function @code{gpgme\_op\_keylist\_start} initiates a key listing operation inside the context @var{ctx}. It sets everything up so that subsequent invocations of @code{gpgme\_op\_keylist\_next} return the keys in the list.

If @var{pattern} is @code{NULL}, all available keys are returned.

Otherwise,

`@var{pattern}` contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `@var{secret_only}` is not `@code{0}`, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and `@code{gpgme_op_keylist_next}` returns `@code{GPG_ERR_EOF}`), or `@code{gpgme_op_keylist_end}` is called to finish the operation.

The function returns the error code `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_keylist_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}[]}, @w{int @var{secret_only}}, @w{int @var{reserved}})
```

The function `@code{gpgme_op_keylist_ext_start}` initiates an extended key listing operation inside the context `@var{ctx}`. It sets everything up so that subsequent invocations of `@code{gpgme_op_keylist_next}` return the keys in the list.

If `@var{pattern}` or `@var{*pattern}` is `@code{NULL}`, all available keys are returned. Otherwise, `@var{pattern}` is a `@code{NULL}` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `@var{secret_only}` is not `@code{0}`, the list is restricted to secret keys only.

The value of `@var{reserved}` must be `@code{0}`.

The context will be busy until either all keys are received (and `@code{gpgme_op_keylist_next}` returns `@code{GPG_ERR_EOF}`), or

`gpgme_op_keylist_end` is called to finish the operation.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

`gpgme_op_keylist_end`

```
@deftypefun gpgme_error_t gpgme_op_keylist_from_data_start @
 (@w{gpgme_ctx_t} ctx, @
 @w{gpgme_data_t} data, @
 @w{int} reserved))
```

Since 1.8.0

The function `gpgme_op_keylist_from_data_start` initiates a key listing operation inside the context `ctx`. In contrast to the other key listing operation the keys are read from the supplied `data` and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys from `data`.

The value of `reserved` must be `0`.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation. While the context is busy `data` may not be released.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

`gpgme_op_keylist_next`

```
@deftypefun gpgme_error_t gpgme_op_keylist_next (@w{gpgme_ctx_t} ctx, @w{gpgme_key_t}
 *r_key)
```

The function `gpgme_op_keylist_next` returns the next key in the list created by a previous `gpgme_op_keylist_start` operation in the context `ctx`. The key will have one reference for the user. [Manipulating Keys](#).

This is the only way to get at `gpgme_key_t` objects in

@acronym{GPGME}.

If the last key in the list has already been returned,

@code{gpgme\_op\_keylist\_next} returns @code{GPG\_ERR\_EOF}.

The function returns the error code @code{GPG\_ERR\_INV\_VALUE} if

@var{ctx} or @var{r\_key} is not a valid pointer, and

@code{GPG\_ERR\_ENOMEM} if there is not enough memory for the operation.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_keylist_end (@w{gpgme_ctx_t @var{ctx}})
```

The function @code{gpgme\_op\_keylist\_end} ends a pending key list operation in the context @var{ctx}.

After the operation completed successfully, the result of the key listing operation can be retrieved with

@code{gpgme\_op\_keylist\_result}.

The function returns the error code @code{GPG\_ERR\_INV\_VALUE} if

@var{ctx} is not a valid pointer, and @code{GPG\_ERR\_ENOMEM} if at some time during the operation there was not enough memory available.

@end deftypefun

The following

example illustrates how all keys containing a certain string (@code{g10code}) can be listed with their key ID and the name and email address of the main user ID:

@example

```
gpgme_ctx_t ctx;
```

```
gpgme_key_t key;
```

```
gpgme_error_t err = gpgme_new (&ctx);
```

```
if (!err)
```

```
@{
```

```
err = gpgme_op_keylist_start (ctx, "g10code", 0);
```

```
while (!err)
```

```
@{
```

```
err = gpgme_op_keylist_next (ctx, &key);
```

```
if (err)
```

```
break;
```

```
printf ("%s:", key->subkeys->keyid);
```

```
if (key->uids && key->uids->name)
```

```
printf (" %s", key->uids->name);
```

```
if (key->uids && key->uids->email)
```

```
printf (" <%s>", key->uids->email);
```

```
putchar ('\n');
```

```

 gpgme_key_release (key);
 @}
 gpgme_release (ctx);
 @}
if (gpg_err_code (err) != GPG_ERR_EOF)
 @{
 fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
 exit (1);
 @}
@end example

```

```

@deftp {Data type} {gpgme_keylist_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_keylist_*}
operation. After successfully ending a key
listing operation, you can retrieve the pointer to the result with
@code{gpgme_op_keylist_result}. The structure contains the following
member:

```

```

@table @code
@item unsigned int truncated : 1
This is true if the crypto backend had to truncate the result, and
less than the desired keys could be listed.
@end table
@end deftp

```

```

@deftypefun gpgme_keylist_result_t gpgme_op_keylist_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_keylist_result} returns a
@code{gpgme_keylist_result_t} pointer to a structure holding the
result of a @code{gpgme_op_keylist_*} operation. The pointer is only
valid if the last operation on the context was a key listing
operation, and if this operation finished successfully. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

```

In a simple program, for which a blocking operation is acceptable, the following function can be used to retrieve a single key.

```

@deftypefun gpgme_error_t gpgme_get_key (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{fpr}},
@w{gpgme_key_t *@var{r_key}}, @w{int @var{secret}})
The function @code{gpgme_get_key} gets the key with the fingerprint
(or key ID) @var{fpr} from the crypto backend and return it in
@var{r_key}. If @var{secret} is true, get the secret key. The
currently active keylist mode is used to retrieve the key. The key
will have one reference for the user.

```



If the key is not found in the keyring, `gpgme_get_key` returns the error code `GPG_ERR_EOF` and `*r_key` will be set to `NULL`.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` or `r_key` is not a valid pointer or `fpr` is not a fingerprint or key ID, `GPG_ERR_AMBIGUOUS_NAME` if the key ID was not a unique specifier for a key, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

`@end deftypefun`

`@node` Information About Keys

`@subsection`

Information About Keys

`@cindex` key, information about

`@cindex` key, attributes

`@cindex` attributes, of a key

Please see the beginning of this section for more information about

`gpgme_key_t` objects.

`@deftp` {Data type} `gpgme_validity_t`

The `gpgme_validity_t` type is used to specify the validity of a user ID in a key. The following validities are defined:

`@table @code`

`@item` `GPGME_VALIDITY_UNKNOWN`

The user ID is of unknown validity. The string representation of this validity is `?`.

`@item` `GPGME_VALIDITY_UNDEFINED`

The validity of the user ID is undefined. The string representation of this validity is `q`.

`@item` `GPGME_VALIDITY_NEVER`

The user ID is never valid. The string representation of this validity is `n`.

`@item` `GPGME_VALIDITY_MARGINAL`

The user ID is marginally valid. The string representation of this validity is `m`.

`@item` `GPGME_VALIDITY_FULL`

The user ID is fully valid. The string representation of this validity is `f`.

`@item` `GPGME_VALIDITY_ULTIMATE`

The  
user ID is ultimately valid. The string representation of this  
validity is ``u".  
@end table  
@end deftp

@node Manipulating Keys  
@subsection Manipulating Keys  
@cindex key, manipulation

@deftypefun void gpgme\_key\_ref (@w{gpgme\_key\_t @var{key}})  
The function @code{gpgme\_key\_ref} acquires an additional reference for  
the key @var{key}.  
@end deftypefun

@deftypefun void gpgme\_key\_unref (@w{gpgme\_key\_t @var{key}})  
The function @code{gpgme\_key\_unref} releases a reference for the key  
@var{key}. If this was the last reference, the key will be destroyed  
and all resources associated to it will be released.  
@end deftypefun

@c  
@c gpgme\_op\_setexpire  
@c  
@deftypefun gpgme\_error\_t gpgme\_op\_setexpire @  
 (@w{gpgme\_ctx\_t @var{ctx}}, @  
 @w{gpgme\_key\_t @var{key}}, @  
 @w{unsigned long @var{expires}}, @  
 @w{const char \*@var{subfprs}}, @  
 @w{unsigned int @var{reserved}});

@since{1.14.1}

The function @code{gpgme\_op\_setexpire} sets the expiration time of  
the  
key @var{key} or of the specified subkeys.  
This function requires at least version 2.1.22 of GnuPG.

@var{key} specifies the key to operate on.

@var{expires} specifies the expiration time in seconds from now.  
To be similar to other usages where expiration times are provided  
in unsigned long this is similar to the key creation date  
and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`@var{subfprs}` selects the subkey(s) for which the expiration time should be set. If `@var{subfprs}` is set to `NULL`, then the expiration time of the primary key is set. If `@var{subfprs}` is an asterisk (`*`), then the expiration times of all non-revoked and not yet expired subkeys are set.

To select more than one subkey put all subkey fingerprints into one string separated by linefeeds characters (`\n`).

`@var{reserved}` is reserved for later use and must be `0`.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_setexpire_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{unsigned long @var{expires}}, @
 @w{const char *@var{subfprs}}, @
 @w{unsigned int @var{flags}});
```

`@since{1.14.1}`

The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. [@xref{Waiting For Completion}](#).

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_revuid_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});
```

`@since{1.14.1}`

The function `gpgme_op_setexpire_start` initiates a `gpgme_op_setexpire`

operation; see there for details. It must be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

`@end deftypefun`

`@node Generating Keys`

`@subsection Generating Keys`

`@cindex key, creation`

`@cindex key ring, add`

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the `gpgme_op_genkey` function can be used. Existing code which wants to update to the new functions or new code which shall supports older GnuPG versions may try the new functions first and provide a fallback to the old function if the error code `GPG_ERR_NOT_SUPPORTED` is received.

`@c`

`@c gpgme_op_createkey`

`@c`

`@deftypefun gpgme_error_t gpgme_op_createkey @`

`(@w{gpgme_ctx_t @var{ctx}}, @`

`@w{const char *@var{userid}}, @`

`@w{const char *@var{algo}}, @`

`@w{unsigned long @var{reserved}}, @`

`@w{unsigned long @var{expires}}, @`

`@w{gpgme_key_t @var{extrakey}},`

`@`

`@w{unsigned int @var{flags}});`

`@since{1.7.0}`

The function `gpgme_op_createkey` generates a new key for the protocol active in the context `@var{ctx}`. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

`@var{userid}` is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`@var{algo}` specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see

the GnuPG manual. If `@var{algo}` is `@code{NULL}` or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine;

however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via `@var{flags}`, triggers the creation of a primary key plus a secondary key (subkey).

`@var{reserved}` must be set to zero.

`@var{expires}` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag `@code{GPGME_CREATE_NOEXPIRE}` to create keys that do not expire. Note that this parameter takes an unsigned long value and not a `@code{time_t}` to avoid problems on systems which use a signed 32 bit `@code{time_t}`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`@var{extrakey}` is currently not used and must be set to `@code{NULL}`. A future version of GPGME may use this parameter to create X.509 keys.

`@var{flags}` can be set to the bit-wise OR of the following flags:

```
@table @code
@item GPGME_CREATE_SIGN
@itemx GPGME_CREATE_ENCR
@itemx GPGME_CREATE_CERT
@itemx GPGME_CREATE_AUTH
@since{1.7.0}
```

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: ```signing"`, ```encryption"`, ```certification"`, or ```authentication"`. The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

```
@item GPGME_CREATE_NOPASSWD
@since{1.7.0}
```

Request generation of the key without password protection.

@item GPGME\_CREATE\_SELFSIGNED

@since{1.7.0}

For an X.509 key do not create a CSR but a self-signed certificate.  
This has not yet been implemented.

@item GPGME\_CREATE\_NOSTORE

@since{1.7.0}

Do not store the created key in the local key database.  
This has not yet been implemented.

@item GPGME\_CREATE\_WANTPUB

@itemx GPGME\_CREATE\_WANTSEC

@since{1.7.0}

Return

the public or secret key as part of the result structure.  
This has not yet been implemented.

@item GPGME\_CREATE\_FORCE

@since{1.7.0}

The engine does not allow the creation of a key with a user ID  
already existing in the local key database. This flag can be used to  
override this check.

@item GPGME\_CREATE\_NOEXPIRE

@since{1.9.0}

Request generation of keys that do not expire.

@end table

After the operation completed successfully, information about the  
created key can be retrieved with @code{gpgme\_op\_genkey\_result}.

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if  
the engine does not support the command, or a bunch of other error  
codes.

@end deffun

@deffun gpgme\_error\_t gpgme\_op\_createkey\_start @

(@w{gpgme\_ctx\_t @var{ctx}}, @

@w{const char \*@var{userid}}, @

```

 @w{const char *@var{algo}}, @
 @w{unsigned long @var{reserved}}, @
 @w{unsigned long @var{expires}}, @
 @w{gpgme_key_t @var{extrakey}}, @
 @w{unsigned int
@var{flags}});

```

```
@since{1.7.0}
```

The function `gpgme_op_createkey_start` initiates a `gpgme_op_createkey` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

```
@end deftypefun
```

```
@c
```

```
@c gpgme_op_createsubkey
```

```
@c
```

```

@deftypefun gpgme_error_t gpgme_op_createsubkey @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{algo}}, @
 @w{unsigned long @var{reserved}}, @
 @w{unsigned long @var{expires}}, @
 @w{unsigned int @var{flags}});

```

```
@since{1.7.0}
```

The function `gpgme_op_createsubkey` creates and adds a new subkey to the primary OpenPGP key given by `KEY`. The only allowed protocol in `ctx` is `GPGME_PROTOCOL_OPENPGP`. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.

`key` specifies the key to operate on.

`algo` specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If `algo` is `NULL` or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

@var{reserved} must be set to zero.

@var{expires} specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag @code{GPGME\_CREATE\_NOEXPIRE} to create keys that do not expire. Note that this parameter takes an unsigned long value and not a @code{time\_t} to avoid problems on systems which use a signed 32 bit @code{time\_t}. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

@var{flags} takes the same values as described above for @code{gpgme\_op\_createkey}.

After the operation completed successfully, information about the created key can be retrieved with @code{gpgme\_op\_genkey\_result}.

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end dectypedefun

```
@deftypefun gpgme_error_t gpgme_op_createsubkey_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{algo}}, @
 @w{unsigned long @var{reserved}}, @
 @w{unsigned long @var{expires}}, @
 @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme\_op\_createsubkey\_start} initiates a @code{gpgme\_op\_createsubkey} operation; see there for details. It must be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

@end dectypedefun

@c

@c gpgme\_op\_adduid

@c

@deftypefun gpgme\_error\_t



```

gpgme_op_adduid @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});

```

@since{1.7.0}

The function @code{gpgme\_op\_adduid} adds a new user ID to the OpenPGP key given by @var{KEY}. Adding additional user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context @var{ctx} must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to add to the key. A user ID is commonly the mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

@var{flags} are currently not used and must be set to zero.

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```

@deftypefun gpgme_error_t gpgme_op_adduid_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});

```

@since{1.7.0}

The function @code{gpgme\_op\_adduid\_start} initiates a @code{gpgme\_op\_adduid} operation; see there for details. It must be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

```

@c
@c gpgme_op_revuid
@c
@deftypefun gpgme_error_t gpgme_op_revuid @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});

```

```
@since{1.7.0}
```

The function `gpgme_op_revuid` revokes a user ID from the OpenPGP key given by `KEY`. Revoking user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `ctx` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`key` specifies the key to operate on.

`userid` is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. This is a required parameter.

`flags` are currently not used and must be set to zero.

Note that the engine won't allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
@end deftypefun
```

```

@deftypefun gpgme_error_t gpgme_op_revuid_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}},
 @
 @w{unsigned int @var{flags}});

```

```
@since{1.7.0}
```

The function `gpgme_op_revuid_start` initiates a `gpgme_op_revuid` operation; see there for details. It must

be completed by calling `gpgme_wait` on the context.  
`Waiting For Completion`.

`@end deftypefun`

`@c`

`@c gpgme_op_set_uid_flag`

`@c`

```
@deftypefun gpgme_error_t gpgme_op_set_ui_flag @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{cons char * @var{name}}, @
 @w{cons char * @var{value}});
```

`@since{1.8.0}`

The function `gpgme_op_set_uid_flag` is used to set flags on a user ID from the OpenPGP key given by `KEY`. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `ctx` must be set to OpenPGP.

`key` specifies the key to operate on. This parameters is required.

`userid` is the user ID of the key to be manipulated. This user ID must

be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. This is a required parameter.

`name` names the flag which is to be changed. The only currently supported flag is:

`@table @code`

`@item primary`

This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. `value` must be given as NULL. For technical reasons this functions bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

`@end table`

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_set_uid_flag_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{cons char * @var{name}},
 @
 @w{cons char * @var{value}});
```

@since{1.8.0}

The function @code{gpgme\_op\_set\_uid\_flag\_start} initiates a @code{gpgme\_op\_set\_uid\_flag} operation; see there for details. It must be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

@c

@c gpgme\_op\_genkey

@c

```
@deftypefun gpgme_error_t gpgme_op_genkey @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const char *@var{parms}}, @
 @w{gpgme_data_t @var{public}}, @
 @w{gpgme_data_t @var{secret}})
```

The function @code{gpgme\_op\_genkey} generates a new key pair in the context @var{ctx}. The meaning of @var{public} and @var{secret} depends on the crypto backend.

GPG does not support @var{public} and @var{secret}, they should be @code{NULL}. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with @code{gpgme\_op\_genkey\_result}.

GpgSM requires @var{public} to be a writable data object. GpgSM will generate

a secret key (which will be stored by @command{gpg-agent}, and return a certificate request in @var{public}, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument @var{parms} specifies parameters for the key in a string that looks something like XML. The details about the format of @var{parms} are specific to the crypto engine used by @var{ctx}. The first line of the parameters must be @code{<GnupgKeyParams

format="internal">} and the last line must be  
@code{</GnupgKeyParams>}. Every line in between the first and last  
lines is treated as a Header: Value pair. In particular, no XML  
escaping is necessary if you need to include the characters @code{<},  
@code{>}, or @code{&}.

Here is an example for GnuPG as the crypto engine (all parameters of  
OpenPGP key generation are documented in the GPG manual):

```
@example
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real:
 Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
@end example
```

Here is an example for GpgSM as the crypto engine (all parameters of  
OpenPGP key generation are documented in the GPGSM manual):

```
@example
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@@foo.bar
</GnupgKeyParms>
@end example
```

Strings should be given in UTF-8 encoding. The only format supported  
for now is ``internal''. The content of the @code{GnupgKeyParms}  
container is passed verbatim to the crypto backend. Control  
statements are not allowed.

After the operation completed successfully, the result can be  
retrieved with @code{gpgme\_op\_genkey\_result}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the  
operation could be started successfully, @code{GPG\_ERR\_INV\_VALUE} if  
@var{parms} is not a well-formed string (e.g. does not have the  
expected  
tag-like headers and footers), @code{GPG\_ERR\_NOT\_SUPPORTED}  
if @var{public} or @var{secret} is not valid, and

@code{GPG\_ERR\_GENERAL} if no key was created by the backend.

@end dectyfefun

```
@dectyfefun gpgme_error_t gpgme_op_genkey_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{parms}}, @w{gpgme_data_t @var{public}}, @w{gpgme_data_t @var{secret}})
```

The function @code{gpgme\_op\_genkey\_start} initiates a  
@code{gpgme\_op\_genkey} operation. It can be completed by calling  
@code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the  
operation could be started successfully, @code{GPG\_ERR\_INV\_VALUE} if  
@var{parms} is not a valid XML string, and  
@code{GPG\_ERR\_NOT\_SUPPORTED} if @var{public} or @var{secret} is not  
@code{NULL}.

@end dectyfefun

@c

@c gpgme\_op\_genkey\_result

@c

@deftp {Data type} {gpgme\_genkey\_result\_t}

This is a pointer to a structure used to store the result of a  
@code{gpgme\_op\_genkey} operation.

After successfully generating a  
key, you can retrieve the pointer to the result with  
@code{gpgme\_op\_genkey\_result}. The structure contains the following  
members:

@table @code

@item unsigned int primary : 1

This flag is set to 1 if a primary key was created and to 0  
if not.

@item unsigned int sub : 1

This flag is set to 1 if a subkey was created and to 0 if not.

@item unsigned int uid : 1

This flag is set to 1 if a user ID was created and to 0 if not.

@item char \*fpr

This is the fingerprint of the key that was created. If both a  
primary and a subkey were generated, the fingerprint of the primary  
key will be returned. If the crypto engine does not provide the  
fingerprint, @code{fpr} will be a null pointer.

@item gpgme\_data\_t pubkey

@since{1.7.0}

This will eventually be used to return the public key. It is currently not used.

@item gpgme\_data\_t seckey

@since{1.7.0}

This will eventually be used to return the secret key. It is currently not used.

@end table

@end deftp

@deftypefun

gpgme\_genkey\_result\_t gpgme\_op\_genkey\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_genkey\_result} returns a @code{gpgme\_genkey\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_genkey} operation. The pointer is only valid if the last operation on the context was a @code{gpgme\_op\_genkey} or @code{gpgme\_op\_genkey\_start} operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@c

@c SIGNING KEYS

@c

@node Signing Keys

@subsection Signing Keys

@cindex key, signing

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the @code{gpgme\_op\_interact} function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

@c

@c gpgme\_op\_keysign

@c

@deftypefun

```

gpgme_error_t gpgme_op_keysign @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{const char *@var{userid}}, @
@w{unsigned long @var{expires}}, @
@w{unsigned int @var{flags}});

```

@since{1.7.0}

The function @code{gpgme\_op\_keysign} adds a new key signature to the public key @var{KEY}. This function requires at least version 2.1.12 of GnuPG.

@var{CTX} is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, @code{gpgme\_signers\_add} can be used. @xref{Selecting Signers}.

@var{key} specifies the key to operate on.

@var{userid} selects the user ID or user IDs to be signed. If @var{userid} is set to @code{NULL} all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the @code{uid} field from the user ID object (@code{gpgme\_user\_id\_t}) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (@code{\n}) and set the flag @code{GPGME\_KEYSIGN\_LFSEP}.

@var{expires} specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag @code{GPGME\_KEYSIGN\_NOEXPIRE} is used. Note that this parameter takes an unsigned long value and not a @code{time\_t} to avoid problems on systems which use a signed 32 bit @code{time\_t}. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

@var{flags} can be set to the bit-wise OR of the following flags:

```

@table @code
@item GPGME_KEYSIGN_LOCAL
@since{1.7.0}

```

Instead of creating an exportable



key signature, create a key  
signature which is marked as non-exportable.

```
@item GPGME_KEYSIGN_LFSEP
@since{1.7.0}
```

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that `@var{userid}` may contain several linefeed separated user IDs.

```
@item GPGME_KEYSIGN_NOEXPIRE
```

Force the creation of a key signature without an expiration date. This overrides `@var{expire}` and any local configuration of the engine.

```
@end table
```

The function returns zero on success, `@code{GPG_ERR_NOT_SUPPORTED}` if the engine does not support the command, or a bunch of other error codes.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_keysign_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned long @var{expires}}, @
 @w{unsigned int @var{flags}});
```

```
@since{1.7.0}
```

The function `@code{gpgme_op_keysign_start}` initiates a `@code{gpgme_op_keysign}` operation; see there for details. It must be completed by calling `@code{gpgme_wait}` on the context. [@xref{Waiting For Completion}](#).

```
@end deftypefun
```

```
@c
```

```
@c gpgme_op_revsign
```

```
@c
```

```
@deftypefun gpgme_error_t gpgme_op_revsign @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{gpgme_key_t @var{signing_key}}, @
```

```
@w{const char *@var{userid}}, @
@w{unsigned int @var{flags}});
```

@since{1.14.1}

The function @code{gpgme\_op\_revsig} revokes key signatures of the public key @var{key} made with the key @var{signing\_key}. This function requires at least version 2.2.24 of GnuPG.

@var{key} specifies the key to operate on.

@var{signing\_key} specifies the key whose signatures shall be revoked.

@var{userid} selects the user ID or user IDs whose signatures shall be revoked. If @var{userid} is set to @code{NULL} the signatures on all user IDs are revoked. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the @code{uid} field from the user ID object (@code{gpgme\_user\_id\_t}) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (@code{\n}) and set the flag @code{GPGME\_REVSIG\_LFSEP}.

@var{flags} can be set to the bit-wise OR of the following flags:

```
@table @code
@item GPGME_REVSIG_LFSEP
@since{1.14.1}
```

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that @var{userid} may contain several linefeed separated user IDs.

@end table

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_revsig_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{gpgme_key_t @var{signing_key}}, @
@w{const char *@var{userid}}, @
@w{unsigned int @var{flags}});
```

@since{1.14.1}

The function @code{gpgme\_op\_revsig\_start} initiates a @code{gpgme\_op\_revsig} operation; see there for details. It must be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

@end dectypedefun

@c

@c EXPORTING KEYS

@c

@node Exporting Keys

@subsection Exporting Keys

@cindex key, export

@cindex key ring, export from

Exporting keys means the same as running @command{gpg} with the command @option{--export}. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

@table @code

@item GPGME\_EXPORT\_MODE\_EXTERN

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the @var{keydata} argument of the export function is set to @code{NULL}.

@item GPGME\_EXPORT\_MODE\_MINIMAL

@since{1.3.1}

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

@item GPGME\_EXPORT\_MODE\_SSH

@since{1.4.0}

If this bit is set, the latest authentication key of the requested OpenPGP key is exported in the OpenSSH public key format. This accepts just a single key; to force the export of a specific subkey

a fingerprint pattern with an appended exclamation mark may be used.

@item GPGME\_EXPORT\_MODE\_SECRET  
@since{1.6.0}

Instead of exporting the public key, the secret key is exported. This may not be combined with @code{GPGME\_EXPORT\_MODE\_EXTERN}. For X.509 the export format is PKCS#8.

@item GPGME\_EXPORT\_MODE\_RAW  
@since{1.6.0}

If this flag is used with @code{GPGME\_EXPORT\_MODE\_SECRET} for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

@item GPGME\_EXPORT\_MODE\_PKCS12  
@since{1.6.0}

If this flag is used with @code{GPGME\_EXPORT\_MODE\_SECRET} for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

@item GPGME\_EXPORT\_MODE\_NOUID  
@since{1.12.0 - experimental}  
Do not export user ids. Works only with certain gpg version.

@end table

```
@deftypedefun gpgme_error_t gpgme_op_export (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme\_op\_export} extracts public keys and returns them in the data buffer @var{keydata}. The output format of the key data returned is determined by the @acronym{ASCII} armor attribute set for the context @var{ctx}, or, if that is not set, by the encoding specified for @var{keydata}.

If @var{pattern} is @code{NULL}, all available keys are returned. Otherwise, @var{pattern} contains an engine specific expression that is used to limit the list to all keys matching the pattern.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the

operation

completed successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{keydata} is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_export_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme\_op\_export\_start} initiates a @code{gpgme\_op\_export} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation could be started successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{keydata} is not a valid empty data buffer.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_export_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}}[], @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme\_op\_export} extracts public keys and returns them in the data buffer @var{keydata}. The output format of the key data returned is determined by the @acronym{ASCII} armor attribute set for the context @var{ctx}, or, if that is not set, by the encoding specified for @var{keydata}.

If @var{pattern} or @var{\*pattern} is @code{NULL}, all available keys are returned. Otherwise, @var{pattern} is a @code{NULL} terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation completed successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{keydata} is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_export_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}}[], @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t
@var{keydata}})
```

The function @code{gpgme\_op\_export\_ext\_start} initiates a @code{gpgme\_op\_export\_ext} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation could be started successfully, and @code{GPG\_ERR\_INV\_VALUE}

if @var{keydata} is not a valid empty data buffer.

@end dectyfefun

```
@dectyfefun gpgme_error_t gpgme_op_export_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t keys[]},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}
```

The function @code{gpgme\_op\_export\_keys} extracts public keys and returns them in the data buffer @var{keydata}. The output format of the key data returned is determined by the @acronym{ASCII} armor attribute set for the context @var{ctx}, or, if that is not set, by the encoding specified for @var{keydata}.

The keys to export are taken form the @code{NULL} terminated array @var{keys}. Only keys of the currently selected protocol of @var{ctx} which do have a fingerprint set are considered for export. Other keys specified by the @var{keys} are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation completed successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{keydata} is not a valid empty data buffer, @code{GPG\_ERR\_NO\_DATA} if no useful keys are in @var{keys} and passes through any errors that are reported by the crypto engine support routines.

@end dectyfefun

```
@dectyfefun gpgme_error_t gpgme_op_export_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{keys}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}
```

The function @code{gpgme\_op\_export\_keys\_start} initiates a @code{gpgme\_op\_export\_ext} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation could be started successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{keydata} is not a valid empty data buffer, @code{GPG\_ERR\_NO\_DATA} if no useful keys are in @var{keys} and passes through any errors that are reported by the crypto engine support routines.

@end dectyfefun

@node Importing Keys

@subsection Importing Keys

@cindex key, import

@cindex key ring, import to

Importing keys means the same as running @command{gpg} with the command @option{--import}.

```
@deftypefun gpgme_error_t gpgme_op_import (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme\_op\_import} adds the keys in the data buffer

@var{keydata} to the key ring of the crypto engine used by @var{ctx}.

The format of @var{keydata} can be @acronym{ASCII} armored, for example, but the details are specific to the crypto engine.

After the operation completed successfully, the result can be

retrieved with @code{gpgme\_op\_import\_result}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the import was completed successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{keydata} if @var{ctx} or @var{keydata} is not a valid pointer, and @code{GPG\_ERR\_NO\_DATA} if @var{keydata} is an empty data buffer.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_import_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{keydata}})
```

The function @code{gpgme\_op\_import\_start} initiates a

@code{gpgme\_op\_import} operation. It can be completed by calling

@code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the import could be started successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} or @var{keydata} is not a valid pointer, and @code{GPG\_ERR\_NO\_DATA} if @var{keydata} is an empty data buffer.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_import_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t *@var{keys}})
@since{1.2.0}
```

The

function @code{gpgme\_op\_import\_keys} adds the keys described by the @code{NULL} terminated array @var{keys} to the key ring of the crypto engine used by @var{ctx}. It is used to actually import and make keys permanent which have been retrieved from an external source (i.e. using @code{GPGME\_KEYLIST\_MODE\_EXTERN}) earlier. The external keylisting must have been made with the same context configuration (in

particular the same home directory). `@footnote{`Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.`}` Note that for OpenPGP this may require another access to the keyserver over the network.

Only keys of the currently selected protocol of `@var{ctx}` are considered for import. Other keys specified by the `@var{keys}` are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully, the result can be retrieved with `@code{gpgme_op_import_result}`.

To move keys from one home directory to another, export and import the keydata using `@code{gpgme_op_export}` and `@code{gpgme_op_import}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the import was completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, `@code{GPG_ERR_CONFLICT}` if the key listing mode does not match, and `@code{GPG_ERR_NO_DATA}` if no keys are considered for export.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_import_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
*@var{keys}})
@since{1.2.0}
```

The function `@code{gpgme_op_import_keys_start}` initiates a `@code{gpgme_op_import_keys}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the import was completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{keydata}` if `@var{ctx}` or `@var{keydata}` is not a valid pointer, `@code{GPG_ERR_CONFLICT}` if the key listing mode does not match, and `@code{GPG_ERR_NO_DATA}` if no keys are considered for export.

`@end deftypefun`

```
@deftp {Data type} {gpgme_import_status_t}
```

This is a pointer to a structure used to store a part of the result of a `@code{gpgme_op_import}` operation. For each considered key one status is added that contains information about the result of the import. The structure contains the following members:

```
@table @code
@item gpgme_import_status_t next
```



This is a pointer to the next status structure in the linked list, or `{NULL}` if this is the last element.

@item char \*fpr

This is the fingerprint of the key that was considered.

@item gpgme\_error\_t result

If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is

`{GPG_ERR_NO_ERROR}`.

@item unsigned int status

This is a bit-wise OR of the following flags that give more information about what

part of the key was imported. If the key was already known, this might be 0.

@table @code

@item GPGME\_IMPORT\_NEW

The key was new.

@item GPGME\_IMPORT\_UID

The key contained new user IDs.

@item GPGME\_IMPORT\_SIG

The key contained new signatures.

@item GPGME\_IMPORT\_SUBKEY

The key contained new sub keys.

@item GPGME\_IMPORT\_SECRET

The key contained a secret key.

@end table

@end table

@end deftp

@deftp {Data type} {gpgme\_import\_result\_t}

This is a pointer to a structure used to store the result of a

`{gpgme_op_import}` operation. After a successful import operation, you can retrieve the pointer to the result with

`{gpgme_op_import_result}`. The structure contains the following members:

@table @code

@item int considered

The total number of considered keys.

@item int no\_user\_id

The number of keys without user ID.

@item int imported

The total number of imported keys.

@item int imported\_rsa

The number of imported RSA keys.

@item int unchanged

The number of unchanged keys.

@item

int new\_user\_ids

The number of new user IDs.

@item int new\_sub\_keys

The number of new sub keys.

@item int new\_signatures

The number of new signatures.

@item int new\_revocations

The number of new revocations.

@item int secret\_read

The total number of secret keys read.

@item int secret\_imported

The number of imported secret keys.

@item int secret\_unchanged

The number of unchanged secret keys.

@item int not\_imported

The number of keys not imported.

@item gpgme\_import\_status\_t imports

A list of gpgme\_import\_status\_t objects which contain more information about the keys for which an import was attempted.

@item int skipped\_v3\_keys

For security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP 2.x) and ignores them on import. This counter provides the number of such skipped v3 keys.

@end table

@end deftp

```
@deftypefun gpgme_import_result_t gpgme_op_import_result (@w{gpgme_ctx_t @var{ctx}})
```

The function `gpgme_op_import_result` returns a

```
@code{gpgme_import_result_t}
```

pointer to a structure holding the result

of a `gpgme_op_import` operation. The pointer is only valid if

the last operation on the context was a `gpgme_op_import` or

`gpgme_op_import_start` operation, and if this operation finished

successfully. The returned pointer is only valid until the next

operation is started on the context.

```
@end deftypefun
```

```
@node Deleting Keys
```

```
@subsection Deleting Keys
```

```
@cindex key, delete
```

```
@cindex key ring, delete from
```

```
@deftypefun gpgme_error_t gpgme_op_delete_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
```

```
@var{key}}, @w{unsigned int @var{flags}})
```

```
@since{1.9.1}
```

The function `gpgme_op_delete_ext` deletes the key `@var{key}` from

the key ring of the crypto engine used by `@var{ctx}`.

`@var{flags}` can be set to the bit-wise OR of the following flags:

```
@table @code
```

```
@item GPGME_DELETE_ALLOW_SECRET
```

```
@since{1.9.1}
```

If not set, only public keys are deleted. If set, secret keys are

deleted as well, if that is supported.

```
@item
```

```
GPGME_DELETE_FORCE
```

```
@since{1.9.1}
```

If set, the user is not asked to confirm the deletion.

```
@end table
```

The function returns the error code `GPG_ERR_NO_ERROR` if the key

was deleted successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}` or

`@var{key}` is not a valid pointer, `GPG_ERR_NO_PUBKEY` if

`@var{key}` could not be found in the keyring,

`GPG_ERR_AMBIGUOUS_NAME` if the key was not specified

unambiguously, and `GPG_ERR_CONFLICT` if the secret key for

`@var{key}` is available, but `@var{allow_secret}` is zero.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_delete_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}
```

The function `gpgme_op_delete_ext_start` initiates a `gpgme_op_delete` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `@var{ctx}` or `@var{key}` is not a valid pointer.

```
@end deftypefun
```

The following functions allow only to use one particular flag.

```
@deftypefun gpgme_error_t gpgme_op_delete (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{int @var{allow_secret}})
Similar to gpgme_op_delete_ext, but only the flag GPGME_DELETE_ALLOW_SECRET can be provided.
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_delete_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{int @var{allow_secret}})
Similar to gpgme_op_delete_ext_start, but only the flag GPGME_DELETE_ALLOW_SECRET can be provided.
@end deftypefun
```

```
@node Changing Passphrases
@subsection Changing Passphrases
@cindex passphrase, change
```

```
@deftypefun gpgme_error_t gpgme_op_passwd (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{unsigned int @var{flags}})
```

```
@since{1.3.0}
```

The function `gpgme_op_passwd` changes the passphrase of the private key associated with `@var{key}`. The only allowed value for `@var{flags}` is `0`. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old `gpg` engines (before version 2.0.15) do not support this command and will silently ignore it.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_passwd_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const gpgme_key_t @var{key}}, @
 @w{unsigned int @var{flags}})
```

`@since{1.3.0}`

The function `gpgme_op_passwd_start` initiates a `gpgme_op_passwd` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns `0` if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

`@end deftypefun`

`@c`

`@c CHANGING TOFU DATA`

`@c`

`@node Changing TOFU Data`

`@subsection Changing TOFU Data`

`@cindex validity, TOFU`

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

```
@deftp {Data type} {enum gpgme_tofu_policy_t}
```

`@since{1.7.0}`

```
@tindex gpgme_tofu_policy_t
```

The `gpgme_tofu_policy_t` type specifies the set of possible policy values that are supported by [GPGME](#):

```
@table @code
```

```
@item GPGME_TOFU_POLICY_AUTO
```

Set the policy to `auto`.

```
@item GPGME_TOFU_POLICY_GOOD
```

Set the policy to `good`.

```
@item GPGME_TOFU_POLICY_BAD
```

Set the policy to `bad`.

```

@item GPGME_TOFU_POLICY_ASK
Set the policy to ``ask".
@item GPGME_TOFU_POLICY_UNKNOWN
Set the policy to ``unknown".
@end table

```

```
@end deftp
```

To change the policy for a key the following functions can be used:

```

@deftypefun gpgme_error_t
gpgme_op_tofu_policy @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const gpgme_key_t @var{key}}, @
 @w{gpgme_tofu_policy_t @var{policy}})

```

```
@since{1.7.0}
```

The function `gpgme_op_tofu_policy` changes the TOFU policy of `@var{key}`. The valid values for `@var{policy}` are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
@end deftypefun
```

```

@deftypefun gpgme_error_t gpgme_op_tofu_policy_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const gpgme_key_t @var{key}}, @
 @w{gpgme_tofu_policy_t @var{policy}})

```

```
@since{1.7.0}
```

The function `gpgme_op_tofu_policy_start` initiates a `gpgme_op_tofu_policy` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns `0` if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

```
@end deftypefun
```

@node Advanced Key Editing  
@subsection Advanced Key Editing  
@cindex key, edit

```
@deftp {Data type} {gpgme_error_t (*gpgme_interact_cb_t) @
 (@w{void *@var{handle}}, @
 @w{const char *@var{status}}, @
 @w{const char *@var{args}}, @
 @w{int @var{fd}})}
```

@since{1.7.0}

@tindex gpgme\_interact\_cb\_t

The @code{gpgme\_interact\_cb\_t} type is the type of functions which @acronym{GPGME} calls if a key interact operation is on-going. The status keyword @var{status} and the argument line @var{args} are passed through by @acronym{GPGME} from the crypto engine. An empty string represents EOF. The file descriptor @var{fd} is -1 for normal status messages. If @var{status} indicates a command rather than a status message, the response to the command should be written to @var{fd}. The @var{handle} is provided by the user at start of operation.

The function should return @code{GPG\_ERR\_FALSE} if it did not handle the status code, @code{0} for success, or any other error value.

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_interact (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{unsigned int @var{flags}}, @
 @w{gpgme_interact_cb_t @var{fnc}}, @
 @w{void *@var{handle}}, @
 @w{gpgme_data_t @var{out}})
```

@since{1.7.0}

The function @code{gpgme\_op\_interact} processes the key @var{KEY} interactively, using the interact callback function @var{FNC} with the handle @var{HANDLE}. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by @acronym{GPGME}.

@var{flags} modifies the behaviour

of the function; the only defined  
bit value is:

```
@table @code
@item GPGME_INTERACT_CARD
@since{1.7.0}
```

This is used for smartcard based keys and uses gpgs  
@code{--card-edit} command.

```
@end table
```

The function returns @code{0} if the edit operation completes  
successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} or @var{key} is  
not a valid pointer, and any error returned by the crypto engine or  
the edit callback handler.

```
@end deffun
```

```
@deffun gpgme_error_t gpgme_op_interact_start (@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}}, @
@w{gpgme_interact_cb_t @var{fnc}}, @
@w{void *@var{handle}}, @
@w{gpgme_data_t @var{out}})
```

```
@since{1.7.0}
```

The function @code{gpgme\_op\_interact\_start} initiates a  
@code{gpgme\_op\_interact} operation. It can be completed by calling  
@code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started  
successfully, and @code{GPG\_ERR\_INV\_VALUE}  
if @var{ctx} or @var{key}  
is not a valid pointer.

```
@end deffun
```

```
@node Crypto Operations
@section Crypto Operations
@cindex cryptographic operation
```

Sometimes, the result of a crypto operation returns a list of invalid  
keys encountered in processing the request. The following structure  
is used to hold information about such a key.

```
@defstruct {Data type} {gpgme_invalid_key_t}
```



This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter. The structure contains the following members:

@table @code

@item gpgme\_invalid\_key\_t next

This is a pointer to the next invalid key structure in the linked list, or @code{NULL} if this is the last element.

@item char \*fpr

The fingerprint or key ID of the invalid key encountered.

@item gpgme\_error\_t reason

An error code describing the reason why the key was found invalid.

@end table

@end deftp

@menu

\* Decrypt::                 Decrypting a ciphertext.

\* Verify::  
              Verifying a signature.

\* Decrypt and Verify::       Decrypting a signed ciphertext.

\* Sign::                    Creating a signature.

\* Encrypt::                 Encrypting a plaintext.

@end menu

@node Decrypt

@subsection Decrypt

@cindex decryption

@cindex cryptographic operation, decryption

@deftypefun gpgme\_error\_t gpgme\_op\_decrypt (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_data\_t @var{cipher}}, @w{gpgme\_data\_t @var{plain}})

The function @code{gpgme\_op\_decrypt} decrypts the ciphertext in the data object @var{cipher} and stores it into the data object @var{plain}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the ciphertext could be decrypted successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx}, @var{cipher} or @var{plain} is not a valid pointer, @code{GPG\_ERR\_NO\_DATA} if @var{cipher} does not contain any data to decrypt, @code{GPG\_ERR\_DECRYPT\_FAILED} if @var{cipher} is not a valid cipher text, @code{GPG\_ERR\_BAD\_PASSPHRASE} if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_decrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The function `gpgme_op_decrypt_start` initiates a `gpgme_op_decrypt` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `var{cipher}` or `var{plain}` is not a valid pointer.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_decrypt_ext (@
 @w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_decrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{cipher}}, @
 @w{gpgme_data_t @var{plain}})
```

@since{1.8.0}

The function `gpgme_op_decrypt_ext` is the same as `gpgme_op_decrypt` but has an additional argument `var{flags}`. If `var{flags}` is 0 both function behave identically.

The value in `var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

```
@table @code
@item GPGME_DECRYPT_VERIFY
@since{1.8.0}
```

The `GPGME_DECRYPT_VERIFY` symbol specifies that this function shall exactly act as `gpgme_op_decrypt_verify`.

```
@item GPGME_DECRYPT_UNWRAP
@since{1.8.0}
```

The `GPGME_DECRYPT_UNWRAP` symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to `GPGME_ENCRYPT_WRAP`.

@end table

The function returns the error codes as described for

```
@code{gpgme_op_decrypt}.
```

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_decrypt_ext_start (@
```

```
 @w{gpgme_ctx_t @var{ctx}}, @
```

```
 @w{gpgme_decrypt_flags_t @var{flags}}, @
```

```
 @w{gpgme_data_t @var{cipher}}, @
```

```
 @w{gpgme_data_t @var{plain}})
```

```
@since{1.8.0}
```

The function `gpgme_op_decrypt_ext_start` initiates a `gpgme_op_decrypt_ext` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `@var{cipher}` or `@var{plain}` is not a valid pointer.

```
@end deftypefun
```

```
@deftp {Data type} {gpgme_recipient_t}
```

```
@since{1.1.0}
```

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a `gpgme_op_decrypt` operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

```
@table @code
```

```
@item gpgme_recipient_t next
```

This is a pointer to the next recipient structure in the linked list, or `NULL` if this is the last element.

```
@item gpgme_pubkey_algo_t
```

The public key algorithm used in the encryption.

```
@item char *keyid
```

This is the key ID of the key (in hexadecimal digits) used as recipient.

```
@item gpgme_error_t status
```

This is an error number with the error code `GPG_ERR_NO_SECKEY` if the secret key for this recipient is not available, and 0 otherwise.

@end table

@end deftp

@deftp {Data type} {gpgme\_decrypt\_result\_t}

This is a pointer to a structure used to store the result of a `{gpgme_op_decrypt}` operation. After successfully decrypting data, you can retrieve the pointer to the result with `{gpgme_op_decrypt_result}`. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a structure on its own. The structure contains the following members:

@table @code

@item char \*unsupported\_algorithm

If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

@item unsigned int wrong\_key\_usage

: 1

@since{0.9.0}

This is true if the key was not used according to its policy.

@item unsigned int legacy\_cipher\_nomdc : 1

@since{1.11.2}

The message was made by a legacy algorithm without any integrity protection. This might be an old but legitimate message.

@item unsigned int is\_mime : 1;

@since{1.11.0}

The message claims that the content is a MIME object.

@item unsigned int is\_de\_vs : 1;

@since{1.10.0}

The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

@item gpgme\_recipient\_t recipients

@since{1.1.0}

This is a linked list of recipients to which this message was encrypted.

@item char \*file\_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

@item char \*session\_key

@since{1.8.0}

A textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session keys (see `gpgme_set_ctx_flag`, "export-session-key"), and a session key was available for the most recent decryption operation. Otherwise, this is a null pointer.

You must not try to access this member of the struct unless `gpgme_set_ctx_flag` (ctx, "export-session-key") returns success or `gpgme_get_ctx_flag` (ctx, "export-session-key") returns true (non-empty string).

`char *symkey_algo`  
@since{1.11.0}

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

@end table  
@end deftp

@deftypefun `gpgme_decrypt_result_t gpgme_op_decrypt_result (@w{gpgme_ctx_t @var{ctx}})`

The function `gpgme_op_decrypt_result` returns a `gpgme_decrypt_result_t` pointer to a structure holding the result of a `gpgme_op_decrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_decrypt` or `gpgme_op_decrypt_start` operation.

If the operation failed this might be a `NULL` pointer. The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@node Verify  
@subsection Verify  
@cindex verification  
@cindex signature, verification  
@cindex cryptographic operation, verification  
@cindex cryptographic operation, signature check  
@cindex signature notation data  
@cindex notation data

@deftypefun `gpgme_error_t gpgme_op_verify (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})`

The function `gpgme_op_verify` verifies that the signature in the data object `@var{sig}` is a valid signature. If `@var{sig}` is a

detached signature, then the signed text should be provided in `@var{signed_text}` and `@var{plain}` should be a null pointer. Otherwise, if `@var{sig}` is a normal (or cleartext) signature, `@var{signed_text}` should be a null pointer and `@var{plain}` should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with `@code{gpgme_op_verify_result}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{sig}` or `@var{plain}` is not a valid pointer, `@code{GPG_ERR_NO_DATA}` if `@var{sig}` does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
```

The function `@code{gpgme_op_verify_start}` initiates a `@code{gpgme_op_verify}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. @xref{Waiting For Completion}.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{sig}` or `@var{plain}` is not a valid pointer, and `@code{GPG_ERR_NO_DATA}` if `@var{sig}` or `@var{plain}` does not contain any data to verify.

```
@end deftypefun
```

```
@deftp {Data type} {gpgme_sig_notation_t}
```

This is a pointer to a structure used to store a part of the result of a `@code{gpgme_op_verify}` operation. The structure contains the following members:

```
@table @code
```

```
@item gpgme_sig_notation_t next
```

This is a pointer to the next new signature notation structure in the linked list, or `@code{NULL}` if this is the last element.

```
@item char *name
```

The name of the notation field. If this is `@code{NULL}`, then the member `@code{value}` will contain a policy URL.

```
@item int name_len
```

The length of the `{name}` field. For strings the length is counted without the trailing binary zero.

`@item char *value`

The value of the notation field. If `{name}` is `{NULL}`, then this is a policy URL.

`@item int value_len`

The length of the `{value}` field. For strings the length is counted without the trailing binary zero.

`@item gpgme_sig_notation_flags_t flags`

The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used as an argument to the function `{gpgme_sig_notation_add}`. The value `{flags}` is a bitwise-or combination of one or multiple of the following bit values:

`@table @code`

`@item GPGME_SIG_NOTATION_HUMAN_READABLE`

`@since{1.1.0}`

The `{GPGME_SIG_NOTATION_HUMAN_READABLE}` symbol specifies that the notation data is in human readable form

`@item GPGME_SIG_NOTATION_CRITICAL`

`@since{1.1.0}`

The `{GPGME_SIG_NOTATION_CRITICAL}` symbol specifies that the notation data is critical.

`@end table`

`@item unsigned int human_readable : 1`

This is true if the `{GPGME_SIG_NOTATION_HUMAN_READABLE}` flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

`@item unsigned int critical : 1`

This is true if the

`{GPGME_SIG_NOTATION_CRITICAL}` flag is set and false otherwise. This flag is valid for notation data and policy URLs.

`@end table`

`@end deftp`

`@deftp {Data type} {gpgme_signature_t}`

This is a pointer to a structure used to store a part of the result of a `{gpgme_op_verify}` operation. The structure contains the following members:

`@table @code`

`@item gpgme_signature_t next`

This is a pointer to the next new signature structure in the linked list, or `{NULL}` if this is the last element.

`@item gpgme_sigsum_t summary`

This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for `GPGME_SIGSUM_VALID` like this:

`@example`

```
if ((sig.summary & GPGME_SIGSUM_VALID))
```

```
@{
```

```
..do stuff if valid..
```

```
@}
```

```
else
```

```
@{
```

```
..do stuff if not fully valid..
```

```
@}
```

```
@end example
```

The defined bits are:

`@table @code`

`@item GPGME_SIGSUM_VALID`

The signature is fully valid.

`@item GPGME_SIGSUM_GREEN`

The signature is good but one might want to display some extra information. Check the other bits.

`@item GPGME_SIGSUM_RED`

The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

`@item GPGME_SIGSUM_KEY_REVOKED`

The key or at least one certificate has been revoked.

`@item GPGME_SIGSUM_KEY_EXPIRED`

The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.



@item GPGME\_SIGSUM\_SIG\_EXPIRED

The signature has expired.

@item GPGME\_SIGSUM\_KEY\_MISSING

Can't verify due to a missing key or certificate.

@item GPGME\_SIGSUM\_CRL\_MISSING

The CRL (or an equivalent mechanism) is not available.

@item GPGME\_SIGSUM\_CRL\_TOO\_OLD

Available CRL is too old.

@item GPGME\_SIGSUM\_BAD\_POLICY

A policy requirement was not met.

@item GPGME\_SIGSUM\_SYS\_ERROR

A system error occurred.

@item GPGME\_SIGSUM\_TOFU\_CONFLICT

A TOFU conflict was detected.

@end table

@item char \*fpr

This is the fingerprint or key ID of the signature.

@item gpgme\_error\_t status

This is the status of the signature. In particular, the following status codes are of interest:

@table @code

@item GPG\_ERR\_NO\_ERROR

This status indicates that the signature could be verified or that there is no signature. For the combined result this status means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check the @code{summary} field for that.

For example a @code{gpgme\_op\_decrypt\_verify} returns a verification result with GPG\_ERR\_NO\_ERROR for encrypted but unsigned data.

@item GPG\_ERR\_SIG\_EXPIRED

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

@item GPG\_ERR\_KEY\_EXPIRED

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

@item GPG\_ERR\_CERT\_REVOKED

This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures are valid and all keys are revoked.

@item GPG\_ERR\_BAD\_SIGNATURE

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPG\_ERR\_NO\_PUBKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPG\_ERR\_GENERAL

This status indicates that there was some other error which prevented the signature verification.

@end table

@item gpgme\_sig\_notation\_t notations

This is a linked list with the notation data and policy URLs.

@item unsigned long timestamp

The creation timestamp of this signature.

@item unsigned long exp\_timestamp

The expiration timestamp of this signature, or 0 if the signature does not expire.

@item unsigned int wrong\_key\_usage : 1

This is true if the key was not used according to its policy.

@item unsigned int pka\_trust : 2

This is set to the trust information gained by means of the PKA system.

Values are:

@table @code

@item 0

No PKA information available or verification not possible.

@item 1

PKA verification failed.

@item 2

PKA verification succeeded.

@item 3

Reserved for future use.

@end table

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

@item unsigned int chain\_model : 1

@since{1.1.6}

This is true if the

validity of the signature has been checked using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

@item gpgme\_validity\_t validity

The validity of the signature.

@item gpgme\_error\_t validity\_reason

If a signature is not valid, this provides a reason why.

@item gpgme\_pubkey\_algo\_t

The public key algorithm used to create this signature.

@item gpgme\_hash\_algo\_t

The hash algorithm used to create this signature.

@item char \*pka\_address

The mailbox from the PKA information or @code{NULL}.

@item gpgme\_key\_t key

@since{1.7.0}

An object describing the key used to create the signature. This key object may be incomplete in that it only conveys information available directly with a signature. It may also be @code{NULL} if such information is not readily available.

@end table

@end deftp

@deftp {Data type} {gpgme\_verify\_result\_t}

This is a pointer to a structure used to store the result of a

@code{gpgme\_op\_verify} operation. After verifying a signature, you can retrieve the pointer to the result with

@code{gpgme\_op\_verify\_result}. If the operation failed this might be a @code{NULL} pointer. The structure contains the following member:

@table @code

@item gpgme\_signature\_t signatures

A linked list with information about all signatures for which a verification was attempted.

@item char \*file\_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

@item unsigned int is\_mime : 1;

@since{1.11.0}

The message claims that the content is a MIME object. Warning: This flag is not covered by the signature.

@end table

@end deftp

@deftypefun

gpgme\_verify\_result\_t gpgme\_op\_verify\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_verify\_result} returns a

@code{gpgme\_verify\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_verify} operation. The pointer is only valid if the last operation on the context was a @code{gpgme\_op\_verify},

@code{gpgme\_op\_verify\_start}, @code{gpgme\_op\_decrypt\_verify} or

@code{gpgme\_op\_decrypt\_verify\_start} operation, and if this operation finished successfully (for @code{gpgme\_op\_decrypt\_verify} and

@code{gpgme\_op\_decrypt\_verify\_start}, the error code

@code{GPG\_ERR\_NO\_DATA} counts as successful in this context). The

returned pointer is only valid until the next operation is started on

the context.

@end deftypefun

@node Decrypt and Verify

@subsection Decrypt and Verify

@cindex decryption and verification

@cindex verification and decryption

@cindex signature check

@cindex cryptographic operation, decryption and verification

```
@deftypefun gpgme_error_t gpgme_op_decrypt_verify
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The function `gpgme_op_decrypt_verify` decrypts the ciphertext in the data object `@var{cipher}` and stores it into the data object `@var{plain}`. If `@var{cipher}` contains signatures, they will be verified.

After the operation completed, `gpgme_op_decrypt_result` and `gpgme_op_verify_result` can be used to retrieve more information about the signatures.

If the error code `GPG_ERR_NO_DATA` is returned, `@var{cipher}` does not contain any data to decrypt. However, it might still be signed. The information about detected signatures is available with `gpgme_op_verify_result` in this case.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be decrypted successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{cipher}` or `@var{plain}` is not a valid pointer, `GPG_ERR_NO_DATA` if `@var{cipher}` does not contain any data to decrypt, `GPG_ERR_DECRYPT_FAILED` if `@var{cipher}` is not a valid cipher text, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_decrypt_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The function `gpgme_op_decrypt_verify_start` initiates a `gpgme_op_decrypt_verify` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{cipher}`, `@var{plain}` or `@var{r_stat}` is not a valid pointer, and `GPG_ERR_NO_DATA` if `@var{cipher}` does not contain any data to decrypt.

```
@end deftypefun
```

When processing mails it is sometimes useful to extract the actual mail address (the `addr-spec`) from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

@deftypefun @w{char \*} gpgme\_addrspec\_from\_uid (@w{const char \*}@var{uid})

@since{1.7.1}

Return the mail address (called ``addr-spec" in RFC-5322) from the string @var{uid} which is assumed to be a user id (called ``address" in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must free the result using @code{gpgme\_free}. Returns @code{NULL} if no valid address was found (in which case @code{ERRNO} is set to @code{EINVAL}) or for other errors.

@end deftypefun

@node Sign

@subsection Sign

@cindex signature, creation

@cindex sign

@cindex cryptographic operation, signing

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

@menu

\* Selecting Signers::       How to choose the keys to sign with.

\* Creating a Signature::     How to create a signature.

\* Signature Notation Data::   How to add notation data to a signature.

@end menu

@node Selecting Signers

@subsubsection Selecting Signers

@cindex signature, selecting signers

@cindex signers, selecting

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list. If no signer has been set into the context a default key is used for signing.

@deftypefun void gpgme\_signers\_clear (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_signers\_clear} releases a reference for each key on the signers list and removes the list of signers from the context @var{ctx}.

Every context starts with an empty list.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_signers_add (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}})
```

The function

`gpgme_signers_add` adds the key `@var{key}` to the list of signers in the context `@var{ctx}`.

Calling this function acquires an additional reference for the key.

```
@end deftypefun
```

```
@deftypefun @w{unsigned int} gpgme_signers_count (@w{const gpgme_ctx_t @var{ctx}}) @since{1.4.3}
```

The function `gpgme_signers_count` returns the number of signer keys in the context `@var{ctx}`.

```
@end deftypefun
```

```
@deftypefun gpgme_key_t gpgme_signers_enum (@w{const gpgme_ctx_t @var{ctx}}, @w{int @var{seq}})
```

The function `gpgme_signers_enum` returns the `@var{seq}`th key in the list of signers in the context `@var{ctx}`. An additional reference is acquired for the user.

If `@var{seq}` is out of range, `NULL` is returned.

```
@end deftypefun
```

```
@node Creating a Signature
```

```
@subsubsection Creating a Signature
```

```
@deftp {Data type} {enum gpgme_sig_mode_t}
```

```
@tindex gpgme_sig_mode_t
```

The `gpgme_sig_mode_t` type is used to specify the desired type of a signature. The following modes are available:

```
@table @code
```

```
@item
```

**GPGME\_SIG\_MODE\_NORMAL**

A normal signature is made, the output includes the plaintext and the signature.

```
@item GPGME_SIG_MODE_DETACH
```

A detached signature is made.

```
@item GPGME_SIG_MODE_CLEAR
```

A clear text signature is made. The `ASCII` armor and text

mode settings of the context are ignored.

@end table

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{plain}},
@w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
```

The function `gpgme_op_sign` creates a signature for the text in the data object `@var{plain}` and returns it in the data object `@var{sig}`. The type of the signature created is determined by the `@acronym{ASCII} armor` (or, if that is not set, by the encoding specified for `@var{sig}`), the text mode attributes set for the context `@var{ctx}` and the requested signature mode `@var{mode}`.

After the operation completed successfully, the result can be retrieved with `gpgme_op_sign_result`.

If an S/MIME

signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with `gpgme_set_include_certs`. [@xref{Included Certificates}](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the signature could be created successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{plain}` or `@var{sig}` is not a valid pointer, `GPG_ERR_NO_DATA` if the signature could not be created, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, `GPG_ERR_UNUSABLE_SECKEY` if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{plain}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
```

The function `gpgme_op_sign_start` initiates a `gpgme_op_sign` operation. It can be completed by calling `gpgme_wait` on the context. [@xref{Waiting For Completion}](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{plain}` or `@var{sig}` is not a valid pointer.

@end deftypefun

```
@deftp {Data type} {gpgme_new_signature_t}
```

This is a pointer to a structure used to store a part of the result of a `gpgme_op_sign` operation. The structure contains the following members:



@table @code  
@item gpgme\_new\_signature\_t next  
This is a pointer to the next new signature structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme\_sig\_mode\_t type  
The type of this signature.

@item gpgme\_pubkey\_algo\_t pubkey\_algo  
The public key algorithm used to create this signature.

@item gpgme\_hash\_algo\_t hash\_algo  
The hash algorithm used to create this signature.

@item unsigned int sig\_class  
The signature class of this signature.

@item long int timestamp  
The creation timestamp of this signature.

@item  
char \*fpr  
The fingerprint of the key which was used to create this signature.  
@end table  
@end deftp

@deftp {Data type} {gpgme\_sign\_result\_t}  
This is a pointer to a structure used to store the result of a @code{gpgme\_op\_sign} operation. After successfully generating a signature, you can retrieve the pointer to the result with @code{gpgme\_op\_sign\_result}. The structure contains the following members:

@table @code  
@item gpgme\_invalid\_key\_t invalid\_signers  
A linked list with information about all invalid keys for which a signature could not be created.

@item gpgme\_new\_signature\_t signatures  
A linked list with information about all signatures created.  
@end table  
@end deftp

@deftypedefun gpgme\_sign\_result\_t gpgme\_op\_sign\_result (@w{gpgme\_ctx\_t @var{ctx}})  
The function @code{gpgme\_op\_sign\_result} returns a @code{gpgme\_sign\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_sign} operation. The pointer is only valid if the last operation on the context was

a `{gpgme_op_sign}`,  
`{gpgme_op_sign_start}`, `{gpgme_op_encrypt_sign}` or  
`{gpgme_op_encrypt_sign_start}` operation. If that operation  
failed, the function might return a `{NULL}` pointer. The returned  
pointer is only valid until the next operation is started on the  
context.

`{end dectyfefun}`

`{node Signature Notation Data}`

`{subsubsection Signature Notation Data}`

`{cindex notation data}`

`{cindex signature notation data}`

`{cindex policy URL}`

Using the following functions, you can attach arbitrary notation data  
to a signature. This information is then available to the user when  
the signature is verified.

```
{dectyfefun void gpgme_sig_notation_clear (@w{gpgme_ctx_t @var{ctx}})
{since{1.1.0}}
```

The function `{gpgme_sig_notation_clear}` removes the notation data  
from the context `{var{ctx}}`. Subsequent signing operations from this  
context will not include any notation data.

Every context starts with an empty notation data list.

`{end dectyfefun}`

```
{dectyfefun gpgme_error_t gpgme_sig_notation_add
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{name}}, @w{const char *@var{value}},
@w{gpgme_sig_notation_flags_t @var{flags}})
{since{1.1.0}}
```

The function `{gpgme_sig_notation_add}` adds the notation data with  
the name `{var{name}}` and the value `{var{value}}` to the context  
`{var{ctx}}`.

Subsequent signing operations will include this notation data, as well  
as any other notation data that was added since the creation of the  
context or the last `{gpgme_sig_notation_clear}` operation.

The arguments `{var{name}}` and `{var{value}}` must be `{NUL}`-terminated  
strings in human-readable form. The flag  
`{GPGME_SIG_NOTATION_HUMAN_READABLE}` is implied  
(non-human-readable notation data is currently not supported). The  
strings must be in UTF-8 encoding.

If @var{name} is @code{NULL}, then @var{value} should be a policy URL.

The function @code{gpgme\_sig\_notation\_add} returns the error code @code{GPG\_ERR\_NO\_ERROR} if the notation data could be added successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} is not a valid pointer, or if @var{name}, @var{value} and @var{flags} are an invalid combination. The function also passes through any errors that are reported by the crypto engine support routines.  
@end deftypefun

```
@deftypefun gpgme_sig_notation_t gpgme_sig_notation_get (@w{const gpgme_ctx_t @var{ctx}})
@since{1.1.0}
```

The function @code{gpgme\_sig\_notation\_get} returns the linked list of notation data structures that are contained in the context @var{ctx}.

If @var{ctx} is not a valid pointer, or there is no notation data added for this context, @code{NULL} is returned.  
@end deftypefun

```
@node Encrypt
@subsection Encrypt
@cindex encryption
@cindex cryptographic operation, encryption
```

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then passed to the encryption operation.

```
@menu
* Encrypting a Plaintext:: How to encrypt a plaintext.
@end menu
```

```
@node Encrypting a
Plaintext
@subsubsection Encrypting a Plaintext
```

```
@deftypefun gpgme_error_t gpgme_op_encrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t
@var{cipher}})
```

The function @code{gpgme\_op\_encrypt} encrypts the plaintext in the data object @var{plain} for the recipients @var{recp} and stores the ciphertext in the data object @var{cipher}. The type of the ciphertext created is determined by the @acronym{ASCII} armor (or, if that is not set, by the encoding specified for @var{cipher}) and the

text mode attributes set for the context `@var{ctx}`.

`@var{recp}` must be a `@code{NULL}`-terminated array of keys. The user must keep references for all keys during the whole duration of the call (but see `@code{gpgme_op_encrypt_start}` for the requirements with the asynchronous variant).

The value in `@var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

`@table @code`

`@item GPGME_ENCRYPT_ALWAYS_TRUST`

The

`@code{GPGME_ENCRYPT_ALWAYS_TRUST}` symbol specifies that all the recipients in `@var{recp}` should be trusted, even if the keys do not have a high enough validity in the keyring. This flag should be used with care; in general it is not a good idea to use any untrusted keys.

`@item GPGME_ENCRYPT_NO_ENCRYPT_TO`

`@since{1.2.0}`

The `@code{GPGME_ENCRYPT_NO_ENCRYPT_TO}` symbol specifies that no default or hidden default recipients as configured in the crypto backend should be included. This can be useful for managing different user profiles.

`@item GPGME_ENCRYPT_NO_COMPRESS`

`@since{1.5.0}`

The `@code{GPGME_ENCRYPT_NO_COMPRESS}` symbol specifies that the plaintext shall not be compressed before it is encrypted. This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

`@item GPGME_ENCRYPT_PREPARE`

`@itemx GPGME_ENCRYPT_EXPECT_SIGN`

The `@code{GPGME_ENCRYPT_PREPARE}` symbol is used with the UI Server protocol to prepare an encryption

(i.e. sending the

`@code{PREP_ENCRYPT}` command). With the

`@code{GPGME_ENCRYPT_EXPECT_SIGN}` symbol the UI Server is advised to also expect a sign command.

`@item GPGME_ENCRYPT_SYMMETRIC`

`@since{1.7.0}`

The `@code{GPGME_ENCRYPT_SYMMETRIC}` symbol specifies that the output should be additionally encrypted symmetrically even

if recipients are provided. This feature is only supported for the OpenPGP crypto engine.

@item GPGME\_ENCRYPT\_THROW\_KEYIDS  
@since{1.8.0}

The @code{GPGME\_ENCRYPT\_THROW\_KEYIDS} symbol requests that the identifiers for the decryption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

@item GPGME\_ENCRYPT\_WRAP  
@since{1.8.0}

The @code{GPGME\_ENCRYPT\_WRAP} symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to @code{GPGME\_DECRYPT\_UNWRAP}.

@item GPGME\_ENCRYPT\_WANT\_ADDRESS  
@since{1.11.0}

The @code{GPGME\_ENCRYPT\_WANT\_ADDRESS} symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code @code{GPG\_ERR\_INV\_USER\_ID} is returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the @var{recpstring} argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

@end table

If @code{GPG\_ERR\_UNUSABLE\_PUBKEY} is returned, some recipients in @var{recp} are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in @var{cipher} (if this happens depends on the crypto engine). More information about the invalid recipients is available with @code{gpgme\_op\_encrypt\_result}.

If @var{recp} is @code{NULL}, symmetric rather than public key encryption is performed.

Symmetrically encrypted cipher text can be deciphered with @code{gpgme\_op\_decrypt}. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption is currently only supported for the OpenPGP crypto backend.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be created successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{recp}`, `@var{plain}` or `@var{cipher}` is not a valid pointer, `GPG_ERR_UNUSABLE_PUBKEY` if `@var{recp}` contains some invalid recipients, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

The function `gpgme_op_encrypt_start` initiates

a

`gpgme_op_encrypt` operation. It can be completed by calling `gpgme_wait` on the context. @xref{Waiting For Completion}.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even if the operation is not yet finished.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}`, `@var{rset}`, `@var{plain}` or `@var{cipher}` is not a valid pointer, and `GPG_ERR_UNUSABLE_PUBKEY` if `@var{rset}` does not contain any valid recipients.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_ext @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{recp}}[], @
 @w{const char *@var{recpstring}}, @
 @w{gpgme_encrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

@since{1.11.0}

This is an extended version of `gpgme_op_encrypt` with `@var{recpstring}` as additional parameter. If `@var{recp}` is NULL and `@var{recpstring}` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `@var{recp}` the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is remove from each line in `@var{recpstring}`. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

```
@table @code
@item --hidden
@itemx --no-hidden
```

These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the gpg option `@option{-R}` (or `@option{-F}` in file mode) is used instead of `@option{-r}` (`@option{-f}` in file mode).

```
@item --file
@itemx
--no-file
```

These keywords toggle between regular and file mode for all following key specification. In file mode the option `@option{-f}` or `@option{-F}` is passed to gpg. At least GnuPG version 2.1.14 is required to handle these options. The `@code{GPGME_ENCRYPT_WANT_ADDRESS}` flag is ignored in file mode.

```
@item --
```

This keyword disables all keyword detection up to the end of the string. All keywords are treated as verbatim arguments.

```
@end table
```

To create a `@var{recpstring}` it is often useful to employ a `strconcat` style function. For example this function creates a string to encrypt to two keys:

```
@example
char *
xbuild_recstring (const char *key1, const char *key2)
@{
char *result = gpgmt_strconcat ("--\n", key1, "\n", key2, NULL);
if (!result)
 @ { perror ("strconcat failed"); exit (2); @ }
return result;
@}
@end example
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used `strconcat` function is available in `Libgpg-error 1.28` and later; `Libgpg-error` (aka `Gpgmt`) is a dependency of `GPGME`. The number of arguments to

@code{gpgrt\_strconcat} is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```
@example
char *
xbuild_long_recpstring (void)
@{
gpgrt_stream_t memfp;
const char *s;
void *result;

memfp = gpgrt_fopenmem (0, "w+b");
if (!memfp)
 @ { perror ("fopenmem failed"); exit (2); @ }
gpgrt_fputs ("--", memfp);
while ((s = get_next_keyspec ()))
 @ {
 gpgrt_fputc ('\n', memfp);
 gpgrt_fputs (s, memfp);
 @ }
gpgrt_fputc (0, memfp);
if (gpgrt_ferror (memfp))
 @ { perror ("writing to memstream failed"); exit (2); @ }
if (gpgrt_fclose_snatch (memfp, &result, NULL))
 @ { perror ("fclose_snatch failed"); exit (2); @ }
return result;
@ }
@end example
```

In this example @code{get\_next\_keyspec} is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to @command{gpg} which has as a platform specific length limitation.

@end deftypefun

```
@deftypefun gpgrt_error_t gpgrt_op_encrypt_ext_start @
 (@w{gpgrt_ctx_t @var{ctx}}, @
 @w{gpgrt_key_t @var{recp}[]}, @
 @w{const char *@var{recpstring}}, @
 @w{gpgrt_encrypt_flags_t @var{flags}}, @
 @w{gpgrt_data_t @var{plain}}, @w{gpgrt_data_t @var{cipher}})
```

@since{1.11.0}



This is an extended version of `gpgme_op_encrypt_start` with `recpstring` as additional parameter. If `recp` is NULL and `recpstring` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `recp` the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

`@end deftypefun`

`@deftp {Data type} {gpgme_encrypt_result_t}`

This is a pointer to a structure used to store the result of a `gpgme_op_encrypt` operation. After successfully encrypting data, you can retrieve the pointer to the result with `gpgme_op_encrypt_result`. The structure contains the following members:

`@table @code`

`@item gpgme_invalid_key_t invalid_recipients`

A linked list with information about all invalid keys for which the data could not be encrypted.

`@end table`

`@end deftp`

`@deftypefun gpgme_encrypt_result_t gpgme_op_encrypt_result (@w{gpgme_ctx_t @var{ctx}})`

The function `gpgme_op_encrypt_result` returns a `gpgme_encrypt_result_t` pointer to a structure holding the result of a `gpgme_op_encrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_encrypt`, `gpgme_op_encrypt_start`, `gpgme_op_sign` or `gpgme_op_sign_start` operation. If this operation failed, this might be a `NULL` pointer. The returned pointer is only valid until the next operation is started on the context.

`@end deftypefun`

`@deftypefun gpgme_error_t gpgme_op_encrypt_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})`

The function `gpgme_op_encrypt_sign` does a combined encrypt and sign operation. It is used like `gpgme_op_encrypt`, but the ciphertext also contains signatures for the signers listed in `ctx`.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

The function @code{gpgme\_op\_encrypt\_sign\_start} initiates a @code{gpgme\_op\_encrypt\_sign} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation could be started successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{ctx}, @var{rset}, @var{plain} or @var{cipher} is not a valid pointer.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{recp}}[], @
 @w{const char *@var{recpstring}}, @
 @w{gpgme_encrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

@since{1.11.0}

This is an extended version of @code{gpgme\_op\_encrypt\_sign} with @var{recpstring} as additional parameter. If @var{recp} is NULL and @var{recpstring} is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to @var{recp} the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{recp}}[], @
 @w{const char *@var{recpstring}}, @
 @w{gpgme_encrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

@since{1.11.0}

This is an extended version of `gpgme_op_encrypt_sign_start` with `recpstring` as additional parameter. If `recp` is NULL and `recpstring` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `recp` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

`@end deftypefun`

`@node Miscellaneous`

`@section Miscellaneous`  
operations

Here are some support functions which are sometimes useful.

`@menu`

- \* Running other Programs:: Running other Programs
  - \* Using the Assuan protocol:: Using the Assuan protocol
  - \* Checking for updates:: How to check for software updates
- `@end menu`

`@node Running other Programs`

`@subsection Running other Programs`

GPGME features an internal subsystem to run the actual backend engines. Along with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

`@deftypefun gpgme_error_t gpgme_op_spawn @`

`(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @`  
`@w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @`  
`@w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @`  
`@w{unsigned int @var{flags}})`

`@since{1.5.0}`

The

function `gpgme_op_spawn` runs the program `file` with the arguments taken from the NULL terminated array `argv`. If no arguments are required `argv` may be given as `NULL`. In the latter case or if `argv[0]` is the empty string, GPGME uses the

basename of `@var{file}` for `@code{argv[0]}`. The file descriptors `@code{stdin}`, `@code{stdout}`, and `@code{stderr}` are connected to the data objects `@var{datain}`, `@var{dataout}`, and `@var{dataerr}`. If NULL is passed for one of these data objects the corresponding file descriptor is connected to `@file{/dev/null}`.

The value in `@var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

```
@table @code
@item GPGME_SPAWN_DETACHED
@since{1.5.0}
```

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

```
@item GPGME_SPAWN_ALLOW_SET_FG
@since{1.5.0}
```

Under Windows  
this flag allows the called program to put itself into the foreground.

```
@end table
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_spawn_start @
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
 @w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
 @w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
 @w{unsigned int @var{flags}})
```

```
@since{1.5.0}
```

This is the asynchronous variant of `@code{gpgme_op_spawn}`.

```
@end deftypefun
```

```
@node Using the Assuan protocol
@subsection Using the Assuan protocol
```

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using `@code{gpgme_ctx_set_engine_info}`, passing the location of the servers socket as `@var{file_name}` argument, and an empty string as `@var{home_dir}` argument.

The Assuan protocol functions use three kinds of callbacks to transfer

data:

```
@deftp {Data type}
{ gpgme_error_t (*gpgme_assuan_data_cb_t) @
 (@w{void *@var{opaque}}, @w{const void *@var{data}}, @
 @w{size_t @var{datalen}})}
```

@since{1.2.0}

This callback receives any data sent by the server. @var{opaque} is the pointer passed to @code{gpgme\_op\_assuan\_transact\_start}, @var{data} of length @var{datalen} refers to the data sent.

@end deftp

```
@deftp {Data type} { gpgme_error_t (*gpgme_assuan_inquire_cb_t) @
 (@w{void *@var{opaque}}, @w{const char *@var{name}}, @
 @w{const char *@var{args}}, @w{gpgme_data_t *@var{r_data}})}
```

@since{1.2.0}

This callback is used to provide additional data to the Assuan server.

@var{opaque} is the pointer passed to

@code{gpgme\_op\_assuan\_transact\_start}, @var{name} and @var{args}

specify what kind of data the server requested, and @var{r\_data} is

used to return the actual data.

Note: Returning data is currently not implemented in @acronym{GPGME}.

@end deftp

```
@deftp {Data type} { gpgme_error_t (*gpgme_assuan_status_cb_t) @
 (@w{void *@var{opaque}}, @w{const char *@var{status}}, @
 @w{const char *@var{args}})}
```

@since{1.2.0}

This callback receives any status lines sent by the server.

@var{opaque} is the pointer passed to

@code{gpgme\_op\_assuan\_transact\_start}, @var{status} and @var{args}

denote the status update sent.

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_assuan_transact_start @
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
 @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
 @w{void * @var{data_cb_value}}, @
 @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
 @w{void * @var{inquire_cb_value}}, @
```

```
@w{gpgme_assuan_status_cb_t @var{status_cb}}, @
@w{void * @var{status_cb_value}})
```

```
@since{1.2.0}
```

Send the Assuan `@var{command}` and return results via the callbacks.  
Any callback may be `@code{NULL}`. The result of the operation may be  
retrieved using `@code{gpgme_wait_ext}`.

Asynchronous variant.

```
@end deftypefun
```

```
@deftypefun
```

```
gpgme_error_t gpgme_op_assuan_transact_ext @
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
 @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
 @w{void * @var{data_cb_value}}, @
 @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
 @w{void * @var{inquire_cb_value}}, @
 @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
 @w{void * @var{status_cb_value}}, @
 @w{gpgme_error_t *@var{op_err}})
```

Send the Assuan `@var{command}` and return results via the callbacks.  
The result of the operation is returned in `@var{op_err}`.

Synchronous variant.

```
@end deftypefun
```

```
@node Checking for updates
```

```
@subsection How to check for software updates
```

The GnuPG Project operates a server to query the current versions of  
software packages related to GnuPG. GPGME can be used to  
access this online database and check whether a new version of a  
software package is available.

```
@deftp {Data type} {gpgme_query_swdb_result_t}
@since{1.8.0}
```

This

is a pointer to a structure used to store the result of a  
`@code{gpgme_op_query_swdb}` operation. After success full call to that  
function, you can retrieve the pointer to the result with  
`@code{gpgme_op_query_swdb_result}`. The structure contains the  
following member:

@table @code

@item name

This is the name of the package.

@item iversion

The currently installed version or an empty string. This value is either a copy of the argument given to @code{gpgme\_op\_query\_swdb} or the version of the installed software as figured out by GPGME or GnuPG.

@item created

This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

@item retrieved

This gives the date the file was downloaded.

@item warning

If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could not be figured out, the

@code{update} flag may not reflect a required update status.

@item update

If this flag is set an update of the software is available.

@item urgent

If this flag is set an available update is important.

@item noinfo

If this flag is set, no valid information could be retrieved.

@item unknown

If this flag is set the given @code{name} is not known.

@item toold

If this flag is set the available information is not fresh enough.

@item error

If this flag is set some other error has occurred.

@item version

The version string of the latest released version.

@item reldate

The release date of the latest released version.

@end table

@end deftp

```
@deftypefun gpgme_error_t gpgme_op_query_swdb @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const char *@var{name}}, @
 @w{const char *@var{iversion}}, @
 @w{gpgme_data_t @var{reserved}})
```

@since{1.8.0}

Query the software version database for software package @var{name} and check against the installed version given by @var{iversion}. If @var{iversion} is given as @code{NULL} a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If @code{NULL} is used for @var{name} the current gpgme version is checked. @var{reserved} must be set to 0.

@end deftypefun

```
@deftypefun gpgme_query_swdb_result_t gpgme_op_query_swdb_result @
 (@w{gpgme_ctx_t @var{ctx}})
```

@since{1.8.0}

The function @code{gpgme\_op\_query\_swdb\_result} returns a @code{gpgme\_query\_swdb\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_query\_swdb} operation. The pointer is only valid if the last operation on the context was a successful call to @code{gpgme\_op\_query\_swdb}. If that call failed, the result might be a @code{NULL} pointer. The returned pointer is only valid until the next operation is started on the context @var{ctx}.

@end deftypefun

@noindent

Here is an example on how to check whether GnuPG is current:

@example

```
#include
```

```
<gpgme.h>
```

```
int
```

```
main (void)
```

```
@{
```

```
 gpg_error_t err;
```

```
 gpgme_ctx_t ctx;
```

```
 gpgme_query_swdb_result_t result;
```



```

gpgme_check_version (NULL);
err = gpgme_new (&ctx);
if (err)
 fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
else
 @{
 gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

 err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
 if (err)
 fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
 else
 @{
 result = gpgme_op_query_swdb_result (ctx);
 if (!result)
 fprintf (stderr, "error querying swdb\n");
 if (!result->warning && !result->update)
 printf ("GnuPG version %s is current\n",
 result->iversion);
 else if (!result->warning && result->update)
 printf ("GnuPG version %s can be updated to %s\n",
 result->iversion, result->version);
 else
 fprintf (stderr, "error finding the
update status\n");
 @ }
 gpgme_release (ctx);
 @ }
return 0;
@ }
@end example

```

@node Run Control

@section Run Control

@cindex run control

@cindex cryptographic operation, running

@acronym{GPGME} supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when @acronym{GPGME} runs. This ensures that @acronym{GPGME} only runs when necessary and also prevents it from blocking for a long time.

@menu

- \* **Waiting For Completion::**     Waiting until an operation is completed.
- \* **Using External Event Loops::**   Advanced control over what happens when.
- \* **Cancellation::**                How to end pending operations prematurely.

@end menu

@node Waiting For Completion

@subsection Waiting For Completion

@cindex cryptographic operation, wait for

@cindex wait for completion

@deftypefun

```
gpgme_ctx_t gpgme_wait (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_error_t *@var{status}}, @w{int @var{hang}})
```

The function `gpgme_wait` continues the pending operation within the context `@var{ctx}`. In particular, it ensures the data exchange between `GPGME` and the crypto backend and watches over the run time status of the backend process.

If `@var{hang}` is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in `@var{status}` if `gpgme_wait` does not return `NULL`.

The `@var{ctx}` argument can be `NULL`. In that case, `gpgme_wait` waits for any context to complete its operation.

`gpgme_wait` can be used only in conjunction with any context that has a pending operation initiated with one of the `gpgme_op_*_start` functions except `gpgme_op_keylist_start` and `gpgme_op_trustlist_start` (for which you should use the corresponding `gpgme_op_*_next` functions). If `@var{ctx}` is `NULL`, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect `gpgme_wait`.

In a multi-threaded environment, only one thread should ever call `gpgme_wait` at any time, regardless of whether `@var{ctx}` is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

The function returns the `@var{ctx}` of the context which has finished the operation. If `@var{hang}` is false, and the timeout expires,

`NULL` is returned and `*status` will be set to 0. If an error occurs, `NULL` is returned and the error is returned in `*status`.

```
@end deftypefun
```

```
@node Using External Event Loops
```

```
@subsection Using External Event
```

```
Loops
```

```
@cindex event loop, external
```

`GPGME` hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrarily long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if `gpgme_wait` is used without the `hang` option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. `GPGME` will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading or writing. It is then the user's responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, `GPGME` will never block. This gives the user more control over the program flow, and allows to perform other tasks when `GPGME` would block otherwise.

By using this advanced mechanism, `GPGME` can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

```
@menu
```

- \* I/O Callback Interface:: How I/O callbacks are registered.
- \* Registering I/O Callbacks:: How to use I/O callbacks for a context.
- \* I/O Callback Example:: An example how to use I/O callbacks.
- \* I/O Callback Example GTK+:: How to use `GPGME` with GTK+.
- \* I/O Callback Example GDK:: How to use `GPGME` with GDK.
- \* I/O Callback Example Qt:: How to use `GPGME` with Qt.

```
@end menu
```

@node I/O Callback Interface

@subsubsection I/O Callback Interface

```
@deftp {Data type} {gpgme_error_t
(*gpgme_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}})}
@tindex gpgme_io_cb_t
```

The @code{gpgme\_io\_cb\_t} type is the type of functions which @acronym{GPGME} wants to register as I/O callback handlers using the @code{gpgme\_register\_io\_cb\_t} functions provided by the user.

@var{data} and @var{fd} are provided by @acronym{GPGME} when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor @var{fd}.

The callback handler always returns @code{0}, but you should consider the return value to be reserved for later use.

```
@end deftp
```

```
@deftp {Data type} {gpgme_error_t (*gpgme_register_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}},
@w{int @var{dir}}, @w{gpgme_io_cb_t @var{fnc}}, @w{void *@var{fnc_data}}, @w{void **@var{tag}})}
@tindex gpgme_register_io_cb_t
```

The @code{gpgme\_register\_io\_cb\_t} type is the type of functions which can be called by @acronym{GPGME} to register an I/O callback function

@var{fnc} for the file descriptor @var{fd} with the user.

@var{fnc\_data} should be passed as the first argument to @var{fnc} when the handler is invoked (the second argument should be @var{fd}).

If @var{dir} is 0, @var{fnc} should be called by the user when @var{fd} is ready for writing. If @var{dir} is 1, @var{fnc} should be called when @var{fd} is ready for reading.

@var{data} was provided by the user when registering the @code{gpgme\_register\_io\_cb\_t} function with @acronym{GPGME} and will always be passed as the first argument when registering a callback function.

For example, the user can use this to determine the event loop to which the file descriptor should be added.

@acronym{GPGME} will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with @code{gpgme\_set\_io\_cbs}. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The

user should return a unique handle in @var{tag} identifying this I/O callback registration, which will be passed to the @code{gpgme\_register\_io\_cb\_t} function without interpretation when the file

descriptor should not be monitored anymore.

@end deftp

@deftp {Data type} {void (\*gpgme\_remove\_io\_cb\_t) (@w{void \*@var{tag}})}

The @code{gpgme\_remove\_io\_cb\_t} type is the type of functions which can be called by @acronym{GPGME} to remove an I/O callback handler that was registered before. @var{tag} is the handle that was returned by the @code{gpgme\_register\_io\_cb\_t} for this I/O callback.

@acronym{GPGME} can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

@end deftp

@deftp {Data type} {enum gpgme\_event\_io\_t}

@tindex gpgme\_event\_io\_t

The @code{gpgme\_event\_io\_t} type specifies the type of an event that is reported to the user by @acronym{GPGME} as a consequence of an I/O operation.

The following events are defined:

@table @code

@item GPGME\_EVENT\_START

The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled.

@var{type\_data} is @code{NULL} and reserved for later use.

@item GPGME\_EVENT\_DONE

The operation is finished, the last I/O callback for this operation was removed. The accompanying @var{type\_data} points to a @code{struct gpgme\_io\_event\_done\_data} variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

@item GPGME\_EVENT\_NEXT\_KEY

In a @code{gpgme\_op\_keylist\_start} operation, the next key was received from the crypto engine. The accompanying @var{type\_data} is a @code{gpgme\_key\_t} variable that contains the key with one reference for the user.

@end table

@end deftp

@deftp {Data type} {void (\*gpgme\_event\_io\_cb\_t) (@w{void \*@var{data}},

@w{gpgme\_event\_io\_t @var{type}}, @w{void \*@var{type\_data}})}

The @code{gpgme\_event\_io\_cb\_t} type is the type of functions which can be called by @acronym{GPGME} to signal an event for an operation running

in a context which has I/O callback functions registered by the user.

`@var{data}` was provided by the user when registering the `@code{gpgme_event_io_cb_t}` function with `@acronym{GPGME}` and will always be passed as the first argument when registering a callback function.

For example, the user can use this to determine the context in which this event has occurred.

`@var{type}` will specify the type of event that has occurred.

`@var{type_data}` specifies the event further, as described in the above list of possible `@code{gpgme_event_io_t}` types.

`@acronym{GPGME}` can call this function in an I/O callback handler.

`@end deftp`

`@node Registering I/O Callbacks`

`@subsubsection Registering I/O Callbacks`

`@deftp {Data type} {struct gpgme_io_cbs}`

`@tindex gpgme_event_io_t`

This structure

is used to store the I/O callback interface functions

described in the previous section. It has the following members:

`@table @code`

`@item gpgme_register_io_cb_t add`

This is the function called by `@acronym{GPGME}` to register an I/O callback handler. It must be specified.

`@item void *add_priv`

This is passed as the first argument to the `@code{add}` function when it is called by `@acronym{GPGME}`. For example, it can be used to determine the event loop to which the file descriptor should be added.

`@item gpgme_remove_io_cb_t remove`

This is the function called by `@acronym{GPGME}` to remove an I/O callback handler. It must be specified.

`@item gpgme_event_io_cb_t event`

This is the function called by `@acronym{GPGME}` to signal an event for an operation. It must be specified, because at least the start event must be processed.

`@item void *event_priv`

This is passed as the first argument to the `@code{event}` function when it is called by `@acronym{GPGME}`. For example, it can be used to determine

the context in which the event has occurred.

@end table

@end deftp

```
@deftypefun void gpgme_set_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
```

The function @code{gpgme\_set\_io\_cbs} enables the I/O callback interface for the context @var{ctx}. The I/O callback functions are specified by @var{io\_cbs}.

If @var{io\_cbs}->@code{add} is @code{NULL}, the I/O callback interface is disabled for the context, and normal operation is restored.

@end deftypefun

```
@deftypefun void gpgme_get_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
```

The function @code{gpgme\_get\_io\_cbs} returns the I/O callback functions set with @code{gpgme\_set\_io\_cbs} in @var{io\_cbs}.

@end deftypefun

@node I/O Callback Example

@subsubsection I/O Callback Example

To actually use an external event loop, you have to implement the I/O callback functions that are used by @acronym{GPGME} to register and unregister file descriptors. Furthermore, you have to actually monitor these

file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in @acronym{GPGME} is not predictable.

@example

```
#include <assert.h>
```

```
#include <errno.h>
```

```
#include <stdlib.h>
```

```
#include <pthread.h>
```

```
#include <sys/types.h>
```

```
#include <gpgme.h>
```

```
/* The following structure holds the result of a crypto operation. */
```

```
struct op_result
```

```
@{
```

```
int done;
```

```

gpgme_error_t err;
@};

/* The following structure holds the data associated with one I/O
callback. */
struct one_fd
@{
int fd;
int dir;
gpgme_io_cb_t fnc;
void *fnc_data;
void *loop;
@};

struct event_loop
@{
pthread_mutex_t lock;
#define MAX_FDS 32
/* Unused slots are marked with FD being
-1. */
struct one_fd fds[MAX_FDS];
@};
@end example

```

The following functions implement the I/O callback interface.

```

@example
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
 void **r_tag)
@{
struct event_loop *loop = data;
struct one_fd *fds = loop->fds;
int i;

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS; i++)
 @ {
 if (fds[i].fd == -1)
 @ {
 fds[i].fd = fd;
 fds[i].dir = dir;
 fds[i].fnc = fnc;
 fds[i].fnc_data = fnc_data;
 fds[i].loop = loop;
 break;
 @ }
 @ }

```



```

pthread_mutex_unlock (&loop->lock);
if (i == MAX_FDS)
 return gpg_error (GPG_ERR_GENERAL);
*r_tag = &fds[i];
return 0;
@}

void
remove_io_cb (void *tag)
@{
 struct one_fd *fd = tag;
 struct event_loop *loop = fd->loop;

 pthread_mutex_lock (&loop->lock);
 fd->fd = -1;
 pthread_mutex_unlock (&loop->lock);
@}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
@{
 struct op_result *result = data;

 /* We
 don't support list operations here. */
 if (type == GPGME_EVENT_DONE)
 @{
 result->done = 1;
 result->err = *type_data;
 @}
@}
@end example

```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```

@example
int
do_select (struct event_loop *loop)
@{
 fd_set rfd;
 fd_set wfd;
 int i, n;
 int any = 0;
 struct timeval tv;
 struct one_fd *fdlist = loop->fds;

 pthread_mutex_lock (&loop->lock);

```

```

FD_ZERO (&rfd);
FD_ZERO (&wfds);
for (i = 0; i < MAX_FDS; i++)
 if (fdlist[i].fd != -1)
 FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfds);
pthread_mutex_unlock (&loop->lock);

tv.tv_sec = 0;
tv.tv_usec = 1000;

do
 @ {
 n = select (FD_SETSIZE, &rfd, &wfds, NULL, &tv);
 }
 @ }
while (n < 0 && errno == EINTR);

if (n < 0)
 return n; /* Error or timeout. */

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS && n; i++)
 @ {
 if (fdlist[i].fd
 != -1)
 @ {
 if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfds))
 @ {
 assert (n);
 n--;
 any = 1;
 /* The I/O callback handler can register/remove callbacks,
 so we have to unlock the file descriptor list. */
 pthread_mutex_unlock (&loop->lock);
 (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
 pthread_mutex_lock (&loop->lock);
 }
 @ }
 }
 @ }
pthread_mutex_unlock (&loop->lock);
return any;
 @ }

void
wait_for_op (struct event_loop *loop, struct op_result *result)
 @ {
 int ret;

do

```

```

 @ {
 ret = do_select (loop);
 @ }
while (ret >= 0 && !result->done);
@ }
@end example

```

The main function shows how to put it all together.

```

@example
int
main (int argc, char *argv[])
@ {
 struct event_loop loop;
 struct op_result result;
 gpgme_ctx_t ctx;
 gpgme_error_t err;
 gpgme_data_t sig, text;
 int i;
 pthread_mutexattr_t attr;
 struct gpgme_io_cbs io_cbs =
 @ {
 add_io_cb,
 &loop,
 remove_io_cb,
 event_io_cb,
 &result
 @ };

 init_gpgme ();

 /* Initialize the loop structure. */

 /* The mutex must be recursive, since remove_io_cb (which acquires a
 lock) can be called while holding a lock acquired in do_select. */
 pthread_mutexattr_init (&attr);
 pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
 pthread_mutex_init (&loop.lock, &attr);
 pthread_mutexattr_destroy (&attr);

 for (i = 0; i < MAX_FDS; i++)
 loop.fds[i].fd = -1;

 /* Initialize the result structure. */
 result.done = 0;

 err = gpgme_data_new_from_file (&sig, "signature", 1);
 if (!err)

```

```

err = gpgme_data_new_from_file (&text, "text", 1);
if (!err)
err = gpgme_new (&ctx);
if (!err)
@{
gpgme_set_io_cbs (ctx, &io_cbs);
err = gpgme_op_verify_start (ctx, sig, text, NULL);
@}
if (err)
@{
fprintf (stderr, "gpgme error: %s: %s\n",
gpgme_strerror (err), gpgme_strerror (err));
exit (1);

@}

wait_for_op (&loop, &result);
if (!result.done)
@{
fprintf (stderr, "select error\n");
exit (1);
@}
if (!result.err)
@{
fprintf (stderr, "verification failed: %s: %s\n",
gpgme_strerror (result.err), gpgme_strerror (result.err));
exit (1);
@}
/* Evaluate verify result. */
@dots{}
return 0;
@}
@end example

```

```

@node I/O Callback Example GTK+
@subsection I/O Callback Example GTK+
@cindex GTK+, using @acronym{GPGME} with

```

The I/O callback interface can be used to integrate @acronym{GPGME} with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific setup.

```

@example
#include <gtk/gtk.h>

```

```

struct my_gpgme_io_cb
@{
gpgme_io_cb_t fnc;
void *fnc_data;
guint input_handler_id
@};

void
my_gpgme_io_cb
(gpointer data, gint source, GdkInputCondition condition)
@{
struct my_gpgme_io_cb *iocb = data;
(*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
struct my_gpgme_io_cb *iocb = data;
gtk_input_remove (data->input_handler_id);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
void *fnc_data, void **tag)
@{
struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
iocb->fnc = fnc;
iocb->data = fnc_data;
iocb->input_handler_id = gtk_input_add_full (fd, dir
? GDK_INPUT_READ
: GDK_INPUT_WRITE,
my_gpgme_io_callback,
0, iocb, NULL);

*tag = iocb;
return 0;
@}
@end example

```

```

@node I/O Callback Example GDK
@subsection I/O Callback Example
GDK
@cindex GDK, using @acronym{GPGME} with

```

The I/O callback interface can also be used to integrate @acronym{GPGME} with the GDK event loop. The following code snippets

shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```
@example
#include <gdk/gdk.h>

struct my_gpgme_io_cb
@{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 gint tag;
@};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
@{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
 struct my_gpgme_io_cb *iocb = data;
 gdk_input_remove (data->tag);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
 void *fnc_data, void **tag)
@{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
 my_gpgme_io_callback, iocb, NULL);
 *tag = iocb;
 return 0;
@}
@end example
```

@node I/O Callback Example Qt

@subsection I/O Callback Example Qt  
@cindex Qt, using @acronym{GPGME} with

The I/O callback interface can also be used to integrate @acronym{GPGME} with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any Qt specific setup.

@example

```
#include <qsocketnotifier.h>
#include <qapplication.h>
```

```
struct IOCB @ {
```

```
 IOCB(GpgmeIOCb f, void * d, QSocketNotifier * n)
```

```
 : func(
```

```
 f), data(d), notifier(n) @ { @ }
```

```
 GpgmeIOCb func;
```

```
 void * data;
```

```
 QSocketNotifier * notifier;
```

```
 @ }
```

```
class MyApp : public QApplication @ {
```

```
 // ...
```

```
 static void registerGpgmeIOCallback(void * data, int fd, int dir,
```

```
 GpgmeIOCb func, void * func_data,
```

```
 void ** tag) @ {
```

```
 QSocketNotifier * n =
```

```
 new QSocketNotifier(fd, dir ? QSocketNotifier::Read
```

```
 : QSocketNotifier::Write);
```

```
 connect(n, SIGNAL(activated(int)),
```

```
 qApp, SLOT(slotGpgmeIOCallback(int)));
```

```
 qApp->mIOCBs.push_back(IOCB(func, func_data, n));
```

```
 tag = (void)n;
```

```
 @ }
```

```
 static void removeGpgmeIOCallback(void * tag) @ {
```

```
 if (!tag) return;
```

```
 QSocketNotifier * n = static_cast<QSocketNotifier*>(tag);
```

```
 for (QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
```

```
 it != qApp->mIOCBs.end() ; ++it)
```

```
 if (it->notifier == n) @ {
```

```
 delete it->notifier;
```

```
 qApp->mIOCBs.erase(
```

```

it);
 return;
 @ }
 @ }

public slots:
void slotGpgmeIOCallback(int fd) @ {
 for (QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
 it != mIOCBs.end() ; ++it)
 if (it->notifier && it->notifier->socket() == fd)
 (*(it->func)) (it->func_data, fd);
 @ }

// ...

private:
QValueList<IOCB> mIOCBs;
// ...
@ };
@end example

```

```

@node Cancellation
@subsection Cancellation
@cindex cryptographic operation, aborting
@cindex cryptographic operation, cancelling
@cindex aborting operations
@cindex cancelling operations

```

Sometimes you do not want to wait for an operation to finish. `@acronym{GPGME}` provides two different functions to achieve that. The function `@code{gpgme_cancel}` takes effect immediately. When it returns, the operation is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function `@code{gpgme_cancel_async}` can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

```

@deftypedefun gpgme_ctx_t gpgme_cancel (@w{gpgme_ctx_t @var{ctx}})
@since{0.4.5}

```

The function `@code{gpgme_cancel}` attempts to cancel a pending operation in the context `@var{ctx}`. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call `@code{gpgme_wait}`



during cancellation. After successful cancellation, you can call `gpgme_wait` (optionally waiting on `ctx`), and the context `ctx` will appear as if it had finished with the error code `GPG_ERR_CANCEL`.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a `GPGME_EVENT_DONE` event with the error code `GPG_ERR_CANCEL` will be signalled.

The function returns an error code if the cancellation failed (in this case the state of `ctx` is not modified).

`@end deftypefun`

```
@deftypefun gpgme_ctx_t gpgme_cancel_async (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.7}
```

The function `gpgme_cancel_async` attempts to cancel a pending operation in the context `ctx`. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of `ctx` is not modified).

`@end deftypefun`

```
@c *****
@c ***** Appendices *****
@c *****
```

`@include uiserver.texi`

```
@node Debugging
@appendix How to solve problems
@cindex
debug
@cindex GPGME_DEBUG
```

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like `GPGME` and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using `@command{gpg}` or `@command{gpgsm}` on the command line. If you can't figure out why things don't work, you may use `@acronym{GPGME}`'s built in trace feature. This feature is either enabled using the environment variable `@code{GPGME_DEBUG}` or, if this is not possible, by calling the function `@code{gpgme_set_global_flag}`. The value is the trace level and an optional file name. If no file name is given the trace output is printed to `@code{stderr}`.

`@noindent`

For example

`@smallexample`

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

`@end`

```
smallexample
```

`@noindent`

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

`@node` Deprecated Functions

`@appendix` Deprecated Functions

`@cindex` deprecated

For backward compatibility `@acronym{GPGME}` has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

`@strong{Warning:}` These interfaces will be removed in a future version of `@acronym{GPGME}`.

`@deftypedef` void `gpgme_key_release` (`@w{gpgme_key_t @var{key}}`)

The function `@code{gpgme_key_release}` is equivalent to

`@code{gpgme_key_unref}`.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_import_ext (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}}, @w{int *@var{nr}})
@since{0.3.9}
```

The function @code{gpgme\_op\_import\_ext} is equivalent to:

```
@example
gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
 @ {
 gpgme_import_result_t result = gpgme_op_import_result (ctx);
 *nr = result->considered;
 @ }
@end example
@end deftypefun
```

```
@defftp {Data type} {gpgme_error_t (*gpgme_edit_cb_t) @
(@w{void *@var{handle}}, @
@w{gpgme_status_code_t @var{status}}, @
@w{const char *@var{args}}, @
@w{int @var{fd}})}
```

@tindex gpgme\_edit\_cb\_t

The @code{gpgme\_edit\_cb\_t} type is the type of functions which

@acronym{GPGME} calls

if it a key edit operation is on-going. The

status code @var{status} and the argument line @var{args} are passed

through by @acronym{GPGME} from the crypto engine. The file

descriptor @var{fd} is -1 for normal status messages. If @var{status}

indicates a command rather than a status message, the response to the

command should be written to @var{fd}. The @var{handle} is provided

by the user at start of operation.

The function should return @code{GPG\_ERR\_FALSE} if it did not handle  
the status code, @code{0} for success, or any other error value.

@end defftp

```
@deftypefun gpgme_error_t gpgme_op_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}},
@w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
@since{0.3.9}
```

Note: This function is deprecated, please use

@code{gpgme\_op\_interact} instead.

The function @code{gpgme\_op\_edit} processes the key @var{KEY}

interactively, using the edit callback function @var{FNC} with the

handle @var{HANDLE}. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by @acronym{GPGME}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the edit operation completes successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} or @var{key} is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
```

@since{0.3.9}

Note: This function is deprecated, please use @code{gpgme\_op\_interact\_start} instead.

The function @code{gpgme\_op\_edit\_start} initiates a @code{gpgme\_op\_edit} operation.

It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation was started successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} or @var{key} is not a valid pointer.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_card_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
```

Note: This function is deprecated, please use @code{gpgme\_op\_interact} with the flag @code{GPGME\_INTERACT\_CARD} instead.

The function @code{gpgme\_op\_card\_edit} is analogous to @code{gpgme\_op\_edit}, but should be used to process the smart card corresponding to the key @var{key}.

```
@deftypefun gpgme_error_t gpgme_op_card_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
```

Note: This function is deprecated, please use @code{gpgme\_op\_interact\_start} with the flag @code{GPGME\_INTERACT\_CARD} instead.

The function `gpgme_op_card_edit_start` initiates a `gpgme_op_card_edit` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `ctx` or `key` is not a valid pointer.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_data_new_with_read_cb (@w{gpgme_data_t *@var{dh}}, @w{int (*@var{readfunc})} (@w{void *@var{hook}}, @w{char *@var{buffer}}, @w{size_t @var{count}}, @w{size_t *@var{nread}}), @w{void *@var{hook_value}})
```

The function `gpgme_data_new_with_read_cb` creates a new `gpgme_data_t` object and uses the callback function `readfunc` to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type

[GPGME](#)

provides. However, it can not be used to write data.

The callback function receives `hook_value` as its first argument whenever it is invoked. It should return up to `count` bytes in `buffer`, and return the number of bytes actually read in `nread`. It may return `0` in `nread` if no data is currently available. To indicate `EOF` the function should return with an error code of `-1` and set `nread` to `0`. The callback function may support to reset its internal read pointer if it is invoked with `buffer` and `nread` being `NULL` and `count` being `0`.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `dh` or `readfunc` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_data_rewind (@w{gpgme_data_t @var{dh}})
```

The function `gpgme_data_rewind` is equivalent to:

`@example`

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
? gpgme_error_from_errno (errno) : 0;
```

`@end example`

`@end deftypefun`

@def`tp` {Data type} `gpgme_attr_t`

The @code{gpgme\_attr\_t} type is used to specify a key or trust item attribute. The following attributes are defined:

@table @code

@item GPGME\_ATTR\_KEYID

This is the key ID of a sub key. It is representable as a string.

@item GPGME\_ATTR\_FPR

This is the fingerprint of a sub key. It is representable as a string.

@item GPGME\_ATTR\_ALGO

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the @code{enum gcry\_pk\_algos} values in the gcrypt library.

@item GPGME\_ATTR\_LEN

This is the key length of a sub key. It is representable as a number.

@item GPGME\_ATTR\_CREATED

This is the timestamp at creation time of a sub key. It is representable as a number.

@item GPGME\_ATTR\_EXPIRE

This is the expiration time of a sub key. It is representable as a number.

@item GPGME\_ATTR\_USERID

This is a user ID. There can be more than one user IDs in a @var{gpgme\_key\_t} object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

@item GPGME\_ATTR\_NAME

This is the name belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_VALIDITY

This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

**@item GPGME\_ATTR\_UID\_REVOKED**

This specifies if a user ID is revoked. It is representable as a number, and is @code{1} if the user ID is revoked, and @code{0} otherwise.

**@item GPGME\_ATTR\_UID\_INVALID**

This specifies if a user ID is invalid. It is representable as a number, and is @code{1} if the user ID is invalid, and @code{0} otherwise.

**@item GPGME\_ATTR\_TYPE**

This returns information about the type of key. For the string function this will either be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509.

**@item GPGME\_ATTR\_IS\_SECRET**

This specifies if the key is a secret key. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

**@item GPGME\_ATTR\_KEY\_REVOKED**

This specifies if a sub key is revoked. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

**@item GPGME\_ATTR\_KEY\_INVALID**

This specifies if a sub key is invalid. It is representable as a number, and is @code{1} if the key is invalid, and @code{0} otherwise.

**@item GPGME\_ATTR\_KEY\_EXPIRED**

This specifies if a sub key is expired. It is representable as a number, and is @code{1} if the key is expired, and @code{0} otherwise.

**@item GPGME\_ATTR\_KEY\_DISABLED**

This specifies if a sub key is disabled.  
It is representable as a number, and is @code{1} if the key is disabled, and @code{0} otherwise.

**@item GPGME\_ATTR\_KEY\_CAPS**

This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter "e" if the key can be used for encryption, "s" if the key can be used for signatures, and "c" if the key can be used for certifications.

**@item GPGME\_ATTR\_CAN\_ENCRYPT**

This specifies if a sub key can be used for encryption. It is

representable as a number, and is `{1}` if the sub key can be used for encryption, and `{0}` otherwise.

@item GPGME\_ATTR\_CAN\_SIGN

This specifies if a sub key can be used to create data signatures. It is representable as a number, and is `{1}` if the sub key can be used for signatures, and `{0}` otherwise.

@item GPGME\_ATTR\_CAN\_CERTIFY

This specifies if a sub key can be used to create key certificates. It is representable as a number, and is `{1}` if the sub key can be used for certifications, and `{0}` otherwise.

@item GPGME\_ATTR\_SERIAL

The X.509 issuer serial attribute of the key. It is representable as a string.

@item GPGME\_ATTR\_ISSUE

The X.509 issuer name attribute of the key. It is representable as a string.

@item GPGME\_ATTR\_CHAINID

The X.509 chain ID can be used to build the certification chain. It is representable as a string.

@end table

@end deftp

```
@deftypefun {const char *} gpgme_key_get_string_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function `{gpgme_key_get_string_attr}` returns the value of the string-representable attribute `{what}` of key `{key}`. If the attribute is an attribute of a sub key or an user ID, `{idx}` specifies the sub key or user ID of which the attribute value is returned. The argument `{reserved}` is reserved for later use and should be `{NULL}`.

The string returned is only valid as long as the key is valid.

The function returns `{0}`

if an attribute can't be returned as a string, `{key}` is not a valid pointer, `{idx}` out of range, or `{reserved}` not `{NULL}`.

@end deftypefun

```
@deftypefun {unsigned long} gpgme_key_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function `{gpgme_key_get_ulong_attr}` returns the value of the



number-representable attribute `@var{what}` of key `@var{key}`. If the attribute is an attribute of a sub key or an user ID, `@var{idx}` specifies the sub key or user ID of which the attribute value is returned. The argument `@var{reserved}` is reserved for later use and should be `@code{NULL}`.

The function returns `@code{0}` if the attribute can't be returned as a number, `@var{key}` is not a valid pointer, `@var{idx}` out of range, or `@var{reserved}` not `@code{NULL}`.  
`@end deftypefun`

`@c`

`@c Key Signatures`

`@c`

The signatures on a key are only available if the key was retrieved via a listing operation with the `@code{GPGME_KEYLIST_MODE_SIGS}` mode enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function `@code{gpgme_get_key}`.

`@defntp {Data type} gpgme_attr_t`

The `@code{gpgme_attr_t}` type is used to specify a key signature attribute. The following attributes are defined:

`@table @code`

`@item GPGME_ATTR_KEYID`

This is the key ID of the key which was used for the signature. It is representable as a string.

`@item GPGME_ATTR_ALGO`

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the `@code{enum gcry_pk_algos}` values in the gcrypt library.

`@item GPGME_ATTR_CREATED`

This is the timestamp at creation time of the signature. It is representable as a number.

`@item GPGME_ATTR_EXPIRE`

This is the expiration time of the signature. It is representable as a number.

@item GPGME\_ATTR\_USERID

This is the user ID associated with the signing key. The user ID is representable as a number.

@item GPGME\_ATTR\_NAME

This is the name belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_KEY\_REVOKED

This specifies if a key signature is a revocation signature. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@c @item GPGME\_ATTR\_KEY\_EXPIRED

@c This specifies if a key signature is expired. It is representable as @c a number, and is @code{1} if the key is revoked, and @code{0} @c otherwise.

@c

@item GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

@item GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

@item GPGME\_ATTR\_SIG\_STATUS

This is the same value as returned by @code{gpgme\_get\_sig\_status}.

@end table

@end deftp

@deftypedefun {const char \*} gpgme\_key\_sig\_get\_string\_attr (@w{gpgme\_key\_t @var{key}}, @w{int @var{uid\_idx}}, @w{gpgme\_attr\_t @var{what}}, @w{const void \*@var{reserved}}, @w{int @var{idx}})

The function @code{gpgme\_key\_sig\_get\_string\_attr} returns the value of the string-representable attribute @var{what} of the signature

@var{idx} on the user ID @var{uid\_idx} in the key @var{key}. The

argument @var{reserved} is reserved for later use and should be

@code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns `{0}` if an attribute can't be returned as a string, `@var{key}` is not a valid pointer, `@var{uid_idx}` or `@var{idx}` out of range, or `@var{reserved}` not `{NULL}`.  
@end deftypefun

```
@deftypefun {unsigned long} gpgme_key_sig_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{int @var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function `gpgme_key_sig_get_ulong_attr` returns the value of the number-representable attribute `@var{what}` of the signature `@var{idx}` on the user ID `@var{uid_idx}` in the key `@var{key}`. The argument `@var{reserved}` is reserved for later use and should be `{NULL}`.

The function returns `{0}` if an attribute can't be returned as a string, `@var{key}` is not a valid pointer, `@var{uid_idx}` or `@var{idx}` out of range, or `@var{reserved}` not `{NULL}`.  
@end deftypefun

```
@deftp {Data type} {enum gpgme_sig_stat_t}
@tindex gpgme_sig_stat_t
```

The `gpgme_sig_stat_t` type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

```
@table @code
@item GPGME_SIG_STAT_NONE
This status should not occur
in normal operation.
```

```
@item GPGME_SIG_STAT_GOOD
This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.
```

```
@item GPGME_SIG_STAT_GOOD_EXP
This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.
```

```
@item GPGME_SIG_STAT_GOOD_EXPKEY
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.
```

@item GPGME\_SIG\_STAT\_BAD

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPGME\_SIG\_STAT\_NOKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPGME\_SIG\_STAT\_NOSIG

This status indicates that the signature data provided was not a real signature.

@item GPGME\_SIG\_STAT\_ERROR

This status indicates that there was some other error which prevented the signature verification.

@item GPGME\_SIG\_STAT\_DIFF

For the combined result this status means that at least two signatures have a different status. You can get each key's status with

@code{gpgme\_get\_sig\_status}.

@end table

@end deftp

@deftypefun {const char \*} gpgme\_get\_sig\_status (@w{gpgme\_ctx\_t @var{ctx}}, @w{int @var{idx}}, @w{gpgme\_sig\_stat\_t \*@var{r\_stat}}, @w{time\_t \*@var{r\_created}})

The function @code{gpgme\_get\_sig\_status} is equivalent to:

@example

```
gpgme_verify_result_t result;
gpgme_signature_t sig;
```

```
result = gpgme_op_verify_result (ctx);
sig = result->signatures;
```

```
while (sig && idx)
```

```
 @ {
 sig = sig->next;
 idx--;
 @ }
```

```
if (!sig || idx)
 return NULL;
```

```
if (r_stat)
```

```
 @ {
 switch (gpg_err_code (sig->status))
 @ {
```

```

case GPG_ERR_NO_ERROR:
 *r_stat = GPGME_SIG_STAT_GOOD;

 break;

case GPG_ERR_BAD_SIGNATURE:
 *r_stat = GPGME_SIG_STAT_BAD;
 break;

case GPG_ERR_NO_PUBKEY:
 *r_stat = GPGME_SIG_STAT_NOKEY;
 break;

case GPG_ERR_NO_DATA:
 *r_stat = GPGME_SIG_STAT_NOSIG;
 break;

case GPG_ERR_SIG_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXP;
 break;

case GPG_ERR_KEY_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
 break;

default:
 *r_stat = GPGME_SIG_STAT_ERROR;
 break;
@ }
@ }
if (r_created)
 *r_created = sig->timestamp;
return sig->fpr;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_string_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
The function @code{gpgme_get_sig_string_attr} is equivalent to:

@example
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)

```

```

@{
 sig = sig->next;
 idx--;
@}
if (!sig || idx)
 return
NULL;

switch (what)
@{
case GPGME_ATTR_FPR:
 return sig->fpr;

case GPGME_ATTR_ERRTOK:
 if (whatidx == 1)
 return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
 else
return "";
default:
 break;
@}

return NULL;
@end example
@end deftypefun

```

```

@deftypefun {const char *} gpgme_get_sig_ulong_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})

```

The function @code{gpgme\_get\_sig\_ulong\_attr} is equivalent to:

```

@example
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
@{
 sig = sig->next;
 idx--;
@}
if (!sig || idx)
 return 0;

switch (what)
@{
case GPGME_ATTR_CREATED:

```

```

return sig->timestamp;

case GPGME_ATTR_EXPIRE:
return sig->exp_timestamp;

case GPGME_ATTR_VALIDITY:
return (unsigned long) sig->validity;

case GPGME_ATTR_SIG_STATUS:
switch (sig->status)
@{
case GPG_ERR_NO_ERROR:
return GPGME_SIG_STAT_GOOD;

case GPG_ERR_BAD_SIGNATURE:
return GPGME_SIG_STAT_BAD;

case GPG_ERR_NO_PUBKEY:
return GPGME_SIG_STAT_NOKEY;

case GPG_ERR_NO_DATA:
return GPGME_SIG_STAT_NOSIG;

case GPG_ERR_SIG_EXPIRED:
return GPGME_SIG_STAT_GOOD_EXP;

case GPG_ERR_KEY_EXPIRED:
return GPGME_SIG_STAT_GOOD_EXPKEY;

default:
return GPGME_SIG_STAT_ERROR;
@}

case GPGME_ATTR_SIG_SUMMARY:
return sig->summary;

default:
break;
@}
return 0;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_key (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_key_t *@var{r_key}})
The function @code{gpgme_get_sig_key} is equivalent to:

@example

```

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
 @ {
 sig = sig->next;
 idx--;
 @ }
if (!sig || idx)
 return gpg_error
(GPG_ERR_EOF);

return gpgme_get_key (ctx, sig->fpr, r_key, 0);
@end example
@end deftypefun

```

@include lesser.texi

@include gpl.texi

@node Concept Index

@unnumbered Concept Index

@printindex cp

@node Function and Data Index

@unnumbered Function and Data Index

@printindex fn

@bye

```

{
 "dec_info": {
 "symkey_algo": "TWOFISH.CFB",
 "wrong_key_usage": false,
 "is_de_vs": false,
 "is_mime": false,
 "legacy_cipher_nomdc": false,
 "recipients": [{
 "keyid": "6AE6D7EE46A871F8",

```



```

 "pubkey_algo_name": "ELG-E",
 "status_string": "Success",
 "status_code": 0
 }}
},
"info": {
 "is_mime": false,
 "signatures": [{
 "summary": {
 "sigsum": [],
 "valid": false,
 "green": false,
 "red": false,
 "revoked": false,
 "key-expired": false,
 "sig-expired": false,
 "key-missing": false,
 "crl-missing": false,
 "crl-too-old": false,
 "bad-policy": false,
 "sys-error": false
 },
 "wrong_key_usage": false,
 "chain_model": false,
 "is_de_vs": false,
 "status_string": "Success",
 "fingerprint": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
 "validity_string": "unknown",
 "pubkey_algo_name": "DSA",
 "hash_algo_name": "RIPEMD160",
 "status_code": 0,
 "timestamp": 1542200353,
 "exp_timestamp": 0,
 "pka_trust": 0,
 "validity": 0,
 "validity_reason": 0
]}
},
"type": "plaintext",
"base64": false,
"data": "Hello world"
}
(21:protected-private-key(3:elg(1:p193:5*n^f"Q'R0_6<y mec \=c7S8u[5
ZF'xf5yi9F@T=KhZdU0(k5nZEI/ R]njVITPU$W<xs-Yx)(1:g1:)(1:y192:O9GNR{?}Y_W[FD*zurmk%'R\>>e9pe
eU)uS%VJ!5F)yH*O
]l'7{ @wJmQP^jurx'V2H2j[G{q_"8(0(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:o"%7:5242880)16:Hs*}u
)256:Gzk3%\Kb2=ooO@,)eBBI3F|OQP3eD%n,;~L-6UH^=64i);l

```



```

;;; WITHOUT ANY WARRANTY; without even the implied warranty of
;;; MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
;;; Lesser General Public License for more details.
;;;
;;; You should have received a copy of the GNU General Public License
;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

;;; TODO

;;; Set up the library.

(in-package :gpgme)

(deftype byte-array ()
 '(simple-array (unsigned-byte 8) (*)))

(deftype character-array ()
 '(simple-array character (*)))

;;;
Debugging.

(defvar *debug* nil "If debugging output should be given or not.")

;;; Load the foreign library.

(define-foreign-library libgpgme
 (:unix "libgpgme.so")
 (t (:default "libgpgme")))

(use-foreign-library libgpgme)

;;; System dependencies.

; Access to ERRNO.
(defun ("strerror" c-strerror) :string
 (err :int))

(defun get-errno ()
 errno)

(defun set-errno (errno)
 (setf *errno* errno))

(define-condition system-error (error)
 ((:errno :initarg :errno :reader system-error-errno))
 (:report (lambda (c stream)

```

```
(format stream "System error: ~A: ~A"
 (system-error-errno c)
 (c-strerror (system-error-errno c))))
(:documentation "Signalled when an errno is encountered.")
```

; Needed to write passphrases.

```
(defcfun ("write" c-write) ssize-t
 (fd :int)
 (buffer :string) ; Actually :pointer, but we only need string.
 (size size-t))
```

```
(defun system-write (fd buffer size)
 (let ((res (c-write fd buffer size)))
 (when (< res 0) (error 'system-error
 :errno (get-errno)))
 res))
```

```
:::
```

```
::: C Interface Definitions
```

```
:::
```

```
::: Data Type Interface
```

```
::: Some new data types used for easier translation.
```

```
::: The number of include certs. Translates to NIL for default.
```

```
(defctype cert-int-t
 (:wrapper :int
 :from-c translate-cert-int-t-from-foreign
 :to-c translate-cert-int-t-to-foreign))
```

```
::: A string that may be NIL to indicate a null pointer.
```

```
(defctype string-or-nil-t
 (:wrapper :string
 :to-c translate-string-or-nil-t-to-foreign))
```

```
::: Some opaque data types used by GPGME.
```

```
(defctype gpgme-ctx-t
 (:wrapper :pointer
 :to-c translate-gpgme-ctx-t-to-foreign)
 "The GPGME context type.")
```

```
(defctype gpgme-data-t
 (:wrapper :pointer
 :to-c translate-gpgme-data-t-to-foreign)
 "The GPGME data object type.")
```

;;; Wrappers for the libgpg-error library.

```
(defctype gpgme-error-t
 (:wrapper gpg-error::gpg-error-t
 :from-c translate-gpgme-error-t-from-foreign
 :to-c translate-gpgme-error-t-to-foreign)
 "The
 GPGME error type.")
```

```
(defctype gpgme-error-no-signal-t
 (:wrapper gpg-error::gpg-error-t
 :from-c translate-gpgme-error-no-signal-t-from-foreign)
 "The GPGME error type (this version does not signal conditions in translation.)")
```

```
(defctype gpgme-err-code-t gpg-error::gpg-err-code-t
 "The GPGME error code type.")
```

```
(defctype gpgme-err-source-t gpg-error::gpg-err-source-t
 "The GPGME error source type.")
```

```
(defun gpgme-err-make (source code)
 "Construct an error value from an error code and source."
 (gpg-err-make source code))
```

```
(defun gpgme-error (code)
 "Construct an error value from an error code."
 (gpgme-err-make :gpg-err-source-gpgme code))
```

```
(defun gpgme-err-code (err)
 "Retrieve an error code from the error value ERR."
 (gpg-err-code err))
```

```
(defun gpgme-err-source (err)
 "Retrieve an error source from the error value ERR."
 (gpg-err-source err))
```

```
(defun gpgme-sterror (err)
 "Return a string containing a description of the error code."
 (gpg-sterror err))
```

```
(defun
 gpgme-strsource (err)
 "Return a string containing a description of the error source."
 (gpg-strsource err))
```

```
(defun gpgme-err-code-from-errno (err)
 "Retrieve the error code for the system error. If the system error
 is not mapped, :gpg-err-unknown-errno is returned."
```

```
(gpg-err-code-from-errno err))

(defun gpgme-err-code-to-errno (code)
 "Retrieve the system error for the error code. If this is not a
 system error, 0 is returned."
 (gpg-err-code-to-errno code))

(defun gpgme-err-make-from-errno (source err)
 (gpg-err-make-from-errno source err))

(defun gpgme-error-from-errno (err)
 (gpg-error-from-errno err))
```

```
:::
```

```
(defcenum gpgme-data-encoding-t
 "The possible encoding mode of gpgme-data-t objects."
 (:none 0)
 (:binary 1)
 (:base64 2)
 (:armor 3)
 (:url 4)
 (:urlesc 5)
 (:url0 6)
 (:mime 7))
```

```
:::
```

```
(defcenum gpgme-pubkey-algo-t
 "Public key algorithms from libgcrypt."
 (:rsa 1)
 (:rsa-e 2)
 (:rsa-s 3)
 (:elg-e 16)
 (:dsa 17)
 (:ecc 18)
 (:elg 20)
 (:ecdsa 301)
 (:ecdh 302)
 (:eddsa 303))
```

```
(defcenum gpgme-hash-algo-t
 "Hash algorithms from libgcrypt."
 (:none 0)
 (:md5 1)
 (:sha1 2)
 (:rmd160 3)
 (:md2 5))
```

(:tiger 6)  
(:haval 7)  
(:sha256 8)  
(:sha384 9)  
(:sha512 10)  
(:sha224 11)  
(:md4 301)  
(:crc32 302)  
(:crc32-rfc1510 303)  
(:crc24-rfc2440 304))

:::

(defcenum gpgme-sig-mode-t  
"The available signature modes."  
(:none 0)  
(:detach 1)  
(:clear 2))

:::

(defcenum gpgme-validity-t  
"The available validities for a trust item or key."  
(:unknown 0)  
(:undefined 1)  
(:never 2)  
(:marginal 3)  
(:full 4)  
(:ultimate 5))

:::

(defcenum gpgme-protocol-t  
"The available protocols."  
(:openpgp 0)  
(:cms 1)  
(:gpgconf 2)  
(:assuan 3)  
(:g13 4)  
(:uiserver 5)  
(:spawn 6)  
(:default 254)  
(:unknown 255))

:::

(defbitfield (gpgme-keylist-mode-t :unsigned-int)  
"The available keylist mode flags."

```

(:local 1)
(:extern 2)
(:sigs 4)
(:sig-notations)
(:with-secret 16)
(:with-tofu 32)
(:ephemeral
128)
(:validate 256))

;;;

(defbitfield (gpgme-sig-notation-flags-t :unsigned-int)
"The available signature notation flags."
(:human-readable 1)
(:critical 2))

(defctype gpgme-sig-notation-t
(:wrapper :pointer
:from-c translate-gpgme-sig-notation-t-from-foreign)
"Signature notation pointer type.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-sig-notation-bitfield :unsigned-int)
(:human-readable 1)
(:critical 2))

(defestruct gpgme-sig-notation
"Signature notations."
(next gpgme-sig-notation-t)
(name :pointer)
(value :pointer)
(name-len :int)
(value-len :int)
(flags gpgme-sig-notation-flags-t)
(bitfield gpgme-sig-notation-bitfield))

;;;

(defcenum gpgme-status-code-t
"The possible status codes for the edit operation."
(:eof 0)
(:enter 1)
(:leave 2)
(:abort 3)
(:goodsig 4)
(:badsig 5)
(:errsig 6)

```



(:badarmor 7)  
(:rsa-or-idea 8)  
(:keyexpired 9)  
(:keyrevoked 10)  
(:trust-undefined 11)  
(:trust-never  
12)  
(:trust-marginal 13)  
(:trust-fully 14)  
(:trust-ultimate 15)  
(:shm-info 16)  
(:shm-get 17)  
(:shm-get-bool 18)  
(:shm-get-hidden 19)  
(:need-passphrase 20)  
(:validsig 21)  
(:sig-id 22)  
(:enc-to 23)  
(:nodata 24)  
(:bad-passphrase 25)  
(:no-pubkey 26)  
(:no-seckey 27)  
(:need-passphrase-sym 28)  
(:decryption-failed 29)  
(:decryption-okay 30)  
(:missing-passphrase 31)  
(:good-passphrase 32)  
(:goodmdc 33)  
(:badmdc 34)  
(:errmdc 35)  
(:imported 36)  
(:import-ok 37)  
(:import-problem 38)  
(:import-res 39)  
(:file-start 40)  
(:file-done 41)  
(:file-error 42)  
(:begin-decryption 43)  
(:end-decryption 44)  
(:begin-encryption 45)  
(:end-encryption 46)  
(:delete-problem 47)  
(:get-bool 48)  
(:get-line 49)  
(:get-hidden 50)  
(:got-it 51)  
(:progress 52)  
(:sig-created 53)

(:session-key 54)  
(:notation-name 55)  
(:notation-data 56)  
(:policy-url 57)  
(:begin-stream 58)  
(:end-stream 59)  
(:key-created 60)  
(:userid-hint 61)  
(:unexpected  
62)  
(:inv-recp 63)  
(:no-recp 64)  
(:already-signed 65)  
(:sigexpired 66)  
(:expsig 67)  
(:expkeysig 68)  
(:truncated 69)  
(:error 70)  
(:newsig 71)  
(:revkeysig 72)  
(:sig-subpacket 73)  
(:need-passphrase-pin 74)  
(:sc-op-failure 75)  
(:sc-op-success 76)  
(:cardctrl 77)  
(:backup-key-created 78)  
(:pka-trust-bad 79)  
(:pka-trust-good 80)  
(:plaintext 81)  
(:inv-sgnr 82)  
(:no-sgnr 83)  
(:success 84)  
(:decryption-info 85)  
(:plaintext-length 86)  
(:mountpoint 87)  
(:pinentry-launched 88)  
(:attribute 89)  
(:begin-signing 90)  
(:key-not-created 91)  
(:inquire-maxlen 92)  
(:failure 93)  
(:key-considered 94)  
(:tofu-user 95)  
(:tofu-stats 96)  
(:tofu-stats-long 97)  
(:notation-flags 98)  
(:decryption-compliance-mode 99)  
(:verification-compliance-mode 100))

```
:::
```

```
(defctype gpgme-engine-info-t
 (:wrapper :pointer
 :from-c translate-gpgme-engine-info-t-to-foreign)
 "The engine information structure pointer type.")
```

```
(defcstruct gpgme-engine-info
 "Engine information."
 (next gpgme-engine-info-t)
 (protocol gpgme-protocol-t)
 (file-name :string)
 (version :string)
 (req-version :string)
 (home-dir :string))
```

```
:::
```

```
(defctype gpgme-subkey-t
 (:wrapper :pointer
 :from-c translate-gpgme-subkey-t-from-foreign)
 "A subkey from a key.")
```

```
::: FIXME: Doesn't this depend on endianness?
```

```
(defbitfield (gpgme-subkey-bitfield :unsigned-int)
 "The subkey bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512)
 (:is-cardkey 1024)
 (:is-de-vs 2048))
```

```
(defcstruct gpgme-subkey
 "Subkey from a key."
 (next gpgme-subkey-t)
 (bitfield gpgme-subkey-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (length :unsigned-int)
 (keyid :string)
 (-keyid :char :count 17))
```

```
(fpr :string)
(timestamp :long)
(expires :long))
```

```
(defctype gpgme-key-sig-t
 (:wrapper :pointer
 :from-c translate-gpgme-key-sig-t-from-foreign)
 "A signature on a user ID.")
```

```
:: FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-sig-bitfield :unsigned-int)
 "The key signature bitfield."
 (:revoked 1)
 (:expired 2)
 (:invalid 4)
 (:exportable 16))
```

```
(defcstruct gpgme-key-sig
 "A signature on a user ID."
 (next gpgme-key-sig-t)
 (bitfield gpgme-key-sig-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (keyid :string)
 (-keyid :char :count 17)
 (timestamp :long)
 (expires :long)
 (status gpgme-error-no-signal-t)
 (-class :unsigned-int)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (sig-class :unsigned-int))
```

```
(defctype gpgme-user-id-t
 (:wrapper :pointer
 :from-c translate-gpgme-user-id-t-from-foreign)
 "A user ID from a key.")
```

```
:: FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-user-id-bitfield :unsigned-int)
 "The user ID bitfield."
 (:revoked 1)
 (:invalid 2))
```

```
(defcstruct gpgme-user-id
```

```

"A user ID from a key."
(next
 gpgme-user-id-t)
(bitfield gpgme-user-id-bitfield)
(Validity gpgme-validity-t)
(uid :string)
(name :string)
(email :string)
(comment :string)
(signatures gpgme-key-sig-t)
(-last-keysig gpgme-key-sig-t))

(defctype gpgme-key-t
 (:wrapper :pointer
 :from-c translate-gpgme-key-t-from-foreign
 :to-c translate-gpgme-key-t-to-foreign)
 "A key from the keyring.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-bitfield :unsigned-int)
 "The key bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512))

(defcstruct gpgme-key
 "A signature on a user ID."
 (-refs :unsigned-int)
 (bitfield gpgme-key-bitfield)
 (protocol gpgme-protocol-t)
 (issuer-serial :string)
 (issuer-name :string)
 (chain-id :string)
 (owner-trust gpgme-validity-t)
 (subkeys gpgme-subkey-t)
 (uids gpgme-user-id-t)
 (-last-subkey gpgme-subkey-t)
 (-last-uid gpgme-user-id-t)
 (keylist-mode gpgme-keylist-mode-t))

```

```

;;;

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-passphrase-cb-t :pointer)

(defctype gpgme-progress-cb-t :pointer)

(defctype gpgme-edit-cb-t :pointer)

;;;

;;; Function Interface
;;;

;;; Context management functions.

(defcfun ("gpgme_new" c-gpgme-new) gpgme-error-t
 (ctx :pointer))

(defcfun ("gpgme_release" c-gpgme-release) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_protocol" c-gpgme-set-protocol) gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t))

(defcfun ("gpgme_get_protocol" c-gpgme-get-protocol) gpgme-protocol-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_get_protocol_name" c-gpgme-get-protocol-name) :string
 (proto gpgme-protocol-t))

(defcfun ("gpgme_set_armor" c-gpgme-set-armor) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_armor" c-gpgme-get-armor) :boolean
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_textmode" c-gpgme-set-textmode) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_textmode" c-gpgme-get-textmode) :boolean
 (ctx gpgme-ctx-t))

```

```

(defconstant +include-certs-default+ -256)

(defcfun ("gpgme_set_include_certs" c-gpgme-set-include-certs) :void
 (ctx gpgme-ctx-t)
 (nr-of-certs cert-int-t))

(defcfun ("gpgme_get_include_certs" c-gpgme-get-include-certs) cert-int-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_keylist_mode" c-gpgme-set-keylist-mode) gpgme-error-t
 (ctx gpgme-ctx-t)
 (mode gpgme-keylist-mode-t))

(defcfun ("gpgme_get_keylist_mode" c-gpgme-get-keylist-mode)
 gpgme-keylist-mode-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_passphrase_cb" c-gpgme-set-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-passphrase-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_passphrase_cb" c-gpgme-get-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_progress_cb"
 c-gpgme-set-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-progress-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_progress_cb" c-gpgme-get-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_locale" c-gpgme-set-locale) gpgme-error-t
 (ctx gpgme-ctx-t)
 (category :int)
 (value string-or-nil-t))

(defcfun ("gpgme_ctx_get_engine_info" c-gpgme-ctx-get-engine-info)
 gpgme-engine-info-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_ctx_set_engine_info" c-gpgme-ctx-set-engine-info)

```

```

 gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir string-or-nil-t))

;;;

(defcfun ("gpgme_pubkey_algo_name" c-gpgme-pubkey-algo-name) :string
 (algo gpgme-pubkey-algo-t))

(defcfun ("gpgme_hash_algo_name" c-gpgme-hash-algo-name) :string
 (algo gpgme-hash-algo-t))

;;;

(defcfun ("gpgme_signers_clear" c-gpgme-signers-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_signers_add" c-gpgme-signers-add)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t))

(defcfun ("gpgme_signers_enum" c-gpgme-signers-enum) gpgme-key-t
 (ctx gpgme-ctx-t)
 (seq :int))

;;;

(defcfun ("gpgme_sig_notation_clear" c-gpgme-sig-notation-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_sig_notation_add" c-gpgme-sig-notation-add) gpgme-error-t
 (ctx gpgme-ctx-t)
 (name :string)
 (value string-or-nil-t)
 (flags gpgme-sig-notation-flags-t))

(defcfun ("gpgme_sig_notation_get" c-gpgme-sig-notation-get)
 gpgme-sig-notation-t
 (ctx gpgme-ctx-t))

;;; Run Control.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

```



```
(defctype gpgme-io-cb-t :pointer)
```

```
(defctype gpgme-register-io-cb-t :pointer)
```

```
(defctype gpgme-remove-io-cb-t :pointer)
```

```
(defcenum gpgme-event-io-t
"The possible events on I/O event callbacks."
(:start 0)
(:done 1)
(:next-key 2)
(:next-trustitem 3))
```

```
(defctype gpgme-event-io-cb-t :pointer)
```

```
(defcstruct
gpgme-io-cbs
"I/O callbacks."
(add gpgme-register-io-cb-t)
(add-priv :pointer)
(remove gpgme-remove-io-cb-t)
(event gpgme-event-io-cb-t)
(event-priv :pointer))
```

```
(defctype gpgme-io-cbs-t :pointer)
```

```
(defcfun ("gpgme_set_io_cbs" c-gpgme-set-io-cbs) :void
(ctx gpgme-ctx-t)
(io-cbs gpgme-io-cbs-t))
```

```
(defcfun ("gpgme_get_io_cbs" c-gpgme-get-io-cbs) :void
(ctx gpgme-ctx-t)
(io-cbs gpgme-io-cbs-t))
```

```
(defcfun ("gpgme_wait" c-gpgme-wait) gpgme-ctx-t
(ctx gpgme-ctx-t)
(status-p :pointer)
(hang :int))
```

;;; Functions to handle data objects.

;;; There is no support in CFFI to define callback C types and have  
;;; automatic type checking with the callback definition.

```
(defctype gpgme-data-read-cb-t :pointer)
(defctype gpgme-data-write-cb-t :pointer)
(defctype gpgme-data-seek-cb-t :pointer)
(defctype gpgme-data-release-cb-t :pointer)
```

```

(defcstruct gpgme-data-cbs
 "Data callbacks."
 (read gpgme-data-read-cb-t)
 (write gpgme-data-write-cb-t)
 (seek gpgme-data-seek-cb-t)
 (release gpgme-data-release-cb-t))

(defctype gpgme-data-cbs-t :pointer
 "Data callbacks pointer.")

(defcfun ("gpgme_data_read" c-gpgme-data-read) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))

(defcfun ("gpgme_data_write" c-gpgme-data-write) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))

(defcfun ("gpgme_data_seek" c-gpgme-data-seek) off-t
 (dh gpgme-data-t)
 (offset off-t)
 (whence :int))

(defcfun ("gpgme_data_new" c-gpgme-data-new) gpgme-error-t
 (dh-p :pointer))

(defcfun ("gpgme_data_release" c-gpgme-data-release) :void
 (dh gpgme-data-t))

(defcfun ("gpgme_data_new_from_mem" c-gpgme-data-new-from-mem) gpgme-error-t
 (dh-p :pointer)
 (buffer :pointer)
 (size size-t)
 (copy :int))

(defcfun ("gpgme_data_release_and_get_mem" c-gpgme-data-release-and-get-mem)
 :pointer
 (dh gpgme-data-t)
 (len-p :pointer))

(defcfun ("gpgme_data_new_from_cbs" c-gpgme-data-new-from-cbs) gpgme-error-t
 (dh-p :pointer)
 (cbs gpgme-data-cbs-t)
 (handle :pointer))

```

```

(defcfun ("gpgme_data_new_from_fd" c-gpgme-data-new-from-fd) gpgme-error-t
 (dh-p :pointer)
 (fd :int))

(defcfun ("gpgme_data_new_from_stream" c-gpgme-data-new-from-stream)
 gpgme-error-t
 (dh-p :pointer)
 (stream :pointer))

(defcfun ("gpgme_data_get_encoding" c-gpgme-data-get-encoding)
 gpgme-data-encoding-t
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_encoding" c-gpgme-data-set-encoding)
 gpgme-error-t
 (dh gpgme-data-t)
 (enc gpgme-data-encoding-t))

(defcfun ("gpgme_data_get_file_name" c-gpgme-data-get-file-name) :string
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_file_name" c-gpgme-data-set-file-name) gpgme-error-t
 (dh gpgme-data-t)
 (file-name string-or-nil-t))

(defcfun ("gpgme_data_new_from_file" c-gpgme-data-new-from-file) gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (copy :int))

(defcfun ("gpgme_data_new_from_filepart" c-gpgme-data-new-from-filepart)
 gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (fp
 :pointer)
 (offset off-t)
 (length size-t))

;;; Key and trust functions.

(defcfun ("gpgme_get_key" c-gpgme-get-key) gpgme-error-t
 (ctx gpgme-ctx-t)
 (fpr :string)
 (key-p :pointer)
 (secret :boolean))

(defcfun ("gpgme_key_ref" c-gpgme-key-ref) :void

```

```

(key gpgme-key-t))

(defcfun ("gpgme_key_unref" c-gpgme-key-unref) :void
 (key gpgme-key-t))

;;; Crypto operations.

(defcfun ("gpgme_cancel" c-gpgme-cancel) gpgme-error-t
 (ctx gpgme-ctx-t))

;;;

(defctype gpgme-invalid-key-t
 (:wrapper :pointer
 :from-c translate-gpgme-invalid-key-t-from-foreign)
 "An invalid key structure.")

(defcstruct gpgme-invalid-key
 "An invalid key structure."
 (next gpgme-invalid-key-t)
 (fpr :string)
 (reason gpgme-error-no-signal-t))

;;; Encryption.

(defcstruct gpgme-op-encrypt-result
 "Encryption result structure."
 (invalid-recipients gpgme-invalid-key-t))

(defctype gpgme-op-encrypt-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-encrypt-result-t-from-foreign)
 "An encryption result structure.")

(defcfun ("gpgme_op_encrypt_result" c-gpgme-op-encrypt-result)
 gpgme-op-encrypt-result-t
 (ctx gpgme-ctx-t))

(defbitfield gpgme-encrypt-flags-t
 (:always-trust 1)
 (:no-encrypt-to 2)
 (:prepare 4)
 (:expect-sign 8)
 (:no-compress 16)
 (:symmetric 32)
 (:throw-keyids 64)
 (:wrap 128)
 (:want-address 256))

```

```
(defcfun ("gpgme_op_encrypt_start" c-gpgme-op-encrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))
```

```
(defcfun ("gpgme_op_encrypt" c-gpgme-op-encrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))
```

```
(defcfun ("gpgme_op_encrypt_sign_start" c-gpgme-op-encrypt-sign-start)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))
```

```
(defcfun ("gpgme_op_encrypt_sign"
 c-gpgme-op-encrypt-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))
```

::: Decryption.

```
(defctype gpgme-recipient-t
 (:wrapper :pointer
 :from-c translate-gpgme-recipient-t-from-foreign)
 "A recipient structure.")
```

```
(defcstruct gpgme-recipient
 "Recipient structure."
 (next gpgme-recipient-t)
 (keyid :string)
 (-keyid :char :count 17)
 (pubkey-algo gpgme-pubkey-algo-t)
 (status gpgme-error-no-signal-t))
```

```
(defbitfield gpgme-op-decrypt-result-bitfield
 "Decryption result structure bitfield."
```

```
(:wrong-key-usage 1)
```

```
(:is-de-vs 2)
```

```
(:is-mine 4))
```

```
(defcstruct gpgme-op-decrypt-result
 "Decryption result structure."
 (unsupported-algorithm :string)
 (bitfield gpgme-op-decrypt-result-bitfield)
 (recipients gpgme-recipient-t)
 (file-name :string))
```

```
(defctype gpgme-op-decrypt-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-decrypt-result-t-from-foreign)
 "A decryption result structure.")
```

```
(defcfun ("gpgme_op_decrypt_result" c-gpgme-op-decrypt-result)
 gpgme-op-decrypt-result-t
 (ctx gpgme-ctx-t))
```

```
(defcfun ("gpgme_op_decrypt_start" c-gpgme-op-decrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))
```

```
(defcfun ("gpgme_op_decrypt" c-gpgme-op-decrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))
```

```
(defcfun ("gpgme_op_decrypt_verify_start" c-gpgme-op-decrypt-verify-start)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))
```

```
(defcfun ("gpgme_op_decrypt_verify" c-gpgme-op-decrypt-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))
```

```
::: Signing.
```

```
(defctype gpgme-new-signature-t
 (:wrapper :pointer
 :from-c translate-gpgme-new-signature-t-from-foreign)
 "A new signature structure.")
```

```

(defcstruct gpgme-new-signature
 "New signature structure."
 (next gpgme-new-signature-t)
 (type gpgme-sig-mode-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t)
 (-obsolete-class :unsigned-long)
 (timestamp :long)
 (fpr :string)
 (-obsolete-class-2 :unsigned-int)
 (sig-class :unsigned-int))

(defcstruct gpgme-op-sign-result
 "Signing result structure."
 (invalid-signers gpgme-invalid-key-t)
 (signatures gpgme-new-signature-t))

(defctype gpgme-op-sign-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-sign-result-t-from-foreign)
 "A signing result structure.")

(defcfun ("gpgme_op_sign_result" c-gpgme-op-sign-result)
 gpgme-op-sign-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_sign_start" c-gpgme-op-sign-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

(defcfun ("gpgme_op_sign" c-gpgme-op-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

;;; Verify.

(defbitfield (gpgme-sigsum-t :unsigned-int)
 "Flags
 used for the summary field in a gpgme-signature-t."
 (:valid #x0001)
 (:green #x0002)
 (:red #x0004)
 (:key-revoked #x0010)
 (:key-expired #x0020))

```

```

(:sig-expired #x0040)
(:key-missing #x0080)
(:crl-missing #x0100)
(:crl-too-old #x0200)
(:bad-policy #x0400)
(:sys-error #x0800)
(:tofu-conflict #x1000))

(defctype gpgme-signature-t
 (:wrapper :pointer
 :from-c translate-gpgme-signature-t-from-foreign)
 "A signature structure.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-signature-bitfield :unsigned-int)
 "The signature bitfield."
 (:wrong-key-usage 1)
 (:pka-trust 2)
 (:chain-model 4)
 (:is-de-vs 8))

(defcstruct gpgme-signature
 "Signature structure."
 (next gpgme-signature-t)
 (summary gpgme-sigsum-t)
 (fpr :string)
 (status gpgme-error-no-signal-t)
 (notations gpgme-sig-notation-t)
 (timestamp :unsigned-long)
 (exp-timestamp :unsigned-long)
 (bitfield gpgme-signature-bitfield)
 (validity gpgme-validity-t)
 (validity-reason
 gpgme-error-no-signal-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t))

(defcstruct gpgme-op-verify-result
 "Verify result structure."
 (signatures gpgme-signature-t)
 (file-name :string))

(defctype gpgme-op-verify-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-verify-result-t-from-foreign)
 "A verify result structure.")

(defcfun ("gpgme_op_verify_result" c-gpgme-op-verify-result)

```



```

 gpgme-op-verify-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_verify_start" c-gpgme-op-verify-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)
 (signed-text gpgme-data-t)
 (plaintext gpgme-data-t))

(defcfun ("gpgme_op_verify" c-gpgme-op-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)
 (signed-text gpgme-data-t)
 (plaintext gpgme-data-t))

;; Import.

(defbitfield (gpgme-import-flags-t :unsigned-int)
 "Flags used for the import status field."
 (:new #x0001)
 (:uid #x0002)
 (:sig #x0004)
 (:subkey #x0008)
 (:secret
 #x0010))

(defctype gpgme-import-status-t
 (:wrapper :pointer
 :from-c translate-gpgme-import-status-t-from-foreign)
 "An import status structure.")

(defcstruct gpgme-import-status
 "New import status structure."
 (next gpgme-import-status-t)
 (fpr :string)
 (result gpgme-error-no-signal-t)
 (status :unsigned-int))

(defcstruct gpgme-op-import-result
 "Import result structure."
 (considered :int)
 (no-user-id :int)
 (imported :int)
 (imported-rsa :int)
 (unchanged :int)
 (new-user-ids :int)
 (new-sub-keys :int)
 (new-signatures :int))

```

```

(new-revocations :int)
(secret-read :int)
(secret-imported :int)
(secret-unchanged :int)
(skipped-new-keys :int)
(not-imported :int)
(imports gpgme-import-status-t))

(defctype gpgme-op-import-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-import-result-t-from-foreign)
 "An import status result structure.")

(defcfun ("gpgme_op_import_result" c-gpgme-op-import-result)
 gpgme-op-import-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_import_start" c-gpgme-op-import-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_import" c-gpgme-op-import) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

;;; Export.

(defcfun ("gpgme_op_export_start" c-gpgme-op-export-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_export" c-gpgme-op-export) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

;;; FIXME: Extended export interfaces require array handling.

;;; Key generation.

(defbitfield (gpgme-genkey-flags-t :unsigned-int)
 "Flags used for the key generation result bitfield."
 (:primary #x0001)
 (:sub #x0002)
 (:uid #x0004))

```

```

(defcstruct gpgme-op-genkey-result
 "Key generation result structure."
 (bitfield gpgme-genkey-flags-t)
 (fpr :string))

(defctype gpgme-op-genkey-result-t :pointer
 "A
 key generation result structure.")

(defcfun ("gpgme_op_genkey_result" c-gpgme-op-genkey-result)
 gpgme-op-genkey-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_genkey_start" c-gpgme-op-genkey-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

(defcfun ("gpgme_op_genkey" c-gpgme-op-genkey) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

;;; Key deletion.

(defcfun ("gpgme_op_delete_start" c-gpgme-op-delete-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

(defcfun ("gpgme_op_delete" c-gpgme-op-delete) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

;;; FIXME: Add edit interfaces.

;;; Keylist interface.

(defbitfield (gpgme-keylist-flags-t :unsigned-int)
 "Flags used for the key listing result bitfield."
 (:truncated #x0001))

(defcstruct gpgme-op-keylist-result
 "Key listing result structure."

```

```

(bitfield
 gpgme-keylist-flags-t))

(defctype gpgme-op-keylist-result-t :pointer
 "A key listing result structure.")

(defcfun ("gpgme_op_keylist_result" c-gpgme-op-keylist-result)
 gpgme-op-keylist-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_keylist_start" c-gpgme-op-keylist-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (secret_only :boolean))

;;; FIXME: Extended keylisting requires array handling.

(defcfun ("gpgme_op_keylist_next" c-gpgme-op-keylist-next) gpgme-error-t
 (ctx gpgme-ctx-t)
 (r-key :pointer))

(defcfun ("gpgme_op_keylist_end" c-gpgme-op-keylist-end) gpgme-error-t
 (ctx gpgme-ctx-t))

;;; Various functions.

(defcfun ("gpgme_check_version" c-gpgme-check-version) :string
 (req-version string-or-nil-t))

(defcfun ("gpgme_get_engine_info" c-gpgme-get-engine-info) gpgme-error-t
 (engine-info-p :pointer))

(defcfun ("gpgme_set_engine_info" c-gpgme-set-engine-info) gpgme-error-t
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir
 string-or-nil-t))

(defcfun ("gpgme_engine_check_version" c-gpgme-engine-check-version)
 gpgme-error-t
 (proto gpgme-protocol-t))

;;;
;;; L I S P I N T E R F A C E
;;;

;;;
;;; Lisp type translators.

```

;;;

;; Both directions.

;; cert-int-t is a helper type that takes care of representing the  
;; default number of certs as NIL.

```
(defun translate-cert-int-t-from-foreign (value)
 (cond
 ((eql value +include-certs-default+) nil)
 (t value)))
```

```
(defun translate-cert-int-t-to-foreign (value)
 (cond
 (value value)
 (t +include-certs-default+)))
```

;; string-or-nil-t translates a null pointer to NIL and vice versa.  
;; Translation from foreign null pointer already works as expected.

```
(defun translate-string-or-nil-t-to-foreign (value)
 (cond
 (value value)
 (t (null-pointer))))
```

;; Output only.

;; These type translators only convert from foreign type, because we  
;; never use these types in the other direction.

;; Convert gpgme-engine-info-t linked lists into a  
list of property  
;; lists. Note that this converter will automatically be invoked  
;; recursively.  
;;  
;; FIXME: Should we use a hash table (or struct, or clos) instead of  
;; property list, as recommended by the Lisp FAQ?

```
(defun translate-gpgme-engine-info-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next protocol file-name version req-version home-dir)
 value (:struct gpgme-engine-info))
 (append (list protocol (list
 :file-name file-name
 :version version
 :req-version req-version
```

```

 :home-dir home-dir))
next))))))

(defun translate-gpgme-invalid-key-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next fpr reason)
 value (:struct gpgme-invalid-key))
 (append (list (list :fpr fpr
 :reason reason))
 next))))))

(defun translate-gpgme-op-encrypt-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((invalid-recipients)
 value (:struct gpgme-op-encrypt-result))
 (list :encrypt
 (list :invalid-recipients invalid-recipients))))))

(defun translate-gpgme-recipient-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next keyid pubkey-algo status)
 value (:struct gpgme-recipient))
 (append (list (list :keyid keyid
 :pubkey-algo pubkey-algo
 :status status))
 next))))))

(defun translate-gpgme-op-decrypt-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((unsupported-algorithm bitfield recipients file-name)
 value (:struct gpgme-op-decrypt-result))
 (list :decrypt (list :unsupported-algorithm unsupported-algorithm
 :bitfield bitfield
 :recipients recipients
 :file-name file-name))))))

(defun translate-gpgme-new-signature-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)

```

```

(t (with-foreign-slots
 ((next
type pubkey-algo hash-algo timestamp fpr sig-class)
 value (:struct gpgme-new-signature))
(append (list (list :type type
 :pubkey-algo pubkey-algo
 :hash-algo hash-algo
 :timestamp timestamp
 :fpr fpr
 :sig-class sig-class))
next))))

```

```

(defun translate-gpgme-op-sign-result-t-from-foreign (value)
(cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((invalid-signers signatures)
value (:struct gpgme-op-sign-result))
(list :sign (list :invalid-signers invalid-signers
 :signatures signatures))))))

```

```

(defun translate-gpgme-signature-t-from-foreign (value)
(cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next summary fpr status notations timestamp
exp-timestamp bitfield validity validity-reason
pubkey-algo hash-algo)
value (:struct gpgme-signature))
(append (list (list :summary summary
 :fpr fpr
 :status status
 :notations notations
 :timestamp timestamp

:exp-timestamp exp-timestamp
 :bitfield bitfield
 :validity validity
 :validity-reason validity-reason
 :pubkey-algo pubkey-algo))
next))))

```

```

(defun translate-gpgme-op-verify-result-t-from-foreign (value)
(cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((signatures file-name)
value (:struct gpgme-op-verify-result))

```

```

(list :verify (list :signatures signatures
 :file-name file-name))))))

(defun translate-gpgme-import-status-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next fpr result status)
 value (:struct gpgme-import-status))
 (append (list (list :fpr fpr
 :result result
 :status status))
 next))))))

(defun translate-gpgme-op-import-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((considered no-user-id imported imported-rsa unchanged
 new-user-ids new-sub-keys new-signatures
 new-revocations
 secret-read secret-imported
 secret-unchanged skipped-new-keys not-imported
 imports)
 value (:struct gpgme-op-import-result))
 (list :verify (list :considered considered
 :no-user-id no-user-id
 :imported imported
 :imported-rsa imported-rsa
 :unchanged unchanged
 :new-user-ids new-user-ids
 :new-sub-keys new-sub-keys
 :new-signatures new-signatures
 :new-revocations new-revocations
 :secret-read secret-read
 :secret-imported secret-imported
 :secret-unchanged secret-unchanged
 :skipped-new-keys skipped-new-keys
 :not-imported not-imported
 :imports imports))))))

```

;;; Error handling.

;;; Use gpgme-error-no-signal-t to suppress automatic error handling

;;; at translation time.

;;;

;;; FIXME: Part of this probably should be in gpg-error!



```
(define-condition gpgme-error (error)
 ((value :initarg :gpgme-error :reader gpgme-error-value))
 (:report (lambda (c stream)

 (format stream "GPGME returned error: ~A (~A)"
 (gpgme-strerror (gpgme-error-value c))
 (gpgme-strsource (gpgme-error-value c))))))
 (:documentation "Signalled when a GPGME function returns an error."))
```

```
(defun translate-gpgme-error-t-from-foreign (value)
 "Raise a GPGME-ERROR if VALUE is non-zero."
 (when (not (eql (gpgme-err-code value) :gpg-err-no-error))
 (error 'gpgme-error :gpgme-error value))
 (gpg-err-canonicalize value))
```

```
(defun translate-gpgme-error-t-to-foreign (value)
 "Canonicalize the error value."
 (if (eql (gpgme-err-code value) :gpg-err-no-error)
 0
 (gpg-err-as-value value)))
```

```
(defun translate-gpgme-error-no-signal-t-from-foreign (value)
 "Canonicalize the error value."
 (gpg-err-canonicalize value))
```

```
;;; *INTERNAL* Lispy Function Interface that is still close to the C
;;; interface.
```

```
;;; Passphrase callback management.
```

```
;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.
```

```
(defvar
 passphrase-handles (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
 passphrase callback object as value.")
```

```
(defcallback passphrase-cb gpgme-error-t ((handle :pointer)
 (uid-hint :string)
 (passphrase-info :string)
 (prev-was-bad :boolean)
 (fd :int))
 (handler-case
 (let* ((passphrase-cb
 (gethash (pointer-address handle) *passphrase-handles*)))
 (passphrase
```

```

(cond
((functionp passphrase-cb)
(concatenate 'string
 (funcall passphrase-cb uid-hint passphrase-info
 prev-was-bad)
 '(\Newline)))
(t (concatenate 'string passphrase-cb '(\Newline))))
(passphrase-len (length passphrase))
;; FIXME: Could be more robust.
(res (system-write fd passphrase passphrase-len)))
(cond
((< res passphrase-len) ; FIXME: Blech. A weak attempt to be robust.
(gpgme-error :gpg-err-ival))
(t (gpgme-error :gpg-err-no-error)))
(gpgme-error (err)
(gpgme-error-value err))
(system-error (err) (gpgme-error-from-errno (system-error-errno err)))
;; FIXME: The original error gets lost here.
(condition (err) (progn
 (when *debug*
(format t "DEBUG: passphrase-cb: Unexpressable: ~A~%"
err))
(gpgme-error :gpg-err-general))))

```

;;; CTX is a C-pointer to the context.

```

(defun gpgme-set-passphrase-cb (ctx cb)
"Set the passphrase callback for CTX."
(let ((handle (pointer-address ctx)))
(cond
(cb (setf (gethash handle *passphrase-handles*) cb)
(c-gpgme-set-passphrase-cb ctx (callback passphrase-cb) ctx)
(t (c-gpgme-set-passphrase-cb ctx (null-pointer) (null-pointer))
(remhash handle *passphrase-handles*))))))

```

;;; Progress callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable  
;;; default implementation for ease-of-use.

```

(defvar *progress-handles* (make-hash-table)
"Hash table with GPGME context address as key and the corresponding

progress callback

object as value.")

```

```

(defcallback progress-cb :void ((handle :pointer)
 (what :string)
 (type :int)
 (current :int)

```

```

(total :int)
(handler-case
 (let* ((progress-cb
 (gethash (pointer-address handle) *progress-handles*)))
 (funcall progress-cb what type current total))
 ;; FIXME: The original error gets lost here.
 (condition (err) (when *debug*
 (format t "DEBUG: progress-cb: Unexpressable: ~A~%"
 err))))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-progress-cb (ctx cb)
 "Set the progress callback for CTX."
 (let ((handle (pointer-address ctx)))
 (cond
 (cb (setf (gethash handle *progress-handles*) cb)
 (c-gpgme-set-progress-cb ctx (callback progress-cb) ctx)
 (t (c-gpgme-set-progress-cb ctx (null-pointer) (null-pointer))
 (remhash handle *progress-handles*))))))

;;; Context management.

(defun gpgme-new (&key (protocol :openpgp) armor textmode include-certs
 keylist-mode passphrase progress file-name
 home-dir)
 "Allocate a new GPGME context."
 (with-foreign-object (ctx-p 'gpgme-ctx-t)
 (c-gpgme-new ctx-p)
 (let ((ctx (mem-ref ctx-p 'gpgme-ctx-t)))
 ;; Set locale?
 (gpgme-set-protocol ctx protocol)
 (gpgme-set-armor ctx armor)
 (gpgme-set-textmode ctx textmode)
 (when include-certs (gpgme-set-include-certs ctx include-certs))
 (when keylist-mode (gpgme-set-keylist-mode ctx keylist-mode))
 (gpgme-set-passphrase-cb ctx passphrase)
 (gpgme-set-progress-cb ctx progress)
 (gpgme-set-engine-info ctx protocol
 :file-name file-name :home-dir home-dir)
 (when *debug* (format t "DEBUG: gpgme-new: ~A~%" ctx)
 ctx)))

(defun gpgme-release (ctx)
 "Release a GPGME context."
 (when *debug* (format t "DEBUG: gpgme-release: ~A~%" ctx))
 (c-gpgme-release ctx))

(defun gpgme-set-protocol (ctx proto)

```

```

"Set the protocol to be used by CTX to PROTO."
(c-gpgme-set-protocol ctx proto))

(defun gpgme-get-protocol (ctx)
 "Get
the protocol used with CTX."
 (c-gpgme-get-protocol ctx))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme-get-protocol-name

(defun gpgme-set-armor (ctx armor)
 "If ARMOR is true, enable armor mode in CTX, disable it otherwise."
 (c-gpgme-set-armor ctx armor))

(defun gpgme-armor-p (ctx)
 "Return true if armor mode is set for CTX."
 (c-gpgme-get-armor ctx))

(defun gpgme-set-textmode (ctx textmode)
 "If TEXTMODE is true, enable text mode mode in CTX, disable it otherwise."
 (c-gpgme-set-textmode ctx textmode))

(defun gpgme-textmode-p (ctx)
 "Return true if text mode mode is set for CTX."
 (c-gpgme-get-textmode ctx))

(defun gpgme-set-include-certs (ctx &optional certs)
 "Include up to CERTS certificates in an S/MIME message."
 (c-gpgme-set-include-certs ctx certs))

(defun gpgme-get-include-certs (ctx)
 "Return the number of certs to include in an S/MIME message,
or NIL if the default is used."
 (c-gpgme-get-include-certs ctx))

(defun gpgme-get-keylist-mode (ctx)
 "Get the keylist mode in CTX."
 (c-gpgme-get-keylist-mode ctx))

(defun gpgme-set-keylist-mode (ctx mode)
 "Set the keylist mode in CTX."
 (c-gpgme-set-keylist-mode ctx mode))

;;; FIXME: How to handle locale? cffi-grovel?

```

```
(defun gpgme-get-engine-info (&optional ctx)
 "Retrieve the engine info for CTX, or the default if CTX is omitted."
 (cond
 (ctx (c-gpgme-ctx-get-engine-info ctx))
 (t (with-foreign-object (info-p 'gpgme-engine-info-t)
 (c-gpgme-get-engine-info info-p)
 (mem-ref info-p 'gpgme-engine-info-t))))))
```

```
(defun gpgme-set-engine-info (ctx proto &key file-name home-dir)
 "Set the engine info for CTX, or the default if CTX is NIL."
 (cond
 (ctx (c-gpgme-ctx-set-engine-info ctx proto file-name home-dir))
 (t (c-gpgme-set-engine-info proto file-name home-dir))))
```

```
;;; FIXME: How to do pretty printing?
;;;
;;; gpgme_pubkey_algo_name, gpgme_hash_algo_name
```

```
(defun gpgme-set-signers (ctx keys)
 "Set the signers for the context CTX."
 (c-gpgme-signers-clear ctx)
 (dolist (key keys) (c-gpgme-signers-add ctx key)))
```

```
;;;
```

```
(defun gpgme-set-sig-notation (ctx notations)
 "Set the sig notation for the context CTX."
 (c-gpgme-sig-notation-clear ctx)
 (dolist (notation notations)
 (c-gpgme-sig-notation-add
 ctx (first notation) (second notation) (third notation))))
```

```
(defun gpgme-get-sig-notation (ctx)
 "Get the signature notation data for the context CTX."
 (c-gpgme-sig-notation-get ctx))
```

```
;;; FIXME: Add I/O callback interface, for integration with clg.
```

```
;;; FIXME: Add gpgme_wait?
```

```
;;; Streams
```

```
;;; -----
```

```
;;;
```

```
;;; GPGME uses standard streams. You can define your own streams, or
;;; use the existing file or string streams.
```

```
;;;
```

```
;;; A stream-spec is either a stream, or a list with a stream as its
```

```
;;; first argument followed by keyword parameters: encoding,
```

```

;;; file-name.
;;;
;;; FIXME: Eventually, we should provide a class that can be mixed
;;; into stream classes and which provides accessors for encoding and
;;; file-names. This interface
 should be provided in addition to the
;;; above sleazy interface, because the sleazy interface is easier to
;;; use (less typing), and is quite sufficient in a number of cases.
;;;
;;; For best results, streams with element type (unsigned-byte 8)
;;; should be used. Character streams may work if armor mode is used.

```

```

;;; Do we need to provide access to GPGME data objects through streams
;;; as well? It seems to me that specific optimizations, like
;;; directly writing to file descriptors, is better done by extending
;;; the sleazy syntax (stream-spec) instead of customized streams.
;;; Customized streams do buffering, and this may mess up things. Mmh.

```

```

(defvar *data-handles* (make-hash-table)
 "Hash table with GPGME data user callback handle address as key
 and the corresponding stream as value.")

```

```

;;; The release callback removes the stream from the *data-handles*
;;; hash and releases the CBS structure that is used as the key in
;;; that hash. It is implicitly invoked (through
 GPGME) by
;;; gpgme-data-release.

```

```

(defcallback data-release-cb :void ((handle :pointer))
 (unwind-protect (remhash (pointer-address handle) *data-handles*)
 (when (not (null-pointer-p handle)) (foreign-free handle))))

```

```

(defcallback data-read-cb ssize-t ((handle :pointer) (buffer :pointer)
 (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-read-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
 (cond
 (stream
 (let* ((stream-type (stream-element-type stream))
 (seq (make-array size :element-type stream-type))
 (read (read-sequence seq stream)))
 (cond
 ((equal stream-type '(unsigned-byte 8))
 (dotimes (i read)
 (setf (mem-aref buffer :unsigned-char i)
 (aref (the byte-array seq) i))))
 ((eql stream-type 'character)
 (dotimes (i read)
 (setf (mem-aref buffer :unsigned-char

```

```

i)
 (char-code (aref (the character-array seq) i))))
 (t
 (dotimes (i read)
 (setf (mem-aref buffer :unsigned-char i)
 (coerce (aref seq i) '(unsigned-byte 8))))))
 (when *debug* (format t "DEBUG: gpgme-data-read-cb: read ~A~%" read)
 read))
(t
 (set-errno +ebadf+
 -1))))

```

```

(defcallback data-write-cb ssize-t ((handle :pointer) (buffer :pointer)
 (size size-t)
 (when *debug* (format t "DEBUG: gpgme-data-write-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
 (cond
 (stream
 (let* ((stream-type (stream-element-type stream))
 (seq (make-array size :element-type stream-type)))
 (cond
 ((equal stream-type '(unsigned-byte 8))
 (dotimes (i size)
 (setf (aref (the byte-array seq) i)
 (mem-aref buffer :unsigned-char i))))
 ((eql stream-type 'character)
 (dotimes (i size)
 (setf (aref (the character-array seq) i)
 (code-char (mem-aref buffer :unsigned-char i))))))
 (t
 (dotimes (i size)
 (setf (aref seq i)
 (coerce (mem-aref buffer :unsigned-char i) stream-type))))))
 (write-sequence seq stream)
 size))
 (t
 (set-errno +ebadf+
 -1))))

```

;;; This little helper macro allows us to swallow the cbs structure by  
 ;;; simply setting it to a null pointer, but still protect against  
 ;;; conditions.

```

(defmacro with-cbs-swallowed ((cbs) &body body)
 `(let ((,cbs (foreign-alloc '(struct gpgme-data-cbs))))
 (unwind-protect (progn ,@body)
 (when (not (null-pointer-p ,cbs)) (foreign-free ,cbs))))

```

```

(defun gpgme-data-new (stream &key encoding file-name)

```

```

"Allocate a new GPGME data object for STREAM."
(with-foreign-object (dh-p 'gpgme-data-t)
 ;; We allocate one CBS structure
for each stream we wrap in a
 ;; data object. Although we could also share all these
 ;; structures, as they contain the very same callbacks, we need a
 ;; unique C pointer as handle anyway to look up the stream in the
 ;; callback. This is a convenient one to use.
(with-cbs-swallowed (cbs)
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'read)
 (callback data-read-cb))
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'write)
 (callback data-write-cb))
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'seek)
 (null-pointer))
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'release)
 (callback data-release-cb))
 (c-gpgme-data-new-from-cbs dh-p cbs cbs)
 (let ((dh (mem-ref dh-p 'gpgme-data-t)))
 (when encoding (gpgme-data-set-encoding dh encoding))
 (when file-name (gpgme-data-set-file-name dh file-name))
 ;; Install the stream into the hash table and
 swallow the cbs
 ;; structure while protecting against any errors.
(unwind-protect
 (progn
 (setf (gethash (pointer-address cbs) *data-handles*) stream)
 (setf cbs (null-pointer)))
 (when (not (null-pointer-p cbs)) (c-gpgme-data-release dh)))
 (when *debug* (format t "DEBUG: gpgme-data-new: ~A~%" dh))
 dh))))

;; This function releases a GPGME data object. It implicitly
;; invokes the data-release-cb function to clean up associated junk.
(defun gpgme-data-release (dh)
 "Release a GPGME data object."
 (when *debug* (format t "DEBUG: gpgme-data-release: ~A~%" dh))
 (c-gpgme-data-release dh))

(defclass data ()
 (c-data) ; The C data object pointer
 (:documentation "The GPGME data type.))

(defmethod initialize-instance :after ((data data) &key streamspec
 &allow-other-keys)
 (let ((c-data (if (listp streamspec)
 (apply #'gpgme-data-new streamspec)
 (gpgme-data-new streamspec))))

```



```

(cleanup t)
(unwind-protect
 (progn
 (setf (slot-value data 'c-data) c-data)
 (finalize data (lambda () (gpgme-data-release c-data)))
 (setf cleanup nil))
 (if cleanup (gpgme-data-release c-data))))

(defun translate-gpgme-data-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (cond
 ((null value) (null-pointer))
 ((pointerp value) value)
 (t (slot-value value 'c-data))))

(defmacro with-gpgme-data ((dh streamspec) &body body)
 `(let ((,dh (make-instance 'data :streamspec ,streamspec)))
 ,@body))

(defun gpgme-data-get-encoding (dh)
 "Get the encoding associated with the data object DH."
 (c-gpgme-data-get-encoding dh))

(defun gpgme-data-set-encoding (dh encoding)
 "Set the encoding associated with the data object DH to ENCODING."
 (c-gpgme-data-set-encoding dh encoding))

(defun gpgme-data-get-file-name (dh)
 "Get the file name associated with the data object
 DH."
 (c-gpgme-data-get-file-name dh))

(defun gpgme-data-set-file-name (dh file-name)
 "Set the file name associated with the data object DH to FILE-NAME."
 (c-gpgme-data-set-file-name dh file-name))

;;; FIXME: Add key accessor interfaces.

(defun gpgme-get-key (ctx fpr &optional secret)
 "Get the key with the fingerprint FPR from the context CTX."
 (with-foreign-object (key-p 'gpgme-key-t)
 (c-gpgme-get-key ctx fpr key-p secret)
 (mem-ref key-p 'gpgme-key-t)))

(defun gpgme-key-ref (key)
 "Acquire an additional reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-ref: ~A~%" key))
 (c-gpgme-key-ref key))

```

```

(defun gpgme-key-unref (key)
 "Release a reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-unref: ~A~%" key))
 (c-gpgme-key-unref key))

;;; FIXME: We REALLY need pretty printing for keys and all the other
;;; big structs.

;;; Various interfaces.

(defun gpgme-check-version (&optional req-version)
 (c-gpgme-check-version req-version))

;;;
;;;
The *EXPORTED* CLOS interface.
;;;

;;; The context type.

;;; We wrap the C context pointer into a class object to be able to
;;; stick a finalizer on it.

(defclass context ()
 (c-ctx ; The C context object pointer.
 signers ; The list of signers.
 sig-notation) ; The list of signers.
 (:documentation "The GPGME context type.))

(defmethod initialize-instance :after ((ctx context) &rest rest
 &key &allow-other-keys)
 (let ((c-ctx (apply #'gpgme-new rest))
 (cleanup t))
 (unwind-protect
 (progn (setf (slot-value ctx 'c-ctx) c-ctx)
 (finalize ctx (lambda () (gpgme-release c-ctx)))
 (setf cleanup nil))
 (if cleanup (gpgme-release c-ctx))))))

(defun translate-gpgme-ctx-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-ctx)))

(defmacro context (&rest rest)
 "Create a new GPGME context."
 `(make-instance 'context ,@rest))

```

;;; The context type: Accessor  
functions.

;;; The context type: Accessor functions: Protocol.

```
(defgeneric protocol (ctx)
 (:documentation "Get the protocol of CONTEXT."))
```

```
(defmethod protocol ((ctx context))
 (gpgme-get-protocol ctx))
```

```
(defgeneric (setf protocol) (protocol ctx)
 (:documentation "Set the protocol of CONTEXT to PROTOCOL."))
```

;;; FIXME: Adjust translator to reject invalid protocols. Currently,  
;;; specifying an invalid protocol throws a "NIL is not 32 signed int"  
;;; error. This is suboptimal.

```
(defmethod (setf protocol) (protocol (ctx context))
 (gpgme-set-protocol ctx protocol))
```

;;; The context type: Accessor functions: Armor.

;;; FIXME: Is it good style to make foop self-able? Or should it be  
;;; foo/foop for set/get?

```
(defgeneric armorp (ctx)
 (:documentation "Get the armor flag of CONTEXT."))
```

```
(defmethod armorp ((ctx context))
 (gpgme-armor-p ctx))
```

```
(defgeneric (setf armorp) (armor ctx)
 (:documentation "Set the armor flag of CONTEXT to ARMOR."))
```

```
(defmethod (setf armorp) (armor (ctx
 context))
 (gpgme-set-armor ctx armor))
```

;;; The context type: Accessor functions: Textmode.

;;; FIXME: Is it good style to make foop self-able? Or should it be  
;;; foo/foop for set/get?

```
(defgeneric textmodep (ctx)
 (:documentation "Get the text mode flag of CONTEXT."))
```

```
(defmethod textmodep ((ctx context))
 (gpgme-textmode-p ctx))
```

```
(defgeneric (setf textmodep) (textmode ctx)
```

```
(:documentation "Set the text mode flag of CONTEXT to TEXTMODE.")
```

```
(defmethod (setf textmodep) (textmode (ctx context))
 (gpgme-set-textmode ctx textmode))
```

```
::; The context type: Accessor functions: Include Certs.
```

```
(defgeneric include-certs (ctx)
 (:documentation "Get the number of included certificates in an
 S/MIME message, or NIL if the default is used."))
```

```
(defmethod include-certs ((ctx context))
 (gpgme-get-include-certs ctx))
```

```
(defgeneric (setf include-certs) (certs ctx)
 (:documentation "Return the number of certificates to include in an
 S/MIME message, or
 NIL if the default is used."))
```

```
(defmethod (setf include-certs) (certs (ctx context))
 (gpgme-set-include-certs ctx certs))
```

```
::; The context type: Accessor functions: Engine info.
```

```
(defgeneric engine-info (ctx)
 (:documentation "Retrieve the engine info for CTX."))
```

```
(defmethod engine-info ((ctx context))
 (gpgme-get-engine-info ctx))
```

```
(defgeneric (setf engine-info) (info ctx)
 (:documentation "Set the engine info for CTX."))
```

```
(defmethod (setf engine-info) (info (ctx context))
 (dolist (proto '(:openpgp :cms))
 (let ((pinfo (getf info proto)))
 (when pinfo
 (gpgme-set-engine-info ctx proto :file-name (getf pinfo :file-name)
 :home-dir (getf pinfo :home-dir))))))
```

```
::; The context type: Accessor functions: Keylist mode.
```

```
(defgeneric keylist-mode (ctx)
 (:documentation "Get the keylist mode of CTX."))
```

```
(defmethod keylist-mode ((ctx context))
 (gpgme-get-keylist-mode ctx))
```

```
(defgeneric (setf keylist-mode) (mode ctx)
 (:documentation "Set the keylist mode of CTX to MODE."))
```

```
(defmethod
 (setf keylist-mode) (mode (ctx context))
 (gpgme-set-keylist-mode ctx mode))
```

;;; The context type: Accessor functions: Signers.

```
(defgeneric signers (ctx)
 (:documentation "Get the signers of CTX."))
```

```
(defmethod signers ((ctx context))
 (slot-value ctx 'signers))
```

```
(defgeneric (setf signers) (signers ctx)
 (:documentation "Set the signers of CTX to SIGNERS."))
```

```
(defmethod (setf keylist-mode) (signers (ctx context))
 (gpgme-set-signers ctx signers)
 (setf (slot-value ctx 'signers) signers))
```

;;; The context type: Accessor functions: Sig notations.

```
(defgeneric sig-notations (ctx)
 (:documentation "Get the signature notations of CTX."))
```

```
(defmethod sig-notations ((ctx context))
 (slot-value ctx 'signers))
```

```
(defgeneric (setf sig-notations) (notations ctx)
 (:documentation "Set the signatire notations of CTX to NOTATIONS."))
```

```
(defmethod (setf sig-notations) (notations (ctx context))
 (gpgme-set-signers ctx notations)
 (setf (slot-value ctx 'notations) notations))
```

;;;

The context type: Support macros.

```
(defmacro with-context ((ctx &rest rest) &body body)
 `(let ((,ctx (make-instance 'context ,@rest)))
 ,@body))
```

;;; The key type.

```
(defclass key ()
 (c-key) ; The C key object pointer.
```

```

(:documentation "The GPGME key type.")

;;; In the initializer, we swallow the c-key argument.
(defmethod initialize-instance :after ((key key) &key c-key
 &allow-other-keys)
 (setf (slot-value key 'c-key) c-key)
 (finalize key (lambda () (gpgme-key-unref c-key))))

(defun translate-gpgme-key-t-from-foreign (value)
 (when *debug* (format t "DEBUG: import key: ~A~%" value))
 (make-instance 'key :c-key value))

(defun translate-gpgme-key-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-key)))

(defmethod print-object ((key key) stream)
 (print-unreadable-object (key stream :type t :identity t)
 (format stream "~s" (fpr key))))

;;; The key type:
Accessor functions.

;;; FIXME: The bitfield and flags contain redundant information at
;;; this point. FIXME: Deal nicer with zero-length name (policy url)
;;; and zero length value (omit?) and human-readable (convert to string).
;;; FIXME: Turn binary data into sequence or vector or what it should be.
;;; FIXME: Turn the whole thing into a hash?
(defun translate-gpgme-sig-notation-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next name value name-len value-len flags bitfield)
 value (:struct gpgme-sig-notation))
 (append (list (list
 :name name
 :value value
 :name-len name-len
 :value-len value-len
 :flags flags
 :bitfield bitfield))
 next))))))

;;; FIXME: Deal nicer with timestamps. bitfield field name?
(defun translate-gpgme-subkey-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots

```

```
((next bitfield pubkey-algo length keyid fpr timestamp expires)
 value (:struct gpgme-subkey))
```

```
(append (list (list
 :bitfield bitfield
 :pubkey-algo pubkey-algo
 :length length
 :keyid keyid
 :fpr fpr
 :timestamp timestamp
 :expires expires))
 next))))
```

```
(defun translate-gpgme-key-sig-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next bitfield pubkey-algo keyid timestamp expires status
 uid name email comment sig-class)
 value (:struct gpgme-key-sig))
 (append (list (list
 :bitfield bitfield
 :pubkey-algo pubkey-algo
 :keyid keyid
 :timestamp timestamp
 :expires expires
 :status status
 :uid uid
 :name name
 :email email
 :comment comment
 :sig-class sig-class))
 next))))))
```

```
(defun translate-gpgme-user-id-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next bitfield validity uid name email comment signatures)
 value (:struct gpgme-user-id))
 (append (list (list
 :bitfield bitfield
 :validity validity
 :uid uid
 :name
 name
 :email email
 :comment comment
```

```

:signatures signatures))
next))))))

(defun key-data (key)
 (with-slots (c-key) key
 (with-foreign-slots
 ((bitfield protocol issuer-serial issuer-name chain-id
 owner-trust subkeys uids keylist-mode)
 c-key (:struct gpgme-key))
 (list
 :bitfield bitfield
 :protocol protocol
 :issuer-serial issuer-serial
 :issuer-name issuer-name
 :chain-id chain-id
 :owner-trust owner-trust
 :subkeys subkeys
 :uids uids
 :keylist-mode keylist-mode))
))

(defgeneric fpr (key)
 (:documentation "Get the primary fingerprint of the key."))

(defmethod fpr ((key key))
 (getf (car (getf (key-data key) :subkeys)) :fpr))

;;; The context type: Crypto-Operations.

(defgeneric get-key (ctx fpr &optional secret)
 (:documentation "Get the (secret) key FPR from CTX."))

(defmethod get-key ((ctx context) fpr &optional secret)
 (gpgme-get-key ctx fpr secret))

;;; Encrypt.

(defgeneric
 op-encrypt (ctx recp plain cipher &key always-trust sign)
 (:documentation "Encrypt."))

(defmethod op-encrypt ((ctx context) recp plain cipher
 &key always-trust sign)
 (with-foreign-object (c-recp :pointer (+ 1 (length recp)))
 (dotimes (i (length recp))
 (setf (mem-aref c-recp 'gpgme-key-t i) (elt recp i))))

```



```

(setf (mem-aref c-recp :pointer (length recp)) (null-pointer))
(with-gpgme-data (in plain)
 (with-gpgme-data (out cipher)
 (let ((flags))
 (if always-trust (push :always-trust flags))
 (cond
 (sign
 (c-gpgme-op-encrypt-sign ctx c-recp flags in out)
 (append (c-gpgme-op-encrypt-result ctx)
 (c-gpgme-op-sign-result ctx))))
 (t
 (c-gpgme-op-encrypt ctx c-recp flags in out)
 (c-gpgme-op-encrypt-result ctx)))))))

```

;;; Decrypt.

```

(defgeneric op-decrypt (ctx cipher plain &key verify)
 (:documentation "Decrypt."))

(defmethod op-decrypt ((ctx context) cipher plain &key verify)
 (with-gpgme-data (in cipher)
 (with-gpgme-data
 (out plain)
 (cond
 (verify
 (c-gpgme-op-decrypt-verify ctx in out)
 (append (c-gpgme-op-decrypt-result ctx)
 (c-gpgme-op-verify-result ctx)))
 (t
 (c-gpgme-op-decrypt ctx in out)
 (c-gpgme-op-decrypt-result ctx))))))

```

;;; Signing.

```

(defgeneric op-sign (ctx plain sig &optional mode)
 (:documentation "Sign."))

(defmethod op-sign ((ctx context) plain sig &optional (mode :none))
 (with-gpgme-data (in plain)
 (with-gpgme-data (out sig)
 (c-gpgme-op-sign ctx in out mode)
 (c-gpgme-op-sign-result ctx)))

```

;;; Verify.

```

(defgeneric op-verify (ctx sig text &key detached)
 (:documentation "Verify."))

```

```
(defmethod op-verify ((ctx context) sig text &key detached)
 (with-gpgme-data (in sig)
 (with-gpgme-data (on text)
 (c-gpgme-op-verify ctx in (if detached on nil)
 (if detached nil on))
 (c-gpgme-op-verify-result ctx))))
```

::: Import.

```
(defgeneric op-import (ctx keydata)
 (:documentation "Import."))
```

```
(defmethod op-import ((ctx context) keydata)
 (with-gpgme-data (in keydata)
 (c-gpgme-op-import ctx in)
 (c-gpgme-op-import-result ctx)))
```

::: Export.

```
(defgeneric op-export (ctx pattern keydata)
 (:documentation "Export public key data matching PATTERN to the
 stream KEYDATA."))
```

```
(defmethod op-export ((ctx context) pattern keydata)
 (with-gpgme-data (dh keydata)
 (c-gpgme-op-export ctx pattern 0 dh)))
```

::: Key generation.

:::

::: Initialization

:::

```
(defun check-version (&optional req-version)
 "Check that the GPGME version requirement is satisfied."
 (gpgme-check-version req-version))
```

```
(defparameter *version* (check-version)
 "The version number of GPGME used.")
{
 "op": "import",
 "data": "-----BEGIN PGP PUBLIC KEY BLOCK-----
\n\nmQGIBDbjs5oRBACjAxqGzA6j190iiN/1vJvS5jYLQ1H3xxhzXdZ6ZxjPJkslX1ox\nFqBINhJzBJnV9/7b1FFe5
089NiCcGUVZa2xD3Vu+niLTAAGTQeNy6Y0E6wEfvplQ\nLJbpVGOMuVeZyShHNCKjrsZfTS1mr7o19SUb5Q
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Qy3Jo2wigwkhQU+zyOU5C85QBD9ctkbYp/0mu9bpxmYTchHwD1v3dXUX\nEVajA/9lnEz1GiI0bwKpm8VKXp
```

```
0YYP5hea8Jh5fNVb1QW2QqGd+XNHnRGSqX5smG\nyrs+xoYxD8+jv1FhmGaSv+6+n+JBVK4TuWrQpZ0cgZ
L5jZnX27TOYXeY4d5YKge+\n7ZO57TWCiF/P6pufIGm+t5GcFwj4kkfohMEaeNhm1S+xf29q7QrVmljdG9yIFR
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IDfGIBaheAAAoJEEevS2lh8EeEzEkAoMA+KfY9bA8EdfvWwa8zUM1S\nMs5rAKDS+6X3HVuCaLtVxzXOob
+DKbB7b7kBDQQ247O+EAQA5FAgdvaTJL3jBgC\njYiiJosxeTWf3L/dUY99fZN8R39DSVoUKf9Rt/EsS5Dyw
XVnKAeJiUTYw8lbMRVF\n70VhSDHpMC9KtbB0lk3CcAqULPiyirT5g9ywn24W7k0naWIJisttUh+Hqbm6gc5P
\nz9Nfd5l18x4Ehi3lKE6Nze3gUNMAAwUD/AtUN1hqwWTTphVZctHq3JaUEb9agmu/\nOcsf24/bq9i8R8FaMwB
F4fl5qIimcqAM+2BZ6dvZEdqrVaZR9aHjzchcHmaiI7Zm\nW4gmk+LHFFWf9y7mG8YDKFBXkaBuJpxFb1FifJp
maLzJmRa76dLqI3A7H2E8dFQa\n/MGsYCa4NmILiEUEGBECAAYFAjbs74ACgkQR69LaWHwR4RT3QCgn
MIRAiGtvL5l\nD4Gdo5F0KEP5zZEA1A6Ri9WmZ9Xiqw5R3Bsg+As8sJ4=\n=FRd4\n-----END
PGP PUBLIC KEY BLOCK-----\n"
```

```
}
```

```
- mode: org --
```

```
#+TITLE: A Short History of the GPGME bindings for Python
```

```
#+LATEX_COMPILER: xelatex
```

```
#+LATEX_CLASS: article
```

```
#+LATEX_CLASS_OPTIONS: [12pt]
```

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```

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```

```
* Overview
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: overview
```

```
:END:
```

```
| Version: | 0.0.1 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |
```

The GPGME Python bindings passed through many hands and numerous phases before, after a fifteen year journey, coming full circle to return to the source. This is a short explanation of that journey.

```
** In the beginning
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: in-the-beginning
```

```
:END:
```

In 2002 John Goerzen released PyME; Python bindings for the GPGME module which utilised the current release of Python of the time and SWIG.<sup>[fn:1]</sup> Shortly after creating it and ensuring it worked he stopped supporting it, though he left his work available on his Gopher site.

\*\* Keeping the flame alive

```
:PROPERTIES:
:CUSTOM_ID: keeping-the-flame-alive
:END:
```

A couple of years later the project was picked up by Igor Belyi and actively developed and maintained by him from 2004 to 2008. Igor's whereabouts at the time of this document's creation are unknown, but the current authors do hope he is well. We're assuming (or hoping) that life did what life does and made continuing untenable.

\*\* Passing the torch

```
:PROPERTIES:
:CUSTOM_ID: passing-the-torch
:END:
```

In 2014 Martin Albrecht wanted to patch a bug in the PyME code and discovered the absence of Igor. Following a discussion on the PyME mailing list he became the new maintainer for PyME, releasing version 0.9.0 in May of that year. He remains the maintainer of the original PyME release in Python 2.6 and 2.7 (available via PyPI).

\*\* Coming full circle

```
:PROPERTIES:
:CUSTOM_ID: ouroboros
:END:
```

In 2015 Ben McGinnes approached Martin about a Python 3 version, while investigating how complex a task this would be the task ended up being completed. A subsequent discussion with Werner Koch led to the decision to fold the Python 3 port back into the original GPGME release in the languages subdirectory for non-C bindings under the module name of `=pyme3=`.

In 2016 this PyME module was integrated back into the GPGME project by Justus Winter. During the course of this work Justus adjusted the port to restore limited support for Python 2, but not as many minor point releases as the original PyME package supports. During the course of this integration the package was renamed to more accurately reflect its status as a component of GPGME. The `=pyme3=` module was renamed to `=gpg=` and adopted by the upstream GnuPG team.

In 2017 Justus departed G10code and the GnuPG team. Following this Ben returned to maintain of gpgme Python bindings and continue building them from that point.

\* Relics of the past

```
:PROPERTIES:
:CUSTOM_ID: relics-past
:END:
```

There are a few things, in addition to code specific factors, such as SWIG itself, which are worth noting here.

\*\* The Annoyances of Git

```
:PROPERTIES:
:CUSTOM_ID: the-annoyances-of-git
:END:
```

As anyone who has ever worked with git knows, submodules are horrible way to deal with pretty much anything. In the interests of avoiding migraines, that was skipped with addition of the PyME code to GPGME.

Instead the files were added to a subdirectory of the =lang/= directory, along with a copy of the entire git log up to that point as a separate file within the =lang/python/docs/= directory.[fn:2] As the log for PyME is nearly 100KB and the log for GPGME is approximately 1MB, this would cause considerable bloat, as well as some confusion, should the two be merged.

Hence the unfortunate, but necessary, step to simply move the files. A regular repository version has been maintained should it be possible to implement this better in the future.

\*\* The Perils of PyPI

```
:PROPERTIES:
:CUSTOM_ID: the-perils-of-pypi
:END:
```

The early port of the Python 2 =pyme= module as =pyme3= was never added to PyPI while the focus remained on development and testing during 2015 and early 2016. Later in 2016, however, when Justus completed his major integration work and subsequently renamed the module from =pyme3= to =gpg=, some prior releases were also provided through PyPI.

Since these bindings require a matching release of the GPGME

libraries in order to function, it was determined that there was little benefit in also providing a copy through PyPI since anyone obtaining the GPGME source code would obtain the Python bindings source code at the same time. Whereas there was the potential to sew confusion amongst Python users installing the module from PyPI, only to discover that without the relevant C files, header files or SWIG compiled binaries, the Python module did them little good.

There are only two files on PyPI which might turn up in a search for this module or a sample of its content:

1. gpg (1.8.0) - Python bindings for GPGME GnuPG cryptography library
2. pyme (0.9.0) - Python support for GPGME GnuPG cryptography library

```
*** GPG 180 - Python bindings for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-180
:END:
```

This is the most recent version to reach PyPI and is the version of the official Python bindings which shipped with GPGME 1.8.0. If you have GPGME 1.8.0 installed and /only/ 1.8.0 installed, then it is probably safe to use this copy from PyPI.

As there have been a lot of changes since the release of GPGME 1.8.0, the GnuPG Project recommends not using this version of the module and instead installing the current version of GPGME along with the Python bindings included with that package.

```
*** PyME 090 - Python support for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-90
:END:
```

This is the last release of the PyME bindings maintained by Martin Albrecht and is only compatible with Python 2, it will not work with Python 3. This is the version of the software from which the port from Python 2 to Python 3 code was made in 2015.

Users of the more recent Python bindings will recognise numerous points of similarity, but also significant differences. It is likely that the more recent official bindings will feel "more pythonic."

For those using Python 2, there is essentially no harm in using

this module, but it may lack  
a number of more recent features  
added to GPGME.

\* Footnotes

[fn:1] In all likelihood this would have been Python 2.2 or possibly  
Python 2.3.

[fn:2] The entire PyME git log and other preceding VCS logs are  
located in the =gpgme/lang/python/docs/old-commits.log= file.

```
{
 "op": "verify",
 "data": "-----BEGIN PGP MESSAGE-----
\n\nowGbwMvMwCSow1RzPCOz3ITxtFASQ/SbgPceiTk5+Qo+qaUlqVwd51kYBJkY+sUU\nWRb8d52wO1Hp7
fs8mxCYHIYmkAaDKQ0MQKDAwF5QlJqWWISUmqKbmpuYmaObmpec\nnn5KZl+5QkF6gl5yfC6RyM3NTIU
XAGrgZ+HMSS9MzQApyU71Ki0sUggtLU1OrUhV8\nU2WkMkpKCqot9PXLy8v10vNK9fKL0vUL8nMykyv1G
bg4BWBuYP7OMN9VdOep8HTD\nKQLOd+7+Cshs6jVTfsMwT3sje7Pmui779IU/657Lb575u9z/LgA=\n=iqJ\n--
---END PGP MESSAGE-----\n\n"
}
{
 "manifest_version": 2,

 "name": "gpgme-json with native Messaging",
 "description": "A simple demo application",
 "version": "0.1",
 "content_security_policy": "default-src 'self' filesystem:",
 "browser_action": {
 "default_icon": "testicon.png",
 "default_title": "gpgme.js",
 "default_popup": "popup.html"
 },
 "permissions": ["nativeMessaging", "activeTab"]
}
HACKING -*- org -*-
#+TITLE: Hacking notes for GPGME
#+STARTUP: showall

* How to contribute
** No more ChangeLog files
```

Do not modify any of the ChangeLog files in GPGME. Starting  
on December 1st, 2011 we put change information only in the GIT  
commit log, and generate a top-level ChangeLog file from logs at  
"make dist" time. As such, there are strict requirements on the  
form of the commit log messages. The old ChangeLog files have all  
be renamed to ChangeLog-2011

## \*\* Commit log requirements

Your commit log should always start with a one-line summary, the second line should be blank, and the remaining lines are usually ChangeLog-style entries for all affected files. However, it's fine -- even recommended -- to write a few lines of prose describing the change, when the summary and ChangeLog entries don't give enough of the big picture. Omit the leading TABs that you're used to seeing in a "real" ChangeLog file, but keep the maximum line length at 72 or smaller, so that the generated ChangeLog lines, each with its leading TAB, will not exceed 80 columns. If you want to add text which shall not be copied to the ChangeLog, separate it by a line consisting of two dashes at the begin of a line.

Note that ./autogen.sh installs a git hook to do some basic syntax checking on the commit log message.

Typo fixes and documentation updates don't need a ChangeLog entry; thus you would use a commit message like

```
#+begin_example
Fix typo in a comment

--
#+end_example
```

The marker line here is important; without it the first line would appear in the ChangeLog.

If you exceptionally need to have longer lines in a commit log you may do this after this scissor line:

```
#+begin_example
----- >8 -----
#+end_example
```

(hash, blank, 24 dashes, blank, scissor, blank, 24 dashes).

Note that such a comment will be removed if the git commit option `--cleanup-scissor=` is used.

## \*\* License policy

GPGME is currently licensed under the LGPLv2.1+ with tools and the manual being under the GPLv3+. We may eventually update to a newer version of the licenses or a combination of them. It is thus important, that all contributed code allows for an update of the



license; for example we can't accept code under the LGPLv2(only).

If you want to contribute code or documentation to GPGME you are asked to assert that the contribution is in accordance to the "GPGME Developer's Certificate of Origin" as found in the file "DCO".

Except for a slight wording change, this DCO is identical to the one used by the Linux kernel. Please take these simple steps:

- Decide which mail address you want to use. Please have your real name in the address and not a pseudonym. Anonymous contributions can only be done if you find a proxy who certifies for you.
- If your employer or school might claim ownership of code written by you; you need to talk to them to make sure that you have the right to contribute under the DCO.
- Send an OpenPGP signed mail to the gnupg-devel@gnupg.org public mailing list from your mail address. Include a copy of the DCO as found in the official master branch. Insert your name and email address into the DCO in the same way you want to use it later.  
Example:

Signed-off-by: Joe R. Hacker <joe@example.org>

If you need it, you may perform simple transformations on the mail address: Replacing "@" by " at " or "." by " dot ".)

- That's it. From now on you only need to add a "Signed-off-by:" line with your name and mail address to the GIT commit message. It is recommended to send the patches using a PGP/MIME signed mail.

#### \*\* Coding standards

Please follow the GNU coding standards. If you are in doubt consult the existing code as an example. Do no re-indent code without a need. If you really need to do it, use a separate commit for such a change.

- C99 syntax should not be used; stick to C90.
- Please do not use C++ `///  
//` style comments.
- Try to fit lines into 80 columns.
- Ignore signed/unsigned pointer mismatches
- No arithmetic on void pointers; cast to `char*` first.

#### \*\* Commit log keywords

- GnuPG-bug-id :: Values are comma or space delimited bug numbers from bug.gnupg.org pertaining to this commit.
- Debian-bug-id :: Same as above but from the Debian bug tracker.
- CVE-id :: CVE id number pertaining to this commit.
- Regression-due-to :: Commit id of the regression fixed by this commit.
- Fixes-commit :: Commit id this commit fixes.
- Reported-by :: Value is a name or mail address of a bug reporter.
- Suggested-by :: Value is a name or mail address of someone how suggested this change.
- Co-authored-by :: Name or mail address of a co-author
- Some-comments-by :: Name or mail address of the author of additional comments (commit log or code).
- Proofread-by :: Sometimes used by translation commits.
- Signed-off-by :: Name or mail address of the developer

\* Debug hints

- Use gpgme-tool for manual tests.
- The envvar GPGME\_DEBUG enables debugging; see debug.[ch] for details.

```
{
 "info": [{
 "protocol": "OpenPGP"
 }, {
 "protocol": "spawn",
 "fname": "/nonexistent",
 "version": "1.0.0",
 "req_version": "1.0.0"
 }]
}
```

Configuration files may go here. Note that config.h.in is auto-generated so that this file is not in git.

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-04-06 Werner Koch <wk@g10code.com>

\* gpg-error.m4: Update from current libgpg-error repo.

2010-05-07 Werner Koch <wk@g10code.com>

\* libassuan.m4: Update from libassuan svn.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

\* libassuan.m4: Fix LIBASSUAN\_VERSION.

2006-06-08 Marcus Brinkmann <marcus@g10code.de>

\* pth.m4: Add --all to pth-config invocation.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

\* pth.m4: Fix code generation (required for Max OS X).  
Submitted by Emanuele Giaquinta <exg@gentoo.org>.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

\* glib-2.0.m4: New file.

2004-12-28 Werner Koch <wk@g10code.com>

\* pth.m4: Changed quoting for use with automake 1.9.

2004-09-14

Marcus Brinkmann <marcus@g10code.de>

\* pth.m4: Disable \_ac\_pth\_line, and don't fail if Pth is not  
found.

\* glibc21.m4: New file.

\* gpg-error.m4: New file.

\* pth.m4: New file.

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WITHOUT ANY WARRANTY, to the extent permitted by law; without even the  
implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  
GPGME Developer's Certificate of Origin. Version 1.0

=====

By making a contribution to the GPGME project, I certify that:

(a) The contribution was created in whole or in part by me and I

have the right to submit it under the free software license indicated in the file; or

- (b) The contribution is based upon previous work that, to the best of my knowledge, is covered under an appropriate free software license and I have the right under that license to submit that work with modifications, whether created in whole or in part by me, under the same free software license (unless I am permitted to submit under a different license), as indicated in the file; or
- (c) The contribution was provided directly to me by some other person who certified (a), (b) or (c) and I have not modified it.
- (d) I understand and agree that this project and the contribution are public and that a record of the contribution (including all personal information I submit with it, including my sign-off) is maintained indefinitely and may be redistributed consistent with this project or the free software license(s) involved.

Signed-off-by: [Your name and mail address]

1.15.1

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2008-11-08 Moritz <moritz@gnu.org>

\* gpgme.lisp (size-t): Wrong call to defctype: function accepts optional, not keyword argument.

(ssize-t): Likewise.

(off-t): Likewise.

(gpgme-data-t, gpgme-ctx-t): Likewise.

(gpgme-error-t): Likewise.

(gpgme-error-no-signal-t): Likewise.

(gpgme-err-code-t): Likewise.

(gpgme-err-source-t): Likewise.

(gpgme-sig-notation-t, gpgme-engine-info-t): Likewise.

(gpgme-subkey-t): Likewise.

(gpgme-key-sig-t): Likewise.

(gpgme-user-id-t): Likewise.

(gpgme-key-t): Likewise.

(gpgme-data-cbs-t): Likewise.  
(gpgme-invalid-key-t): Likewise.  
(gpgme-op-encrypt-result-t): Likewise.  
(gpgme-recipient-t): Likewise.  
(gpgme-op-decrypt-result-t): Likewise.  
(gpgme-new-signature-t):  
Likewise.  
(gpgme-op-sign-result-t): Likewise.  
(gpgme-signature-t): Likewise.  
(gpgme-op-verify-result-t): Likewise.  
(gpgme-import-status-t): Likewise.  
(gpgme-op-import-result-t): Likewise.  
(gpgme-op-genkey-result-t): Likewise.  
(gpgme-op-keylist-result-t): Likewise.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

\* Initial release.

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```
{
 "op": "keylist",
 "keys": ["zulu@example.net"],
 "with-secret": false
}
{
 "op": "keylist",
 "keys": ["alpha@example.net", "bravo@example.net"],
 "chunksize": 64
}
```

000

\*H

010 UDE1!0U

Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 \*H  
certify@pca.dfn.de0

981029180310Z

011231180310Z010 UDE1!0U

Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 \*H  
certify@pca.dfn.de0"0

\*H

0

nskvS2r#iA4H|\*/

:Sd;v

tD}L+~IWWD|eP&qH)

!l\p%,1.tlsmnQ,g-W)@\t(<kvm5j(d)9M\_KGQJ0:qTE 00 `HB0) `HBhttps://mystic.pca.dfn.de/0A

`HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html08 `HB

+)The DFN Top Level Certification Authority0! `HBcgi/check-rev.cgi?0 `HB

dfnpca.crl0U00U0

\*H

`^[:8\e7\*%QC?:/JVgwPUB

OgGqjGVxl50%<`Pb18 z;t~r0U<A%3#l'8b"<iX"V!k"\*Q8&hAPI"3 00KU&Qq'46\_{D[JZ!i<=T

/OF

{

"type": "keys",

"base64": false,

"data": "-----BEGIN PGP PUBLIC KEY BLOCK-----

\n\nnmQGIBDbs5oRBACjAqxGzA6j190iiN/1vJvS5jYLQ1H3xxhzXdZ6ZxjPJkslX1ox\nFqBINhjzBJnV9/7b1FFe5

089NiCcGUVZa2xD3Vu+niLTAGNTQeNy6Y0E6wEfvplQ\nLJbpVGOMuVeZyShHNCKjrsZfT51mr7o19SUb5Q

WS3gZHabFTbmbhbcFBXwCg36qG\nVAnGcZzvnuTGPry3xjp+zuED/2qTJNpnPhicKSksVwb6EJFXH7mQSZly

blAnOAVF\nMx19GUijW4MWP5FUdcTd5KzIDgkenRLBrpCLIFVq4/baP/hOiCLOmCoRu3xnFyo\nRPM/Jn94

Qy3Jo2wigwkhQU+zyOU5C85QBD9ctkbYp/0mu9bpxmYTchHwD1v3dXUX\nEVajA/9lnEz1Gil0bwKpm8VKXp

0YYP5hea8Jh5fNVb1QW2QqGd+XNHnRGSqX5smG\nnyrs+xoYxD8+jv1FhmGaSv+6+n+JBVK4TuWrQpZ0cgZ

L5jZnX27TOYXeY4d5YKGe+\n7ZO57TWClfP/6pufIGm+t5GcFwj4kkfohMEaeNhm1S+xf29q7QrVmljdG9yIFR

lnc3QgKGRlbW8ga2V5KSA8dmljdG9yQGv4YW1wbGUub3JnPohVBBMRAGAVBQI247Oa\nAawsKAwMVAw

IDFgIBAheAAAoJEEvS2lh8EeEzEkAoMA+KfY9bA8EdfvWwa8zUM1S\nMs5rAKDS+6X3HVuCaLTVxzXOob

+DKbB7b7kBDQQ2470+EAQA5FAgdvaTJL3jBgc\njYiiJosxeTWf3L/dUY99fZN8R39DSVoUKf9Rt/EsS5Dyw

XVnKAeJiUTYw8lbMRVF\n70VhSDHpMC9KtbB0lk3CcAqULPiyirT5g9ywN24W7k0naWIJisttUh+Hqbm6gc5P

\nz9Nfd5lI8x4Ehi3lKE6Nze3gUNMAAwUD/AtUN1hqwWTTphVZctHq3JaUEb9agmu/\nOcsf24/bq9i8R8FaMwB

F4f15qIimcqAM+2BZ6dvZEdqrVaZR9aHjzchcHmaiI7Zm\nW4gmk+LHFFWf9y7mG8YDKFBXkaBuJpxFb1FifJp

maLzJmRa76dLqI3A7H2E8dFQa\nMGsYCa4NmLiEUEGBECAAYFAjbj574ACgkQR69LaWHwR4RT3QCgn

MIRAiGtvL5l\nD4Gdo5F0KEP5zZEA1A6Ri9WmZ9XiQw5R3Bsg+As8sJ4=\n=FRd4\n-----END

PGP PUBLIC KEY BLOCK-----\n"

}

{

"op": "encrypt",

"keys": ["alpha@example.net", "victor@example.org"],

"signing\_keys": ["A0FF4590BB6122EDEF6E3C542D727CC768697734"],

"data": "Hello world",

"armor": true,

"always-trust": true

}

{

"option": {

"name": "default-key",

"argname": "NAME"

}

}

```
-*- mode: org -*-
#+TITLE: What Was New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

\* What Was New

:PROPERTIES:

:CUSTOM\_ID: new-stuff

:END:

```
| Version: | 0.0.1 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |
```

The following are all the past /What's New/ sections for the Python Bindings HOWTO and other documentation.

\*\* What Was New in GPGME 1120

:PROPERTIES:

:CUSTOM\_ID: gpgme-1-12-0

:END:

The most obviously new point for those reading this guide is this section on other new things, but that's hardly important. Not given all the other things which spurred the need for adding this section and its subsections.

\*\*\* New in GPGME 1120

:PROPERTIES:

:CUSTOM\_ID: new-stuff-1-12-0

:END:

There have been quite a number of additions to GPGME and the Python bindings to it since the last release of GPGME with versions 1.11.0 and 1.11.1 in April, 2018.

The bullet points of new additions are:

- an expanded section on [installing](#) and [troubleshooting](#) the Python bindings.
- The release of Python 3.7.0; which appears to be working just fine with our bindings, in spite of intermittent reports of problems for many other Python projects with that new release.
- Python 3.7 has been moved to the head of the specified python versions list in the build process.
- In order to fix some other issues, there are certain underlying functions which are more exposed through the `gpg.Context()`, but ongoing documentation ought to clarify that or otherwise provide the best means of using the bindings. Some additions to `=gpg.core=` and the `=Context()=`, however, were intended (see below).
- Continuing work in identifying and confirming the cause of oft-reported [problems installing the Python bindings on Windows](#).
- GSOC: Google's Surreptitiously Ordered Conscriptio... erm... oh, right; Google's Summer of Code. Though there were two hopeful candidates this year; only one ended up involved with the GnuPG Project directly, the other concentrated on an unrelated third party project with closer ties to one of the GNU/Linux distributions than to the GnuPG Project. Thus the Python bindings benefited from GSOC participant Jacob Adams, who added the `key_import` function; building on prior work by Tobias Mueller.
- Several new methods functions were added to the `gpg.Context()`, including: [key\\_import](#), [key\\_export](#), [key\\_export\\_minimal](#) and [key\\_export\\_secret](#).
- Importing and exporting examples include versions integrated with Marcel Fest's recently released [\[HKP for Python\]](https://github.com/Selfnet/hkp4py) module. Some [additional notes on this module](#) are included at the end of the HOWTO.
- Instructions for dealing with semi-walled garden implementations like ProtonMail are also included. This is intended to make things a little easier when communicating with users of ProtonMail's services and should not be construed as an endorsement of said service. The GnuPG Project neither favours, nor disfavors ProtonMail and the majority of this deals with interacting with the ProtonMail keyserver.
- Semi-formalised the location where [draft versions](#) of this HOWTO may periodically be accessible. This is both for the reference of others and testing the publishing of the document itself. Renamed



this file at around the same time.

- The Texinfo documentation build configuration has been replicated from the parent project in order to make to maintain consistency with that project (and actually ship with each release).
- a reStructuredText (=rst=) version is also generated for Python developers more used to and comfortable with that format as it is the standard Python documentation format and Python developers may wish to use it with Sphinx. Please note that there has been no testing of the reStructuredText version with Sphinx at all. The reST file was generated by the simple expedient of using [\[\[https://pandoc.org/\]\]](https://pandoc.org/)[Pandoc].

- Added a new section for [\[\[file:gpgme-python-howto#advanced-use\]\]](#)[advanced or experimental use].

- Began the advanced use cases with [\[\[file:gpgme-python-howto#cython\]\]](#)[a section] on using the module with [\[\[https://cython.org/\]\]](https://cython.org/)[Cython].

- Added a number of new scripts to the =example/howto= directory; some of which may be in advance of their planned sections of the HOWTO (and some are just there because it seemed like a good idea at the time).

- Cleaned up a lot of things under the hood.

This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

\* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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File: gpgme.info, Node: UI Server Decrypt, Next: UI Server Verify, Prev: UI Server Sign, Up: UI Server Protocol

### A.3 UI Server: Decrypt a Message

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Decryption may include the verification of OpenPGP messages. This is due to the often used combined signing/encryption modus of OpenPGP. The client may pass an option to the server to inhibit the signature verification. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N

Set the file descriptor for the message to be decrypted to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The decryption is started with the command:

-- Command: DECRYPT --protocol=NAME [--no-verify]  
          [--export-session-key]

NAME is the encryption protocol used for the message. For a description of the allowed protocols see the ENCRYPT command.

This argument is mandatory. If the option --no-verify is given, the server

should not try to verify a signature, in case the input

data is an OpenPGP combined message. If the option

--export-session-key is given and the underlying engine knows how to export the session key, it will appear on a status line

#### A.4 UI Server: Verify a Message

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The server needs to support the verification of opaque signatures as well as detached signatures. The kind of input sources controls what kind message is to be verified.

##### -- Command: MESSAGE FD=N

This command is used with detached signatures to set the file descriptor for the signed data to N. The data is binary encoded (used verbatim). For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

##### -- Command: INPUT FD=N

Set the file descriptor for the opaque message or the signature part of a detached signature to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

##### -- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded and only used for opaque signatures. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The verification is then started using:

##### -- Command: VERIFY --protocol=NAME [--silent]

NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. This argument is mandatory. Depending on the combination of MESSAGE INPUT and OUTPUT commands, the server needs to select the appropriate verification mode:

##### MESSAGE and INPUT

This indicates a detached signature. Output data is not applicable.

##### INPUT

This indicates an opaque signature. As no output command has been given, the server is only required to check the signature.

##### INPUT and OUTPUT

This indicates an opaque signature. The server shall write the signed data to the file descriptor set by the output command. This data shall even be written if the signatures cant be verified.

With --silent the server shall not display any dialog; this is for example used by the client to get the content of opaque signed messages. The client expects the server to send at least this status information before the final OK response:

-- Status line: SIGSTATUS FLAG DISPLAYSTRING

Returns the status for the signature and a short string explaining the status. Valid values for FLAG are:

none

The message has a signature but it could not not be verified due to a missing key.

green

The signature is fully valid.

yellow

The signature is valid but additional information was shown regarding the validity of the key.

red

The signature is not valid.

DISPLAYSTRING is a percent-and-plus-encoded string with a short human readable description of the status. For example

S SIGSTATUS green Good+signature+from+Keith+Moon+<keith@example.net>

Note that this string needs to fit into an Assuan line and should be short enough to be displayed as short one-liner on the clients window. As usual the encoding of this string is UTF-8 and it should be send in its translated form.

The server shall send one status line for every signature found on the message.

File: gpgme.info, Node: UI Server Set Input Files, Next: UI Server Sign/Encrypt Files, Prev: UI Server Verify, Up: UI Server Protocol

A.5 UI Server: Specifying the input files to operate on.

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All file related UI

server commands operate on a number of input files or directories, specified by one or more FILE commands:

-- Command: FILE [--clear] NAME

Add the file or directory NAME to the list of pathnames to be processed by the server. The parameter NAME must be an absolute path name (including the drive letter) and is percent escaped (in particular, the characters %, = and white space characters are always escaped). If the option --clear is given, the list of files is cleared before adding NAME.

Historical note: The original spec did not define --clear but the keyword --continued after the file name to indicate that more files are to be expected. However, this has never been used and thus removed from the specs.

File: gpgme.info, Node: UI Server Sign/Encrypt Files, Next: UI Server Verify/Decrypt Files, Prev: UI Server Set Input Files, Up: UI Server Protocol

#### A.6 UI Server: Encrypting and signing files.

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First,

the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: ENCRYPT\_FILES --nohup

-- Command: SIGN\_FILES --nohup

-- Command: ENCRYPT\_SIGN\_FILES --nohup

Request that the files specified by FILE are encrypted and/or signed. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to encrypt or sign a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for each input file a new file is created under the original filename plus a protocol specific extension (like .gpg or .sig), which contain the encrypted/signed file or a detached signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The ENCRYPT\_SIGN\_FILES command requests a combined sign and encrypt operation. It may not be available for all protocols (for

example, it is available for OpenPGP but not for CMS).

The option `--nohup` is mandatory. It is currently unspecified what should happen if `--nohup` is not present. Because `--nohup` is present, the server always returns OK promptly, and completes the operation asynchronously.

File: `gpgme.info`, Node: UI Server Verify/Decrypt Files, Next: UI Server Import/Export Keys, Prev: UI Server Sign/Encrypt Files, Up: UI Server Protocol

#### A.7 UI Server: Decrypting and verifying files.

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First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

```
-- Command: DECRYPT_FILES --nohup
-- Command: VERIFY_FILES --nohup
-- Command: DECRYPT_VERIFY_FILES
--nohup
```

Request that the files specified by FILE are decrypted and/or verified. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to decrypt or verify a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for decryption, a new file is created for each input file under the original filename minus a protocol specific extension (like `.gpg`) which contains the original plaintext. For verification a status is displayed for each signed input file, indicating if it is signed, and if yes, if the signature is valid. For files that are signed and encrypted, the VERIFY command transiently decrypts the file to verify the enclosed signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option `--nohup` is mandatory. It is currently unspecified what should happen if `--nohup` is not present. Because `--nohup` is present, the server always returns OK promptly, and completes the operation asynchronously.

File: `gpgme.info`, Node: UI Server Import/Export Keys, Next: UI Server Checksum Files, Prev: UI Server Verify/Decrypt Files, Up: UI Server Protocol

## A.8 UI Server: Managing certificates.

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First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: `IMPORT_FILES --nohup`  
Request that the certificates contained in the files specified by FILE are imported into the local certificate databases.

For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option `--nohup` is mandatory. It is currently unspecified what should happen if `--nohup` is not present. Because `--nohup` is present, the server always returns OK promptly, and completes the operation asynchronously.

FIXME: It may be nice to support an EXPORT command as well, which is enabled by the context menu of the background of a directory.

File: [gpgme.info](#), Node: [UI Server Checksum Files](#), Next: [Miscellaneous UI Server Commands](#), Prev: [UI Server Import/Export Keys](#), Up: [UI Server Protocol](#)

## A.9 UI Server: Create and verify checksums for files.

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First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: `CHECKSUM_CREATE_FILES --nohup`  
Request that checksums are created for the files specified by FILE. The choice of checksum algorithm and the destination storage and format for the created checksums depend on the

preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option `--nohup` is mandatory. It is currently unspecified what should happen if `--nohup` is not present. Because `--nohup` is present, the server always returns OK promptly, and completes the operation asynchronously.

-- Command: `CHECKSUM_VERIFY_FILES --nohup`

Request that checksums are created for the files specified by FILE and verified against previously created and stored checksums. The choice of checksum algorithm and the source storage and format for previously created checksums depend on the preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

If the source storage of previously created checksums is available to the user through the Windows shell, this command may also accept such checksum files as FILE arguments. In this case, the UI server should instead verify the checksum of the referenced files as if they were given as INPUT files.

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: Miscellaneous UI Server Commands, Prev: UI Server Checksum Files, Up: UI Server Protocol

#### A.10 Miscellaneous UI Server Commands

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The server needs to implement the following commands which are not related to a specific command:

-- Command: GETINFO WHAT

This is a multi purpose command, commonly used to return a variety of information. The required subcommands as described by the WHAT parameter are:

pid

Return the process id of the server in decimal notation using an Assuan data line.

To allow the server to pop up the windows in the correct relation to the client, the client is advised to tell the server by sending the option:

-- Command option: window-id NUMBER

The NUMBER represents the native window ID of the clients current window. On Windows systems this is a windows handle (HWND) and on X11 systems it is the X Window ID. The number needs to be given as a hexadecimal value so that it is easier to convey pointer values (e.g. HWND).



A client may want to fire up the certificate manager of the server. To do this it uses the Assuan command:

-- Command: START\_KEYMANAGER

The server shall pop up the main window of the key manager (aka certificate manager). The client expects that the key manager is brought into the foreground and that this command immediately returns (does not wait until the key manager has been fully brought up).

A client may want to fire up the configuration dialog of the server. To do this it uses the Assuan command:

-- Command: START\_CONFDIALOG

The server shall pop up its configuration dialog. The client expects that this dialog is brought into the foreground and that this command immediately returns (i.e. it does not wait until the dialog has been fully brought up).

When doing an operation on a mail, it is useful to let the server know the address of the sender:

-- Command: SENDER [--info] [--protocol=NAME] EMAIL

EMAIL is the plain ASCII encoded address ("addr-spec" as per RFC-2822) enclosed in angle brackets. The address set with this command is valid until a successful completion of the operation or until a RESET command. A second command overrides the effect of the first one; if EMAIL is not given and --info is not used, the server shall use the default signing key.

If option --info is not given, the server shall also suggest a protocol to use for signing. The client may use this suggested protocol on its own discretion. The same status line as with PREP\_ENCRYPT is used for this.

The option --protocol may be used to give the server a hint on which signing protocol should be preferred.

To allow the UI-server to visually identify a running operation or to associate operations the server MAY support the command:

-- Command: SESSION NUMBER [STRING]

The NUMBER is an arbitrary value, a server may use to associate simultaneous running sessions. It is a 32 bit unsigned integer with 0 as a special value indicating that no session association

shall be done.

If `STRING` is given, the server may use this as the title of a window or, in the case of an email operation, to extract the senders address. The string may contain spaces; thus no plus-escaping is used.

This command may be used at any time and overrides the effect of the last command. A `RESET` undoes the effect of this command.

File: `gpgme.info`, Node: Debugging, Next: `Deprecated Functions`, Prev: `UI Server Protocol`, Up: `Top`

## Appendix B How to solve problems

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Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like GPGME and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using `gpg` or `gpgsm` on the command line. If you cant figure out why things dont work, you may use GPGMEs built in trace feature. This feature is either enabled using the environment variable `GPGME_DEBUG` or, if this is not possible, by calling the function `gpgme_set_global_flag`. The value is the trace level and an optional file name. If no file name is given the trace output is printed to `stderr`.

For example

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

## Appendix C Deprecated Functions

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For backward compatibility GPGME has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

**\*Warning:** These interfaces will be removed in a future version of GPGME.

-- Function: void gpgme\_key\_release (gpgme\_key\_t KEY)  
The function gpgme\_key\_release is equivalent to gpgme\_key\_unref.

-- Function: gpgme\_error\_t gpgme\_op\_import\_ext (gpgme\_ctx\_t CTX,  
gpgme\_data\_t KEYDATA, int \*NR)  
SINCE: 0.3.9

The function gpgme\_op\_import\_ext is equivalent to:

```
gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
{
 gpgme_import_result_t result = gpgme_op_import_result (ctx);
 *nr = result->considered;
}
```

-- Data type: gpgme\_error\_t (\*gpgme\_edit\_cb\_t) (void \*HANDLE,  
gpgme\_status\_code\_t STATUS, const char \*ARGS, int FD)  
The gpgme\_edit\_cb\_t

type is the type of functions which GPGME calls if it a key edit operation is on-going. The status code STATUS and the argument line ARGS are passed through by GPGME from the crypto engine. The file descriptor FD is -1 for normal status messages. If STATUS indicates a command rather than a status message, the response to the command should be written to FD. The HANDLE is provided by the user at start of operation.

The function should return GPG\_ERR\_FALSE if it did not handle the status code, 0 for success, or any other error value.

-- Function: gpgme\_error\_t gpgme\_op\_edit (gpgme\_ctx\_t CTX,  
gpgme\_key\_t KEY, gpgme\_edit\_cb\_t FNC, void \*HANDLE,

gpgme\_data\_t OUT)

SINCE: 0.3.9

Note: This function is deprecated, please use `gpgme_op_interact` instead.

The function `gpgme_op_edit` processes the key `KEY` interactively, using the edit callback function `FNC` with the handle `HANDLE`. The callback is

invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object `OUT`.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

The function returns the error code `GPG_ERR_NO_ERROR` if the edit operation completes successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

```
-- Function: gpgme_error_t gpgme_op_edit_start (gpgme_ctx_t CTX,
 gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
 gpgme_data_t OUT)
```

SINCE: 0.3.9

Note: This function is deprecated, please use `gpgme_op_interact_start` instead.

The function `gpgme_op_edit_start` initiates a `gpgme_op_edit` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

```
-- Function: gpgme_error_t gpgme_op_card_edit (gpgme_ctx_t CTX,
 gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
 gpgme_data_t OUT)
```

Note: This function is deprecated, please use `gpgme_op_interact` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit` is analogous to `gpgme_op_edit`, but should be used to process the smart card corresponding to the

key KEY.

```
-- Function: gpgme_error_t gpgme_op_card_edit_start (gpgme_ctx_t CTX,
 gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
 gpgme_data_t OUT)
```

Note: This function is deprecated, please use

`gpgme_op_interact_start` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit_start` initiates a

`gpgme_op_card_edit` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

```
-- Function: gpgme_error_t gpgme_data_new_with_read_cb
 (gpgme_data_t *DH, int (*READFUNC) (void *HOOK, char *BUFFER,
 size_t COUNT, size_t *NREAD), void *HOOK_VALUE)
```

The function `gpgme_data_new_with_read_cb` creates a new `gpgme_data_t` object and uses the callback function `READFUNC` to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type GPGME provides. However, it can not be used to write data.

The callback function receives `HOOK_VALUE` as its first argument whenever it is invoked. It should return up to `COUNT` bytes in `BUFFER`, and return the number of bytes

actually read in `NREAD`. It

may return 0 in `NREAD` if no data is currently available. To indicate EOF the function should return with an error code of -1 and set `NREAD` to 0. The callback function may support to reset its internal read pointer if it is invoked with `BUFFER` and `NREAD` being `NULL` and `COUNT` being 0.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `READFUNC` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

```
-- Function: gpgme_error_t gpgme_data_rewind (gpgme_data_t DH)
```

The function `gpgme_data_rewind` is equivalent to:

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
 ? gpgme_error_from_errno (errno) : 0;
```

-- Data type: `gpgme_attr_t`

The `gpgme_attr_t` type is used to specify a key or trust item attribute. The following attributes are defined:

#### `GPGME_ATTR_KEYID`

This is the key ID of a sub key. It is representable as a string.

#### `GPGME_ATTR_FPR`

This is the fingerprint of a sub key. It is representable as a string.

#### `GPGME_ATTR_ALGO`

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the enum `gcry_pk_algos` values in the `gcrypt` library.

#### `GPGME_ATTR_LEN`

This is the key length of a sub key. It is representable as a number.

#### `GPGME_ATTR_CREATED`

This is the timestamp at creation time of a sub key. It is representable as a number.

#### `GPGME_ATTR_EXPIRE`

This is the expiration time of a sub key. It is representable as a number.

#### `GPGME_ATTR_USERID`

This is a user ID. There can be more than one user IDs in a `GPGME_KEY_T` object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

#### `GPGME_ATTR_NAME`

This is the name belonging to a user ID. It is representable as a string.

#### `GPGME_ATTR_EMAIL`

This is the email address belonging to a user ID. It is representable as a string.

#### `GPGME_ATTR_COMMENT`

This is the comment belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_VALIDITY

This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

#### GPGME\_ATTR\_UID\_REVOKED

This specifies if a user ID is revoked. It is representable as a number, and is 1 if the user ID is revoked, and 0 otherwise.

#### GPGME\_ATTR\_UID\_INVALID

This specifies if a user ID is invalid. It is representable as a number, and is 1 if the user ID is invalid, and 0 otherwise.

#### GPGME\_ATTR\_TYPE

This  
returns information about the type of key. For the string function this will either be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509.

#### GPGME\_ATTR\_IS\_SECRET

This specifies if the key is a secret key. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_REVOKED

This specifies if a sub key is revoked. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_INVALID

This specifies if a sub key is invalid. It is representable as a number, and is 1 if the key is invalid, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_EXPIRED

This specifies if a sub key is expired. It is representable as a number, and is 1 if the key is expired, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_DISABLED

This specifies if a sub key is disabled. It is representable  
as a number, and is 1 if the key is disabled, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_CAPS

This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter e if the key can be used for encryption, s if the key can be used for signatures, and c if the key can be used for certifications.

#### GPGME\_ATTR\_CAN\_ENCRYPT

This specifies if a sub key can be used for encryption. It is representable as a number, and is 1 if the sub key can be used for encryption, and 0 otherwise.

#### GPGME\_ATTR\_CAN\_SIGN

This specifies if a sub key can be used to create data signatures. It is representable as a number, and is 1 if the sub key can be used for signatures, and 0 otherwise.

#### GPGME\_ATTR\_CAN\_CERTIFY

This specifies if a sub key can be used to create key certificates. It is representable as a number, and is 1 if the sub key can be used for certifications, and 0 otherwise.

#### GPGME\_ATTR\_SERIAL

The X.509 issuer serial attribute of the key. It is representable as a string.

#### GPGME\_ATTR\_ISSUE

The X.509 issuer name attribute of the key. It is representable as a string.

#### GPGME\_ATTR\_CHAINID

The X.509 chain ID can be used to build the certification chain. It is representable as a string.

-- Function: `const char * gpgme_key_get_string_attr (gpgme_key_t KEY, gpgme_attr_t WHAT, const void *RESERVED, int IDX)`

The function `gpgme_key_get_string_attr` returns the value of the string-representable attribute `WHAT` of key `KEY`. If the attribute is an attribute of a sub key or an user ID, `IDX` specifies the sub key or user ID of which the attribute value is returned. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a string, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED`



not NULL.

-- Function: unsigned long gpgme\_key\_get\_ulong\_attr (gpgme\_key\_t KEY, gpgme\_attr\_t WHAT, const void \*RESERVED, int IDX)

The function gpgme\_key\_get\_ulong\_attr returns the value of the number-representable attribute WHAT of key KEY. If the attribute is an attribute of a sub key or an user ID, IDX specifies the sub key or user ID of which the attribute value is returned. The argument RESERVED is reserved for later use and should be NULL.

The function returns 0 if the attribute cant be returned as a number, KEY is not a valid pointer, IDX out of range, or RESERVED not NULL.

The signatures on a key are only available if the key was retrieved via a listing operation with the GPGME\_KEYLIST\_MODE\_SIGS mode enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function gpgme\_get\_key.

-- Data type: gpgme\_attr\_t

The gpgme\_attr\_t type is used to specify a key signature attribute. The following attributes are defined:

#### GPGME\_ATTR\_KEYID

This is the key ID of the key which was used for the signature. It is representable as a string.

#### GPGME\_ATTR\_ALGO

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the enum gcry\_pk\_algos values in the gcrypt library.

#### GPGME\_ATTR\_CREATED

This is the timestamp at creation time of the signature. It is representable as a number.

#### GPGME\_ATTR\_EXPIRE

This is the expiration time of the signature. It is representable as a number.

#### GPGME\_ATTR\_USERID

This is the user ID associated with the signing key. The user ID is representable as a number.

#### GPGME\_ATTR\_NAME

This is the name belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_KEY\_REVOKED

This specifies if a key signature is a revocation signature. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

#### GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

#### GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

#### GPGME\_ATTR\_SIG\_STATUS

This is the same value as returned by `gpgme_get_sig_status`.

```
-- Function: const char * gpgme_key_sig_get_string_attr
(gpgme_key_t KEY, int UID_IDX, gpgme_attr_t WHAT,
const void *RESERVED, int IDX)
```

The function `gpgme_key_sig_get_string_attr` returns the value of the string-representable attribute `WHAT` of the signature `IDX` on the user ID `UID_IDX` in the key `KEY`. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `UID_IDX` or `IDX` out of range, or `RESERVED` not `NULL`.

-- Function: unsigned long gpgme\_key\_sig\_get\_ulong\_attr

(gpgme\_key\_t KEY, int UID\_IDX, gpgme\_attr\_t

WHAT,

const void \*RESERVED, int IDX)

The function gpgme\_key\_sig\_get\_ulong\_attr returns the value of the number-representable attribute WHAT of the signature IDX on the user ID UID\_IDX in the key KEY. The argument RESERVED is reserved for later use and should be NULL.

The function returns 0 if an attribute cant be returned as a string, KEY is not a valid pointer, UID\_IDX or IDX out of range, or RESERVED not NULL.

-- Data type: enum gpgme\_sig\_stat\_t

The gpgme\_sig\_stat\_t type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

GPGME\_SIG\_STAT\_NONE

This status should not occur in normal operation.

GPGME\_SIG\_STAT\_GOOD

This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

GPGME\_SIG\_STAT\_GOOD\_EXP

This status indicates that  
the signature is valid but expired.

For the combined result this status means that all signatures are valid and expired.

GPGME\_SIG\_STAT\_GOOD\_EXPKEY

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

GPGME\_SIG\_STAT\_BAD

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

GPGME\_SIG\_STAT\_NOKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

#### GPGME\_SIG\_STAT\_NOSIG

This status indicates that the signature data provided was not a real signature.

#### GPGME\_SIG\_STAT\_ERROR

This status indicates that there was some other error which prevented the signature verification.

#### GPGME\_SIG\_STAT\_DIFF

For the combined result this status means that at least two signatures have a different status. You can get each keys status with `gpgme_get_sig_status`.

-- Function: `const char * gpgme_get_sig_status (gpgme_ctx_t CTX, int IDX, gpgme_sig_stat_t *R_STAT, time_t *R_CREATED)`

The function `gpgme_get_sig_status` is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
 sig = sig->next;
 idx--;
}
if (!sig || idx)
 return NULL;

if (r_stat)
{
 switch (gpg_err_code (sig->status))
 {
case GPG_ERR_NO_ERROR:
 *r_stat = GPGME_SIG_STAT_GOOD;
 break;

case GPG_ERR_BAD_SIGNATURE:
 *r_stat = GPGME_SIG_STAT_BAD;
 break;

case GPG_ERR_NO_PUBKEY:
 *r_stat = GPGME_SIG_STAT_NOKEY;
 break;
```

```

case GPG_ERR_NO_DATA:
 *r_stat = GPGME_SIG_STAT_NOSIG;
 break;

case GPG_ERR_SIG_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXP;
 break;

case GPG_ERR_KEY_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
 break;

default:
 *r_stat = GPGME_SIG_STAT_ERROR;
 break;
}
}
if (r_created)
 *r_created = sig->timestamp;
return sig->fpr;

```

-- Function: const char \* gpgme\_get\_sig\_string\_attr (gpgme\_ctx\_t CTX,  
int IDX, gpgme\_attr\_t WHAT, int WHATIDX)

The function gpgme\_get\_sig\_string\_attr is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
 sig = sig->next;
 idx--;
}
if (!sig || idx)
 return NULL;

switch (what)
{
case GPGME_ATTR_FPR:
 return sig->fpr;

case GPGME_ATTR_ERRTOK:
 if (whatidx == 1)
 return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";

```

```

 else
return "";
 default:
 break;
}

return NULL;

```

-- Function: const char \* gpgme\_get\_sig\_ulong\_attr (gpgme\_ctx\_t CTX,  
int IDX, gpgme\_attr\_t WHAT, int WHATIDX)  
The function gpgme\_get\_sig\_ulong\_attr is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

```

```

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

```

```

while (sig && idx)
{
 sig = sig->next;
 idx--;
}

```

```

if (!sig || idx)
return 0;

```

```

switch (what)
{
case GPGME_ATTR_CREATED:
return sig->timestamp;

case GPGME_ATTR_EXPIRE:
return sig->exp_timestamp;

case GPGME_ATTR_VALIDITY:
return (unsigned long) sig->validity;

case GPGME_ATTR_SIG_STATUS:
switch (sig->status)
{
case GPG_ERR_NO_ERROR:
return GPGME_SIG_STAT_GOOD;

case GPG_ERR_BAD_SIGNATURE:
return GPGME_SIG_STAT_BAD;

case GPG_ERR_NO_PUBKEY:

```

```

 return GPGME_SIG_STAT_NOKEY;

case GPG_ERR_NO_DATA:
 return GPGME_SIG_STAT_NOSIG;

case GPG_ERR_SIG_EXPIRED:

return GPGME_SIG_STAT_GOOD_EXP;

case GPG_ERR_KEY_EXPIRED:
 return GPGME_SIG_STAT_GOOD_EXPKEY;

default:
 return GPGME_SIG_STAT_ERROR;
}

case GPGME_ATTR_SIG_SUMMARY:
 return sig->summary;

default:
 break;
}
return 0;

```

-- Function: const char \* gpgme\_get\_sig\_key (gpgme\_ctx\_t CTX, int IDX, gpgme\_key\_t \*R\_KEY)

The function gpgme\_get\_sig\_key is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
 sig = sig->next;
 idx--;
}
if (!sig || idx)
 return gpg_error (GPG_ERR_EOF);

return gpgme_get_key (ctx, sig->fpr, r_key, 0);

```

File: gpgme.info, Node: Library Copying, Next: Copying,  
Prev: Deprecated Functions, Up: Top

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Version 2.1, February 1999

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\* START\_KEYMANAGER: Miscellaneous UI Server Commands.  
(line 31)

\* struct gpgme\_data\_cbs: Callback Based Data Buffers.  
(line 59)

\* struct gpgme\_io\_cbs: Registering I/O Callbacks.  
(line 6)

\* VERIFY: UI Server Verify. (line 31)

\* VERIFY\_FILES: UI Server Verify/Decrypt Files.  
(line 10)

\* void (\*gpgme\_data\_release\_cb\_t) (void \*HANDLE): Callback Based Data Buffers.  
(line 54)

\* void (\*gpgme\_event\_io\_cb\_t) (void \*DATA, gpgme\_event\_io\_t TYPE, void \*TYPE\_DATA): I/O Callback  
Interface.  
(line 83)

\* void (\*gpgme\_progress\_cb\_t)(void \*HOOK, const char \*WHAT, int TYPE, int CURRENT, int TOTAL):  
Progress Meter Callback.  
(line 6)

\* void (\*gpgme\_remove\_io\_cb\_t) (void \*TAG): I/O Callback Interface.  
(line 48)

\* window-id: Miscellaneous UI Server Commands.  
(line 21)

{  
  "name": "gpgmejson",  
  "description": "Integration with GnuPG",

```

"path": "/usr/bin/gpgme-json",
"type": "stdio",
"allowed_extensions": [
 "jid1-AQqSMBYb0a8ADg@jetpack"
]
}

```

Wenn Sie dies lesen können, ist es wohl nicht geheim genug.

```

{
 "info": {
 "is_mime": false,
 "signatures": [{
 "summary": {
 "sigsum": [],
 "valid": false,
 "green": false,
 "red": false,
 "revoked": false,
 "key-expired": false,
 "sig-expired": false,
 "key-missing": false,
 "crl-missing": false,
 "crl-too-old": false,
 "bad-policy": false,
 "sys-error": false
 },
 "wrong_key_usage": false,
 "chain_model": false,
 "is_de_vs": false,
 "status_string": "Success",
 "fingerprint": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
 "validity_string": "unknown",
 "pubkey_algo_name": "DSA",
 "hash_algo_name": "SHA1",
 "status_code": 0,
 "timestamp": 1542201053,
 "exp_timestamp": 0,
 "pka_trust": 0,
 "validity": 0,
 "validity_reason": 0
 }]
 }
}
hkp4py
requests
{
 "op": "decrypt",
 "base64": true,

```

```
"data":
"hQEOA2rm1+5GqHH4EAP+NCYW3vVuCLDTUYhBaKHNgp4fMq9TNACH2NiZyVSaYLe0VE+2LLurHN/X
LwIP7xhl2XijBUe6Q7M+KyoPd9iNIgX9q914dPUN0Q3sJinSbujnFzsy0L2x6kgUJCK/XA7rp0VpmJGUWQYAE
T8Xx6SaWd2XxIdIITUz2MqrTzWrgED/iOuRxt4loNJ/DM2YrOZR0He25SxJskg0t1bik2nM+wHAbJrSa6BqPJY
U4scnG6AH0RRxFV177ADjOcBLEutXw7DE+6YOEExWZD2Fb0oax/ppDulMudrJnj6Wg5/EHbBLDF96Xd6vQX
1rcHmrXImvaQNbavEKswIDZgoYwaV7PYPhQEOAwQHH7gHKHE0EAP/So0a3deCbXVSPkABRO3yZa6kHcV
uO5+lTsunfxav1TwaMkBOiK6usRz2zt3rjozNrh3vXn3o2WpFKebwhIUf0q2qPw3OKIGq9jFT63t+DPjpbSorAev
mVqXWdmaqDPJZ/QIY6NkBhprTdIGPSTFh66eggQLz+BBUVx2myM7AqgcD/3PnOGliqINQzFkfa6iHiV/TZ8A
aMNFvyx4FFG4Zi45ZnDwLCJZ+J7ATXzECauEDLzhjk8M9OP0PwFT1WsnWefKDSLzbO5hEnf8NYdY6i8f2MJ
KYcnpeI4PZA3OK9ovmAoJl31K+/vBJRP4kiJ4Wew7fzMi6Zz87tfHDEpbRR7N80qoBTIT7I044LG5OJKgQukb7
HOv+c668i56UZVgz+LcsFpjYEFTlrPVR5Me3PjSSb8M+tt9NUjenNnghJecxeD902YJcqrWPotouz5fKDTay/
LofFqckEWGIP5pnkeNfYIBIaSSrG/KcdQ0rPOAxKrZzIifYVwnJm/ISxU6uMpNfDJGOJppf4xqXgTKBdIsCljg5Ll
gNvGhNMYaXQkGQInzXvLSUbxLerWw=="
}
```

Additional license notices for GPGME.                    -\*- org -\*-

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\* MIT License

For files:  
- cJSON.c, cJSON.h

```
#+begin_quote
Copyright (c) 2009 Dave Gamble
```

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#+end\_quote

# -\*- mode: org -\*-

#+TITLE: Maintenance Mode

#+AUTHOR: Ben McGinnes

#+LATEX\_COMPILER: xelatex

#+LATEX\_CLASS: article

#+LATEX\_CLASS\_OPTIONS: [12pt]

#+LATEX\_HEADER: \usepackage{xltextra}

#+LATEX\_HEADER: \usepackage[margin=1in]{geometry}

#+LATEX\_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

#+LATEX\_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

\* Maintenance Mode from 2019

:PROPERTIES:

:CUSTOM\_ID: maintenance-mode

:END:

Version:	0.0.1
GPGME Version:	1.13.0
Author:	Ben McGinnes <ben@gnupg.org>
Author GPG Key:	DB4724E6FA4286C92B4E55C4321E4E2373590E5D
Language:	Australian English, British English
xml:lang:	en-AU, en-GB, en

From the beginning of 2019 the Python bindings to GPGME will enter maintenance mode, meaning that new features will not be added and only bug fixes and security fixes will be made.

This also means that documentation beyond that existing at the end of 2018 will not be developed further except to correct errors.

Though use of these bindings appears to have been quite well received, there has been no indication of what demand there is, if any for either financial backing of the current Python bindings development or support contracts with g10code GmbH citing the necessity of including the bindings.

\*\* Maintainer from 2019 onward

:PROPERTIES:

:CUSTOM\_ID: maintenance-mode-bm

:END:

How does this affect the position of GnuPG Python Bindings Maintainer?

Well, I will remain as maintainer of the bindings; but without funding for that position, the amount of time I will be able to dedicate solely to this task will be limited and reduced to volunteered time. As with all volunteered time and effort in free software projects, this will be subject to numerous external imperatives.

\*\* Using the Python Bindings from 2019 and beyond

```
:PROPERTIES:
:CUSTOM_ID:
maintenance-mode-blade-runner
:END:
```

For most, if not all, Python developers using these bindings; they will continue to just work the same as they always have. Expansions of GPGME itself are usually handled by SWIG with the existing code and thus bindings are generated properly when the bindings are installed alongside GPGME and when the latter is built from source.

In the rare circumstances where that is not enough to address some new addition to GPGME, then that is a bug and thus subject to the maintenance mode provisions (i.e. it will be fixed following a bug report being raised and your humble author will need to remember where the timesheet template was filed, depending on how many years off such an event is).

All the GPGME functionality will continue to be accessible via the lower level, dynamically generated methods which match the GPGME C documentation. While the more intuitively Pythonic higher level layer already covers the vast majority of functionality people require with key generation, signatures, certifications (key signing), encryption, decryption, verification, validation, trust levels and so on.

Any wanted features lacking in the Python bindings are usually lacking because they are missing from GPGME itself (e.g. revoking keys via the API) and in such cases they are usually deliberately excluded. More discussion of these issues can be found in the archives of the [\[\[https://lists.gnupg.org/mailman/listinfo/gnupg-devel\]\]](https://lists.gnupg.org/mailman/listinfo/gnupg-devel) [gnupg-devel mailing list].

Any features existing in the dynamically generated layer for which people want a specific, higher level function included to make it more Pythonic (e.g. to avoid needing to learn or memorise cryptographic mode values or GnuPG status code numbers), would be a feature request and /not/ a bug.

It is still worthwhile requesting it, but the addition of such a feature would not be guaranteed and provided on a purely volunteer basis. Expediting such a request would require funding that request.

Those

with a commercial interest in expediting such a feature request already know how to [\[\[https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset\]\]](https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset) [expedite it] (use the message field to state what feature is being requested).

**\*\* Documentation formats**

```
:PROPERTIES:
:CUSTOM_ID: docs
:END:
```

The documentation has been written in Org mode for GNU Emacs, with both Texinfo and reStructuredText formats generated from that. The Texinfo files are intended for use with the rest of the GnuPG documentation; while the reStructuredText files are intended for use with Docutils and Sphinx, as with other Python projects.

**\*\*\* Cautionary Notes regarding Sphinx and EPUB**

```
:PROPERTIES:
:CUSTOM_ID: sphinx-made-epubs-suck
:END:
```

Though Python's Docutils in conjunction with Sphinx is capable of generating some very useful HTML sites, as proven by [\[\[https://readthedocs.org/\]\]](https://readthedocs.org/) [Read the Docs] and the [\[\[https://docs.python.org/\]\]](https://docs.python.org/) [Python documentation], there are a number of output formats it does not

handle well. At the top of the list of things it manages to break so atrociously as to be embarrassing is the [\[\[http://idpf.org/epub/\]\]](http://idpf.org/epub/) [EPUB 3] format.

The automatically generated EPUB of the CPython documentation always contains hundreds of validation errors and even the modest amount of documentation here [\[\[https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub\]\]](https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub) [produced a file] with approximately thirty validation errors. As the volume of documentation content increases, so does the induced errors. Whereas Texinfo doesn't produce EPUB output at all, nor does Org-mode.

Should there ever be genuine demand for this format, lodge a [\[\[https://dev.gnupg.org/maniphest/task/edit/form/4/\]\]](https://dev.gnupg.org/maniphest/task/edit/form/4/) [feature request] case marked for [\[\[https://dev.gnupg.org/p/BenM/\]\]](https://dev.gnupg.org/p/BenM/) [my] attention. The means of generating such files flawlessly is already available, but is not yet part of the GnuPG build system. Nor is it integrated with a means of converting

Org

mode input files to the relevant base format automatically, as can already be done when converting Org to reStructuredText or Org to Texinfo. As a certain amount of work would be required to get it done, there would need to be clear demand for that work to be done. Just GNU it!

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

- \* m4/pth.m4: Removed.
- \* configure.ac: Remove check for pth and automake conditional HAVE\_PTH.

2011-06-16 Marcus Brinkmann <marcus@g10code.com>

Release 1.3.1

- \* configure.ac: Set LT version to C19/A8/R0.

2011-05-06 Marcus Brinkmann <marcus@g10code.com>

- \* Makefile.am (SUBDIRS): Remove complus.
- \* configure.ac (AC\_CONFIG\_FILES): Remove complus/Makefile. (BUILD\_COMPLUS): Remove AM\_CONDITIONAL.
- \* complus/: Remove very old and stale component.
- \* acinclude.m4 (GNUPG\_FIX\_HDR\_VERSION): Remove.

2011-04-14 Werner Koch <wk@g10code.com>

- \* configure.ac: Require automake 1.11.

2011-04-06 Werner Koch <wk@g10code.com>

- \* autogen.sh (--build-w32): Support option --build-w64.
- \* configure.ac (HAVE\_W64\_SYSTEM): Define. (INSERT\_\_TYPEDEFS\_FOR\_GPGME\_H): New. (GPGME\_CONFIG\_HOST): New.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

\* configure.ac (NEED\_LIBASSUAN\_VERSION): Bump to 2.0.2 for system hooks.

2010-12-30 Werner Koch <wk@g10code.com>

\* configure.ac: Support a git revision.

2010-11-03 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CHECK\_HEADERS): Check for sys/types.h and sys.stat.h.

2010-11-02 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CHECK\_HEADERS): Check for sys.time.h.

2010-08-19 Werner Koch <wk@g10code.com>

\* configure.ac (AH\_BOTTOM): Define GPG\_ERR\_ENABLE\_ERRNO\_MACROS.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for setlocale.

2010-05-07 Werner Koch <wk@g10code.com>

\* configure.ac: Change checks to always require libassuan.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh: Update the thing.

\* configure.ac: Check for locale.h.

2010-05-06

Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Detect Windows CE.

(HAVE\_W32CE\_SYSTEM): New symbol and automake conditional.

\* ltmain.sh, m4/libtool.m4: Patch so that it works for Windows CE.

\* configure.ac: Require libgpg-error 1.8.

2010-03-15 Werner Koch <wk@g10code.com>

\* configure.ac (emacs\_local\_vars\_begin)

(emacs\_local\_vars\_read\_only, emacs\_local\_vars\_end): New.



2010-01-22 Werner Koch <wk@g10code.com>

\* autogen.sh (--build-w32): Add --with-libassuan-prefix.

2010-01-11 Marcus Brinkmann <marcus@g10code.de>

Release 1.3.0.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Do not use echo -n. Test for \_\_thread.

2009-12-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Make largefile check more robust.

2009-12-10 Werner Koch <wk@g10code.com>

\* configure.ac: Check for getgid and getegid.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

Update to libtool 2.2.6a.

\* configure.ac: Invoke AC\_CONFIG\_MACRO\_DIR.

(AC\_LIBTOOL\_WIN32\_DLL,

AC\_LIBTOOL\_RC): Replace by ...

(LT\_PREREQ, LT\_INIT, LT\_LANG): ... these.

\* config.guess, config.sub, install-sh, ltmain.sh, m4/libtool.m4:

Updated to libtool 2.2.6a.

\* m4/ltoptions.m4, m4/ltsugar.m4, m4/ltversion.m4,

m4/lt~obsolete.m4: New files from libtool 2.2.6a.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Activate UIserver if FD passing is enabled and Assuan is available.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for argp.h and error\_t.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPG\_VERSION\_DEFAULT): Bump to 1.4.0 as 1.3.0 was development versions only.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add support for G13.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_CONFIG\_FILES): Remove assuan/Makefile.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Replace internal libassuan by external libassuan.

\* m4/libassuan.m4:

New file.

\* Makefile.am (assuan): Remove variable.

(SUBDIRS): Remove \${assuan}.

\* assuan/: Removed.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add AC\_TYPE\_UINTPTR\_T.

\* assuan/assuan.h [\_ASSUAN\_IN\_GPGME\_BUILD\_ASSUAN]: Declare  
\_gpgme\_io\_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

Released GPGME 1.2.0.

\* configure.ac (my\_version): Set to 1.2.0.

(LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump.

(LIBGPGME\_LT\_REVISION): Reset.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add infrastructure for compile time check of  
\_FILE\_OFFSET\_BITS.

2009-04-19 Moritz <moritz@gnu.org>

\* Makefile.am (DISTCHECK\_CONFIGURE\_FLAGS): Specify --with-gpg.

2009-03-06 Marcus Brinkmann <marcus@g10code.de>

\* assuan/: Update to libassuan SVN 2009-03-06.

2009-01-26 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CONFIG\_FILES): Add tests/opassuan/Makefile.

2008-12-08 Marcus Brinkmann <marcus@g10code.de>

Release GPGME

1.1.8.

\* configure.ac: Bump API revision.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

\* configure.ac: Replace gpgme paths with src.

\* gpgme: Move to ...

\* src: ... this new directory.

2008-10-20 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CONFIG\_FILES): Add gpgme.h.

(GNUPG\_FIX\_HDR\_VERSION): Remove.

2008-10-17 Marcus Brinkmann <marcus@g10code.com>

Release GPGME 1.1.7.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2008-09-19 Moritz <moritz@gnu.org>

\* configure.ac: Remove bogus "esac".

2008-09-16 Marcus Brinkmann <marcus@g10code.com>

\* configure.ac (\_XOPEN\_SOURCE) [apple-darwin]: Define it.

2008-07-04 Werner Koch <wk@g10code.com>

\* config.guess, config.sub: Update to 2007-11-19. Also update missing et al scripts.

2008-04-01 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_INIT): Fix quoting.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Bump required version of automake up to 1.10.

\* autogen.sh: Fix

aclocal check.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

Release GPGME 1.1.6.

\* configure.ac: Support gpgconf.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

\* assuan-pipe-connect.c (pipe\_connect\_gpgme): Do not close process handle here. Use this function also on Unix systems.

\* assuan-pipe-connect.c (pipe\_connect\_gpgme): Fix last change.

\* assuan-pipe-connect.c (pipe\_connect\_gpgme): New function, use it if \_ASSUAN\_IN\_GPGME\_BUILD\_ASSUAN.

2007-09-17 Werner Koch <wk@g10code.com>

\* configure.ac: Use the svn version magic.

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for C++, Qt and support --enable-w32-qt.

\* m4/pkg.m4: New file.

2007-08-21 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (--enable-w32-glib): Use --enableval, not --withval.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

\* assuan/assuan-socket.c (\_assuan\_close): Always use close().

\* assuan/assuan.h (\_gpgme\_io\_close): New prototype.

(close): New

macro, define as \_gpgme\_io\_close.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

\* assuan/assuan-io.c (\_assuan\_simple\_read, \_assuan\_simple\_write):

Always use read/write (which means \_gpgme\_io\_read and \_gpgme\_io\_write).

2007-07-09 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.5.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2007-07-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (GPGSM\_DEFAULT) [\*-mingw32\*]: Initialize it.  
(HAVE\_ASSUAN\_H): Set to 1 if we have it.  
(funopen): Use AC\_REPLACE\_FUNCS.  
(USE\_DESCRIPTOR\_PASSING): Define to 1 if we have it. Do not  
define it at all if we don't.  
(NETLIBS) [have\_w32\_system]: Add -lws2\_32.  
(DIRSEP\_C, DIRSEP\_S, EXPSEP\_C, EXPSEP\_S, PATHSEP\_S)  
[HAVE\_DOSISH\_SYSTEM]: Remove definitions.

\* assuan/assuan.h (\_assuan\_funopen): Define to \_gpgme\_funopen.  
\* assuan/funopen.c: Move to ../gpgme/funopen.c.  
\* assuan/Makefile.am (libassuan\_la\_SOURCES): Remove funopen.c.

2007-07-04 Marcus Brinkmann <marcus@g10code.de>

\*  
assuan/Makefile.am (INCLUDES): Include \$(top\_srcdir)/gpgme.  
\* assuan/assuan.h: Include <ath.h> instead of trying to duplicate  
the definitions.

\* assuan/: Update files to 2007-07-04 version of assuan.

\* autogen.sh: Use = not == in test.

2007-03-05 Werner Koch <wk@g10code.com>

Released 1.1.4.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

\* autogen.sh: New option --force.

2007-01-29 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.3.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2007-01-26 Werner Koch <wk@g10code.com>

\* configure.ac: Changed gpg and gpgsm version checks to work with  
arbitrary names of the gpg binary. New option --disable-gpg-test  
and --disable-gpgsm-test.

2007-01-09 Werner Koch <wk@g10code.com>

\* configure.ac (NEED\_GPG\_VERSION, NEED\_GPGSM\_VERSION): Must define

after it may have been changed by an option.

2007-01-08 Werner Koch <wk@g10code.com>

\* configure.ac: Require gpg-error 1.4 due to the use of  
gpg\_error\_from\_syserror.  
(HAVE\_ASSUAN\_H):  
New.

2007-01-05 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add options --with-gpg-version and  
--with-gpgsm-version to allow overriding the minimum version  
requirements.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Fix two typos in last change.

2006-12-03 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Use descriptor passing only if --enable-fd-passing  
is provided.

\* configure.ac: Add check for use of descriptor passing.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPG\_VERSION): Bump to 1.3.0.

2006-09-19 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Turn stpcpy into a replacement function.  
Check for unistd.h and add setenv as replacement function.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for network libraries and set NETLIBS.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

\* lang, lang/cl: New subdirectories.

\*

lang/Makefile.am, lang/README: New files.

\* configure.ac (AC\_CONFIG\_FILES): Add lang/Makefile,  
lang/cl/Makefile and lang/cl/gpgme.asd.

\* Makefile.am (SUBDIRS): Add lang.

2006-03-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.1.

\* configure.ac (LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump for release.

(LIBGPGME\_LT\_REVISION): Reset to 0 for release.

2006-01-05 Werner Koch <wk@g10code.com>

\* configure.ac: Test for inline feature.

(AH\_BOTTOM): New to define the pure attribute.

2006-01-03 Werner Koch <wk@g10code.com>

\* configure.ac: Append SVN revision to the version.

2005-11-18 Werner Koch <wk@g10code.com>

\* configure.ac (BUILD\_REVISION): New.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add support for --enable-w32-glib (disabled by default). Invoke AM\_PATH\_GLIB\_2\_0.

2005-11-16 Werner Koch <wk@g10code.com>

\* configure.ac

(CFLAGS) [W32]: Make sure that -mms-bitfields are used.

2005-11-15 Werner Koch <wk@g10code.com>

\* configure.ac: Create BUILD\_FILEVERSION from SVN Revision.

\* autogen.sh [W32]: Build shared and static versions of the library.

2005-10-20 Marcus Brinkmann <marcus@g10code.de>

\* w32-dll/ChangeLog, w32-dll/build-dll, w32-dll/gpgme.def: Remove files.

\* configure.ac: Instead checking for windres and dlltool, invoke AC\_LIBTOOL\_WIN32\_DLL and AC\_LIBTOOL\_RC.

\* src/Makefile.am [HAVE\_W32\_SYSTEM]: Use libtool, which simplifies the rules.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.0.

\* configure.ac (LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump for release.

(LIBGPGME\_LT\_REVISION): Reset to 0 for release.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (HAVE\_PTH): Don't add \$PTH\_CFLAGS to \$CFLAGS here.

2005-08-26 Werner Koch <wk@g10code.com>

\* configure.ac (SEPCONSTANTS): New to define DIRSEP\_C et al.

2005-08-19 Werner Koch <wk@g10code.com>

\*

configure.ac [W32]: Create values for versioninfo.rc and list substitute versioninfo.rc.

\* configure.ac: Define ENABLE\_GPGSM.

2005-08-08 Werner Koch <wk@g10code.com>

\* configure.ac (stpcpy): Changed from replace to test.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AH\_BOTTOM): Removed.

2005-03-09 Werner Koch <wk@g10code.com>

\* acinclude.m4 (GNUPG\_CHECK\_VA\_COPY): Assume no when cross-compiling.

\* Makefile.am (EXTRA\_DIST): Include autogen.sh

\* autogen.sh: Added the usual code to build for W32 (--build-w32).

\* configure.ac: Fixed the mingw32 host string, removed OS/2 stuff.

(HAVE\_DRIVE\_LETTERS): Removed.

(HAVE\_W32\_SYSTEM): Added.

(AC\_GNU\_SOURCE): New to replace the identical AH\_VERBATIM.

(AH\_BOTTOM): Added.



2004-12-28 Werner Koch <wk@g10code.com>

Released 1.0.2.

- \* Makefile.am (AUTOMAKE\_OPTIONS): Build bzip 2 version.
- (ACLOCAL\_AMFLAGS): Add -I m4.
- \* configure.ac: Require automake 1.9.3 and autoconf 2.59.
- \* acinclude.m4:
- Changed quoting for automake 1.9.
- \* README: Use SHA1 instead of MD5.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: Replace ttyname\_r if it doesn't exist (and warn in that case).

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

- \* README: Refer to COPYING.LESSER and "each file" instead of COPYING.
- \* COPYING.LESSER: New file.
- \* gpgme.spec.in (%doc): Add COPYING.LESSER.
- \* acinclude.m4, configure.ac, Makefile.am: Change license to LGPL 2.1 or later.
- \* TODO: Add copyright notice.
- \* README.CVS: Likewise.
  
- \* configure.ac (GPGSM\_VERSION): Fix filter to get it.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.1.

- \* configure.ac (LIBGPGME\_LT\_REVISION): Bump up to 2.
- (AC\_INIT): Set version to 1.0.1.
  
- \* configure.ac: Set HAVE\_GPGSM to true only if \$GPGSM is not "no".

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.0.

- \* configure.ac (LIBGPGME\_LT\_REVISION): Bump up to 1.
- (AC\_INIT): Set version to 1.0.0.
  
- \* Makefile.am
- (EXTRA\_DIST): Remove README-alpha.
- \* README-alpha: Remove file.

2004-09-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Disable AC\_CONFIG\_MACRO\_DIR for now.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Improve diagnostics with version check.

\* configure.ac: Print diagnostics about found thread libraries at the end. Check for the versions of GPG and GPGSM and print the found versions at the end.

(HAVE\_GPGSM): Do not require GPGSM to exist and be readable.

(AC\_CONFIG\_MACRO\_DIR): Invoke with argument m4.

\* acinclude.m4: Add copyright notice.

(jm\_GLIBC21, AM\_PATH\_GPG\_ERROR, \_AC\_PTH\_ERROR, \_AC\_PTH\_VERBOSE, AC\_CHECK\_PTH): Removed.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for <sys/uio.h>.

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

Released 0.9.0.

\* configure.ac (AC\_INIT): Set version number to 0.9.0.

(LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump up by one.

(LIBGPGME\_LT\_REVISION): Reset to zero.

2004-05-21

Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (GPGME\_CONFIG\_API\_VERSION): New variable, substitute it.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.7.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump it up.

2004-04-02 Thomas Schwinge <schwinge@nic-nac-project.de>

\* autogen.sh: Added ACLOCAL\_FLAGS.

2004-04-06 Werner Koch <wk@gnupg.org>

Released 0.4.6.

\* config.guess, config.sub, ltmain.sh: Updated to those from libtools 1.5.4.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.5.

\* configure.ac (NEED\_GPGSM\_VERSION): Bump up to 1.9.6.

\* Makefile.am (EXTRA\_DIST): Remove autogen.sh and README.CVS.

2004-02-18 Werner Koch <wk@gnupg.org>

\* configure.ac: Make the check for funopen fail with just a warning.

2004-02-11 Werner Koch <wk@gnupg.org>

\* autogen.sh (check\_version): Removed bashism and simplified.

2004-02-10 Werner Koch <wk@gnupg.org>

\* configure.ac: Fixed funopen test change.

2004-02-06 Moritz Schulte  
<mo@g10code.com>

\* configure.ac: Fix funopen replacement mechanism.

2004-01-31 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add invocation of AC\_SYS\_LARGEFILE, AC\_TYPE\_OFF\_T and AC\_FUNC\_FSEEKO.

2004-01-12 Werner Koch <wk@gnupg.org>

Released 0.4.4.

\* configure.ac: Bumbed LT\_Revision; now at C12/A1/R1.  
(NEED\_GPGSM\_VERSION): Set to 1.9.3.

(min\_automake\_version): Added.

\* README.CVS: New.

\* Makefile.am (EXTRA\_DIST): Added README.CVS.

\* autogen.sh: Updated.

2003-11-19 Werner Koch <wk@gnupg.org>

- \* acinclude.m4: Add AM\_PATH\_GPG\_ERROR.
- \* configure.ac: Check for timegm. Made warning messages more prominent.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.3.

- \* configure.ac (LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump up by 1. (LIBGPGME\_LT\_REVISION): Set to 0.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: Require libpgp-error 0.5.
- \* acinclude.m4: Remove libtool cruft, add jm\_GLIBC21.
- \* configure.ac: Add check for getenv\_r, and call jm\_GLIBC21. Define HAVE\_THREAD\_SAFE\_GETENV if appropriate.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: Remove GPGME\_CONFIG\_LIBS and GPGME\_CONFIG\_CFLAGS.

2003-09-02 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: Move invocation of AC\_CANONICAL\_HOST up to suppress warning by autoconf.

2003-08-30 Robert Schiele <rschiele@uni-mannheim.de>

- \* gpgme.spec.in: % {\_infodir}/dir is not packaged, remove to prevent checking failure.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: If building Assuan, check for funopen and fopencookie, and make isascii, putc\_unlocked and memchr replacement functions. (AM\_PATH\_GPG\_ERROR): Require 0.3.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac (AC\_INIT): Bump version to 0.4.3.

2003-07-30 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump up to 1.

Released 0.4.2.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac:

Complain if libgpg-error is not found.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Bump version to 0.4.2.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_CURRENT): Bump up to 11.

\* configure.ac: Use AM\_PATH\_GPG\_ERROR.

\* configure.ac: Check for libgpg-error. Define  
GPG\_ERR\_SOURCE\_DEFAULT.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPG\_VERSION): Bump up to 1.2.2.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

In all files, replace the Gpgme\* type names with the new gpgme\_\*  
type names.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

\* assuan/: Update files to 2002-11-10 version of assuan.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

\* bonobo/gpgme.c, bonobo/main.c, bonobo/main.h, bonobo/Makefile,  
bonobo/Makefile.am, bonobo/Makefile.in: Dead files removed.

\* configure.ac: Remove automake conditional BUILD\_BONOBO  
(AC\_CONFIG\_FILES): Remove bonobo/Makefile.

\*

Makefile.am (bonobo): Remove variable.

(SUBDIRS): Remove \${bonobo}.

\* configure.ac: Remove all uses of GNUPG\_CHECK\_TYPEDEF, for byte,  
ushort, ulong, u16 and u32.

\* acinclude.m4 (GNUPG\_CHECK\_TYPEDEF): Remove macro.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: New conditional HAVE\_LD\_VERSION\_SCRIPT.  
Call AC\_CANONICAL\_HOST, use host instead target.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Bump up to 0.4.1.

Released 0.4.0.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh (automake\_vers): Require 1.7 (really 1.7.1) for the  
conditional source distribution bug fix.

2002-12-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_CURRENT): Increase by one.  
(LIBGPGME\_LT\_AGE, LIBGPGME\_LT\_REVISION): Set to 0.

2002-11-28 Marcus Brinkmann <marcus@g10code.de>

\* NEWS: Add note about moving "gpgmeplug" to the "cryptplug"  
package.

\* README: Remove instructions related to "gpgmeplug".

\* configure.ac:

Remove enable option "gpgmeplug" and automake  
conditional BUILD\_GPGMEPLUG, as well as the status info about it.  
(GPGMEPLUG): Remove variable.

\* Makefile.am (gpgmeplug): Remove variable.

(SUBDIRS): Remove \${gpgmeplug}.

\* cryptplug.h, gpgme-openpgp.c, gpgmeplug.dox, gpgme-smime.c,  
Makefile.am, gpgmeplug.c, ChangeLog: Files removed.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Disable GPGSM for all dosish systems.

2002-10-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add automake conditional HAVE\_GPGSM.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Bump version up to 0.4.0.

(NEED\_GPG\_VERSION): Bump up to 1.2.0.  
(NEED\_GPGSM\_VERSION): Bump up to 0.9.0.  
\* README: Update version numbers.  
\* NEWS: Start entry for 0.4.0.

2002-09-20 Werner Koch <wk@gnupg.org>

Released 0.3.11.

\* configure.ac: Bump up LIBGPGME\_LT\_REVISION.  
\* configure.ac (AC\_CHECK\_HEADERS): Check for sys/select.h.

2002-09-04 Marcus Brinkmann  
<marcus@g10code.de>

\* autogen.sh (autoconf\_vers): Bump up to 2.53 to get the @&t@  
quadrigraph. Always cutting the edge!

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Create and substitute LTLIBOBS.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.10.

\* NEWS: Update for 0.3.9 release.  
\* configure.ac: Bump up LIBGPGME\_LT\_REVISION.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.spec.in: Changed user name in Wojciech Polak's email  
address from ghostface to polak per request by himself.

2002-08-28 Werner Koch <wk@gnupg.org>

\* acinclude.m4 (GNUPG\_CHECK\_VA\_COPY): New.  
\* configure.ac: Use it.

2002-08-23 Werner Koch <wk@gnupg.org>

\* configure.ac (GPGME\_CONFIG\_CFLAGS): Renamed from GPGME\_CFLAGS  
and removed the libpath because it is set by the config script.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Bump version number to 0.3.10.

\* NEWS: Add template for development version.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

Released 0.3.9.

\* NEWS: Update for 0.3.9 release.

\* Makefile.am (EXTRA\_DIST): Add gpgme.spec.in.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* jnlib/argparse.c, jnlib/argparse.h, jnlib/ChangeLog,  
jnlib/dotlock.c, jnlib/dotlock.h, jnlib/libjnlib-config.h,  
jnlib/logging.c, jnlib/logging.h, jnlib/Makefile.am,  
jnlib/mischelp.h, jnlib/README, jnlib/stringhelp.c,  
jnlib/stringhelp.h, jnlib/strlist.c, jnlib/strlist.h,  
jnlib/types.h, jnlib/xmalloc.c, jnlib/xmalloc.h: Remove files.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (SUBDIRS): Remove jnlib.

\* configure.ac: Don't check for unsigned short or unsigned long.

Don't check for memicmp, strtoul, strtoul, memmove, stricmp.

Make stpcpy a replaced function.

Don't define HAVE\_JNLIB\_LOGGING.

Don't generate jnlib/Makefile.

2002-07-02 Werner Koch <wk@gnupg.org>

\* configure.ac: Bumbed version number to 0.3.9; add a comment on  
when to change it.

\* gpgme.spec.in:

New. Contributed by Wojciech Polak.

\* Makefile.am (dist-hook): New.

\* AUTHORS: Added Wojciech and bug reporting addresses.

2002-06-25 Werner Koch <wk@gnupg.org>

Released 0.3.8.

\* configure.ac: Bumbed LT version to 9/3/0.

(NEED\_GPGSM\_VERSION): Need 0.3.8 due to fixed export command.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>



Released 0.3.7.

\* configure.ac (AC\_INIT): Set version to 0.3.7.  
(LIBGPGME\_LT\_REVISION): Add one.

\* README: Document version requirement correctly.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* acinclude.m4: Fix Pth check so that it doesn't error out if pth  
is not found.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add checks for Pth and pthreads.  
\* acinclude.m4: Add slightly hacked check for pth (seems to be an  
autoconf version problem).

2002-05-21 Werner Koch <wk@gnupg.org>

\* configure.ac (NEED\_GPGSM\_VERSION): We need gpgsm 0.3.7.

2002-05-03 Werner Koch <wk@gnupg.org>

Released 0.3.6.

2002-04-05

Marcus Brinkmann <marcus@g10code.de>

\* acconfig.h: File removed.  
\* configure.ac (NEED\_GPG\_VERSION): Add description.  
(NEED\_GPGSM\_VERSION): Likewise.  
(HAVE\_DOSISH\_SYSTEM): Likewise.  
(HAVE\_DRIVE\_LETTERS): Likewise.  
(GPG\_PATH): Likewise.  
(GPGSM\_PATH): Likewise.  
\* acinclude.m4 (GNUPG\_CHECK\_TYPEDEF): Likewise.

2002-04-01 Werner Koch <wk@gnupg.org>

Released 0.3.5.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add automake conditional HAVE\_DOSISH\_SYSTEM.

2002-03-04 Werner Koch <wk@gnupg.org>

\* configure.ac: Bumbed version to 0.3.4-cvs to continue development.

Released 0.3.4.

\* configure.ac: Bumbed LT version numbers to (7,1,0), requires  
gpgsm 0.3.1.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Change version number to snapshot CVS  
version.

2002-02-13 Werner Koch <wk@gnupg.org>

\* configure.ac (vasprintf,fopencookie): Add checks.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT):

Bump version to 0.3.3.

\* jnlib/Makefile.am: Revert to older version that includes xmalloc  
but not dotlock and some other files. Reported by Stphane  
Corthsy.

2002-02-10 Marcus Brinkmann <marcus@g10code.de>

\* Released 0.3.2.

\* configure.ac (AC\_INIT): Bump version to 0.3.2.

\* jnlib/libjnlibconfig.h: Revert to older version that doesn't  
expect libgcrypt. Reported by Jose Carlos Garcia Sogo  
<jsogo@debian.org>.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* Released 0.3.1.

\* configure.ac (LIBGPGME\_LT\_CURRENT): Bump it up to 6!

(NEED\_GPGSM\_VERSION): Bump it up to 0.3.0!

(AC\_INIT): Bump version to 0.3.1

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (HAVE\_JNLIB\_LOGGING): Define always for assuan.

2001-12-19 Werner Koch <wk@gnupg.org>

\* configure.ac (VERSION,PACKAGE): Defined and subst. Used for AM\_INIT\_AUTOMAKE and moved all version number more to the top.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh (libtool\_vers):

Bump to 1.4.

\* configure.ac (LIBGPGME\_LT\_CURRENT): Increment.

(LIBGPGME\_LT\_AGE): Reset.

Improve comment.

Fix wrong comment character.

2001-12-18 Werner Koch <wk@gnupg.org>

\* acinclude.m4 (GNUPG\_FIX\_HDR\_VERSION): Fixed for new automake.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (GPG): Substitute this variable.

(GPGSM): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_CONFIG\_FILES): Add tests/gpg/Makefile and tests/gpgsm/Makefile.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (gpgmeplug): New variable, set to gpgmeplug if [BUILD\_GPGMEPLUG].

\* configure.ac (AC\_CONFIG\_FILES): Add gpgmeplug/Makefile.

Support --enable-gpgmeplug.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh: Tighten version dependencies.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (SUBDIRS): Support building the assuan library (currently if GPGSM\_PATH is set)..

\* configure.ac: Support building the assuan library.

\* assuan: New directory, populated with the Assuan library (copied from the newpg repository).

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPGSM\_VERSION): New variable. Treat it similarly to NEED\_GPG\_VERSION.  
\* acconfig.h: Likewise.

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

\* configure.in: Renamed to ...  
\* configure.ac: ... this. Update to autoconf 2.52. Lots of small changes in the transition. Support --with-gpg=PATH and --with-gpgsm=PATH options. Check if test suites can be run.  
\* acconfig.h: Add GPGSM\_PATH.  
\* Makefile.am: New variable `tests', set to `tests' if RUN\_GPG\_TESTS.  
(SUBDIRS): Replace string `tests' with variable `tests'.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh: Invoke automake with `-a' (add missing files).  
Do not invoke configure.

2001-09-17 Werner Koch <wk@gnupg.org>

Released 0.2.3.

\* configure.in (NEED\_GPG\_VERSION): Set to 1.0.6. Incremented LT current and age.

\* Makefile.am (SUBDIRS): Add doc

2001-06-12 Werner Koch <wk@gnupg.org>

Released 0.2.2.

2001-04-05 Werner Koch <wk@gnupg.org>

\* configure.in (NEED\_GPG\_VERSION): Set to 1.0.4g

2001-04-02 Werner Koch <wk@gnupg.org>

Released 0.2.1.

Changed the copyright notices all over the place.

2001-02-28 Werner Koch <wk@gnupg.org>

Released 0.2.0.

2001-01-18 Werner Koch <wk@gnupg.org>

\* autogen.sh: Added option --build-w32.

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2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-05-11 Marcus Brinkmann <marcus@g10code.com>

\* gpgsm/Makefile.am (DISTCLEANFILES): Move to ...  
(CLEANFILES): ... here.  
(clean-local): New rule.  
\* gpg/Makefile.am (DISTCLEANFILES): Move to ...  
(CLEANFILES): ... here.

2011-05-05 Marcus Brinkmann <marcus@g10code.com>

\* gpg/Makefile.am: Unset GPG\_AGENT\_INFO when setting up local configuration.  
(clean-local): Shut down local gpg-agent.

2011-05-04 Marcus Brinkmann <marcus@g10code.com>

\* gpg/t-import.c (check\_result): Complete secret key pair counting and disable status check, as GPG 2.1 currently emits two IMPORT\_OK lines and we only look at the first.

2011-04-27 Marcus Brinkmann <marcus@g10code.com>

\* gpg/Makefile.am (DISTCLEANFILES):  
Add S.gpg-agent.  
(mkdmodirs, ./Alpha/Secret.gpg): Remove targets.

(GNUPGHOME): Export as absolute build directory (for gpg-agent).  
(./pubring.gpg): Remove --homedir option, import secdemo.asc.  
(clean-local): Rewrite.  
\* gpg/secdemo.asc: New file.  
\* gpg/pubkey-1.asc, gpg/seckey-1.asc: Change passphrase to "abc" (now needed as GnuPG 2.1 asks for secret key passphrase on import).  
\* gpg/t-keylist.c (keys): Update key info for Joe Random Hacker.  
(main): Disable check for can\_encrypt, as this is now in a different subkey.  
\* gpg/t-encrypt-sign.c (check\_result): Allow RMD160 hash algorithm.  
\* gpg/t-import.c (check\_result): One secret key pair now counts as two secret keys, allow that.

2009-11-03 Werner Koch <wk@g10code.com>

\* run-support.h (fail\_if\_err): Include program name.  
\* run-sign.c (main): Add option --uiserver.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

\* opassuan/t-command.c: Update to new interface.

2009-10-15 Werner Koch <wk@g10code.com>

\* run-verify.c:  
New.

2009-08-06 Werner Koch <wk@g10code.com>

\* run-sign.c: New.

2009-07-07 Werner Koch <wk@g10code.com>

\* run-keylist.c (main): Add options --cms and --openpgp.  
  
\* gpg/pgp-keylist.c: Rename to ...  
\* run-keylist.c: ... this.  
\* gpg/pgp-import.c: Rename to ...  
\* run-import.c: ... this.  
\* gpg/pgp-export.c: Rename to ...  
\* run-export.c: ... this.  
\* run-support.h: New. Copied from gpg/t-support.h.  
\* gpg/Makefile.am (noinst\_PROGRAMS): Remove them.  
\* Makefile.am (noinst\_PROGRAMS): Add them.  
(noinst\_HEADERS): New.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-support.h (passphrase\_cb): Implement write() according to the book to silence compiler warning.
- \* gpgsm/t-support.h (passphrase\_cb): Likewise.

2009-06-16 Werner Koch <wk@g10code.com>

- \* gpg/pgp-import.c: New.
- \* gpg/t-support.h (print\_import\_result, nonnull): Factored out from other tools.
- \* gpg/pgp-export.c, gpg/pgp-keylist.c: New.

2009-06-09 Werner Koch <wk@g10code.com>

- \* gpg/Makefile.am  
(./pubring.gpg): Ignore errors in case of already imported keys. Add --no-permission-warning and remove obsolete --allow-secret-key-import.
- \* gpg/mkdemodirs.in (GPG): Add --no-permission-warning.
- \* gpg/t-edit.c (edit\_fnc): Use gpgme\_io\_write.

2009-04-19 Moritz <moritz@gnu.org>

- \* gpg/Makefile.am (EXTRA\_DIST): Replaced mkdemodirs with mkdemodirs.in.  
(mkdemodirs): New target.  
(clean-local): Added command for removing mkdemodirs script.  
(./Alpha/Secret.gpg): Added dependency on mkdemodirs.
- \* gpg/mkdemodirs: Renamed to ...
- \* gpg/mkdemodirs.in: ... here.
- \* gpg/mkdemodirs.in (GPG): Derive value from @GPG@ instead of hard-coding "gpg".

2009-02-24 Werner Koch <wk@g10code.com>

- \* opassuan/t-command.c: Adjust for changed new op\_assuan interface.

2009-02-03 Werner Koch <wk@g10code.com>

- \* gpg/t-keylist.c (main): Check that new fields is\_cardkey and card\_number are not set.

2009-01-26 Werner Koch <wk@g10code.com>

\* opassuan/: New.  
\* opassuan/Makefile.am:  
New.  
\* opassuan/t-command.c: New.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (INCLUDES): Fix path to include file.  
\* gpg/Makefile.am (INCLUDES), gpgsm/Makefile.am (INCLUDES): Likewise.

2008-11-18 Werner Koch <wk@g10code.com>

\* gpgsm/cms-decrypt.c: New.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

\* gpgsm/Makefile.am (INCLUDES, LDADD): Replace gpgme path with src.  
\* gpg/Makefile.am (INCLUDES, LDADD, t\_thread1\_LDADD): Likewise.  
\* Makefile.am (LDADD): Likewise.

2008-10-30 Werner Koch <wk@g10code.com>

\* gpgsm/cms-keylist.c: New.

2008-06-19 Werner Koch <wk@g10code.com>

\* gpg/t-gpgconf.c (dump\_arg): Add new types. Print strings in quotes.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (DISTCLEANFILES): Add pubring.kbx~.

2008-01-10 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-gpgconf.c (main): Allow for dirmngr not to be available.

\* gpg/Makefile.am (./gpg-agent.conf): Correct pinentry path.

\* gpg/pinentry:

New file.

\* gpg/Makefile.am (DISTCLEANFILES, all-local): Add gpg-agent.conf  
(./gpg-agent.conf): New target.  
(EXTRA\_DIST): Add pinentry.

\* gpg/t-gpgconf.c (main): Exit early if compiled without gpgconf.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>



\* gpg/Makefile.am (CLEANFILES): Add pubring.kbx and dirmngr.conf.

\* Makefile.am (TESTS\_ENVIRONMENT): Use absolute path for GNUPGHOME.

\* gpg/Makefile.am (TESTS\_ENVIRONMENT): Use absolute path for GNUPGHOME.

\* gpgsm/Makefile.am (TESTS\_ENVIRONMENT): Use absolute path for GNUPGHOME.

\* gpg/Makefile.am (TESTS): Add t-gpgconf.

t-gpgconf.c: New file.

2007-11-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (show\_auditlog): Check for GPG\_ERR\_ASS\_UNKNOWN\_CMD.

2007-11-23 Werner Koch <wk@g10code.com>

\* gpgsm/t-verify.c (check\_result): Don't exit on error but set a flag.

(main): Consult flag for return value.

(show\_auditlog): New.

(main): Use it.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

\* t-engine-info.c

(check\_engine\_info): Fix debug output.

\* gpg/Makefile.am (tests\_unix): New variable.

(TESTS): Use it.

\* gpg/t-support.h (passphrase\_cb) [HAVE\_W32\_SYSTEM]: Use WriteFile instead of write.

\* gpg/t-wait.c [HAVE\_W32\_SYSTEM]: Define sleep as \_sleep.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (main): Release TEXT and SIG.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (key\_id): Change := into =.

2007-07-12 Werner Koch <wk@g10code.com>

\* gpgsm/t-support.h (init\_gpgme) [W32]: Do not init the locales as the constants are not available.

2007-02-26 Werner Koch <wk@g10code.com>

\* gpg/t-verify.c (double\_plaintext\_sig): New.

(main): Check it.

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (main): Skip unknown keys. Newer versions of GPGSM import more keys than older ones.

2005-12-06 Werner Koch <wk@g10code.com>

\* gpg/t-keylist.c (main): Changed for that secondary keys now have a fingerprint.

\*

gpg/t-keylist-sig.c (main): Ditto.

\* gpgsm/t-keylist.c (main): Ditto. The test used to be wrong.

2005-10-18 Werner Koch <wk@g10code.com>

\* gpg/pubdemo.asc, gpg/secdemo.asc: Add 2 expired subkeys to Whisky.

\* gpg/t-keylist.c: Reordered list to match new demo keyring. Add arg for number of subkeys and for extra checking function.

(main): Enhanced a few error outputs. Changed subkey counting. Call extra checking function.

(check\_whisky): New.

2005-10-07 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (main): Allow for an email address as a second uid.

\* gpg/t-sig-notation.c: Change critical notation to something GnuPG understands.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (EXTRA\_DIST): Remove gpg.conf.

(DISTCLEANFILES): Add gpg.conf.

(all-local): Add gpg.conf.

(./gpg.conf): New target.

\* gpg/gpg.conf: Remove file.

\* gpg/Makefile.am (EXTRA\_DIST): Add gpg.conf.

\* gpg/Makefile.am (TESTS): Add t-sig-notation.

\* gpg/t-sig-notation.c

(check\_result): New file.

\* gpg/t-verify.c (check\_result): Also check the length of the notation data.

\* gpg/gpg.conf: New file.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (TESTS): Add t-filename.

\* gpg/t-filename.c: New file.

2005-09-23 Werner Koch <wk@g10code.com>

\* gpg/t-support.h (init\_gpgme) [W32]: Don't use LC\_MESSAGES.

\* gpg/t-encrypt-large.c: New test.

\* gpg/Makefile.am (TESTS): Add t-encrypt-large.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (TESTS): Add t-wait.

\* gpg/t-wait.c (main): New test.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

\* gpg/mkdemodirs: Add copyright notice.

\* gpgsm/Makefile.am, gpgsm/t-support.h, gpgsm/t-decrypt.c,  
gpgsm/t-encrypt.c, gpgsm/t-export.c, gpgsm/t-genkey.c,  
gpgsm/t-import.c, gpgsm/t-keylist.c, gpgsm/t-sign.c,  
gpgsm/t-verify.c, gpg/Makefile.am, gpg/t-decrypt.c,  
gpg/t-decrypt-verify.c, gpg/t-edit.c, gpg/t-encrypt.c,  
gpg/t-encrypt-sign.c, gpg/t-encrypt-sym.c,  
gpg/t-eventloop.c,  
gpg/t-export.c, gpg/t-genkey.c, gpg/t-import.c, gpg/t-keylist.c,  
gpg/t-keylist-sig.c, gpg/t-sign.c, gpg/t-signers.c,  
gpg/t-support.h, gpg/t-thread1.c, gpg/t-trustlist.c,  
gpg/t-verify.c, Makefile.am, t-data.c, t-engine-info.c,  
t-version.c: Change license to LGPL.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (struct): Add new fields VALIDITY and  
KEY\_LENGTH.

(main): Use them.

\* gpgsm/t-import.c (check\_result): New argument total\_stat.

(main): Pass this argument. Reduce number of total considered  
keys to 1 for the second test.

2004-04-05 Werner Koch <wk@gnupg.org>

\* gpgsm/Makefile.am: Changed the faked system time to 20011213T12000.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c: Add chain IDs.

2004-03-03 Werner Koch <wk@gnupg.org>

\* gpgsm/t-export.c (main): Also check exporting 2 certificates.

2004-02-17 Werner Koch <wk@gnupg.org>

\* gpgsm/t-import.c (check\_result): gpgsm does now  
return info in  
the result->imports; adjust for that.

\* gpgsm/Makefile.am (TESTS\_ENVIRONMENT): Reset the GPG\_AGENT\_INFO.

Include config.h at the top of each C source. This is required  
due to LFS support.

\* gpg/t-keylist-sig.c (main): s/class/sig\_class/.

\* gpg/t-signers.c (check\_result): Ditto.

\* gpg/t-sign.c (check\_result): Ditto.

\* gpg/t-encrypt-sign.c (check\_result): Ditto.

\* gpgsm/t-sign.c (check\_result): Ditto.

2004-01-12 Werner Koch <wk@gnupg.org>

\* gpg/t-keylist-sig.c (main): Temporary disabled one test due top  
gpg 1.3.4 problems.

\* gpg/t-import.c (check\_result): Likewise.

2003-11-19 Werner Koch <wk@gnupg.org>

\* gpg/t-support.h (DIM): Added.

\* gpg/t-verify.c (check\_result): Rewrote test for notations  
because the order of notations is not guaranteed.

\* gpgsm/t-support.h (fail\_if\_err): Also print the numeric values.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-eventloop.c: Include <sys/types.h> for old systems.

\* gpgsm/Makefile.am  
(DISTCLEANFILES): Add random\_seed.

\* gpg/t-thread1.c (thread\_one): Do not call initialize\_gpgme.  
Likewise.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-thread1.c (main): Call init\_gpgme here.  
(initialize\_gpgme): Function removed.

\* gpg/t-thread1.c: New file.  
\* gpg/Makefile.am (TESTS): Add t-thread1.c.  
(t\_thread1\_LDADD): New variable.  
(LDADD): Remove GPG Error lib.  
\* gpgsm/Makefile.am (LDADD): Likewise.

\* gpg/t-import.c (main): Likewise.  
\* gpg/t-keylist-sig.c (main): Likewise.  
\* gpg/t-keylist.c (main): Likewise.  
\* gpg/t-sign.c (main): Likewise.  
\* gpg/t-signers.c (main): Likewise.  
\* gpg/t-trustlist.c (main): Likewise.  
\* gpgsm/t-support.h: Include <stdlib.h> and <locale.h>.  
(init\_gpgme): New function.  
\* gpg/t-support.h: Likewise.  
\* gpgsm/t-verify.c (main): Call init\_gpgme.  
\* gpgsm/t-decrypt.c (main): Likewise.  
\* gpgsm/t-encrypt.c (main): Likewise.  
\* gpgsm/t-export.c (main): Likewise.  
\* gpgsm/t-genkey.c (main): Likewise.  
\* gpgsm/t-import.c (main):  
Likewise.  
\* gpgsm/t-keylist.c (main): Likewise.  
\* gpgsm/t-sign.c (main): Likewise.  
\* gpg/t-verify.c (main): Call init\_gpgme.  
\* gpg/t-decrypt-verify.c (main): Likewise.  
\* gpg/t-decrypt.c (main): Likewise.  
\* gpg/t-edit.c (main): Likewise.  
\* gpg/t-encrypt-sign.c (main): Likewise.  
\* gpg/t-encrypt-sym.c (main): Likewise.  
\* gpg/t-encrypt.c (main): Likewise.  
\* gpg/t-eventloop.c (main): Likewise.  
\* gpg/t-export.c (main): Likewise.  
\* gpg/t-genkey.c (main): Likewise.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-sign.c (check\_result): Change output format for signature  
class to unsigned int.  
\* gpg/t-signers.c (check\_result): Likewise.

- \* gpg/t-encrypt-sign.c (check\_result): Likewise.
- \* gpgsm/t-sign.c (check\_result): Likewise.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-verify.c (check\_result): Change type of SUMMARY to unsigned int.
- \* gpg/t-decrypt-verify.c (check\_verify\_result): Likewise.
- \* gpg/t-keylist-sig.c (keys): Change type of member CLASS to unsigned int.
- \* t-data.c (read\_cb): Change type of AMOUNT to unsigned int.
- \* t-version.c (version): Remove unused variable.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (AM\_CPPFLAGS): New variable.  
(LDADD): Add @GPG\_ERROR\_LIBS@.
- \* gpg/Makefile.am (AM\_CPPFLAGS): New variable.  
(LDADD): Add @GPG\_ERROR\_LIBS@.
- \* gpgsm/Makefile.am (AM\_CPPFLAGS): New variable.  
(LDADD): Add @GPG\_ERROR\_LIBS@.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

- \* gpg/Makefile.am (noinst\_HEADERS): New variable.
- \* gpg/t-support.h: New file.
- \* gpgsm/Makefile.am (noinst\_HEADERS): New variable.
- \* gpgsm/t-support.h: New file.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-encrypt-sym.c (main): Adapt to new syntax.
- \* gpg/t-encrypt.c (main): Likewise.
- \* gpg/t-eventloop.c (main): Likewise.
- \* gpg/t-encrypt-sign.c (main): Likewise.
- \* gpgsm/t-export.c (main): Likewise.
- \* gpgsm/t-encrypt.c (main): Likewise.

2003-05-28 Marcus  
Brinkmann <marcus@g10code.de>

- \* gpg/t-eventloop.c (main): Rewrite recipient management.
- \* gpg/t-encrypt-sign.c (main): Likewise.
- \* gpg/t-encrypt.c (main): Likewise.
- \* gpg/t-export.c (main): Likewise.

- \* gpgsm/t-encrypt.c (main): Likewise.
- \* gpgsm/t-export.c (main): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/Makefile.am (TESTS): Order t-keylist and t-keylist-sig after t-import.
- \* gpg/t-edit.c (edit\_fnc): Fix primary UID for keylisting tests.
- \* gpg/t-keylist.c: Change order of user IDs.
- \* gpg/t-keylist-sig.c: Likewise.
- \* gpg/t-import.c: Add support for gpg in CVS.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

- \* t-data.c: Remove TEST\_OUT\_CB.  
(main): Likewise.
- \* gpg/t-trustlist.c (main): Access ITEM directly.
- \* (t-decrypt-verify.c, t-decrypt.c, t-edit.c, t-encrypt-sign.c, t-encrypt-sym.c, t-sign.c, t-signers.c): Include <unistd.h>.  
(passphrase\_cb): Rewritten.
- \* t-edit.c (edit\_fnc): Rewritten.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

- \*
- gpg/t-keylist-sig.c (main): Remove timestamp check.
- \* gpgsm/t-keylist.c: Add check for timestamp.
- \* gpg/Makefile.am (TESTS): Add t-keylist-sig.
- \* gpg/t-keylist-sig.c: New file.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-eventloop.c (main): Do not call print\_op\_info.  
(print\_op\_info): Function removed.
- \* gpg/t-keylist.c: Rewritten.
- \* gpgsm/t-keylist.c (main): Rewritten.
- \* gpg/t-edit.c (main): Do not use gpgme\_key\_get\_as\_xml. Use gpgme\_key\_unref instead gpgme\_key\_release.
- \* gpg/t-signers.c (main): Use gpgme\_key\_unref instead gpgme\_key\_release.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-trustlist.c: Rewritten.

- \* gpg/t-verify.c (main): Rewritten.
- \* gpg/t-decrypt-verify.c: Rewritten.
- \* gpgsm/t-verify.c (main): Rewritten.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

- \* gpgsm/t-decrypt.c (main): Rewritten.
- \* gpg/t-decrypt.c: Rewritten.
- \* gpg/t-signers.c: Rewritten.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

- \*
- gpg/t-encrypt-sign.c (check\_result): Rewritten.
- \* gpg/t-sign.c: Rewritten.
- \* gpgsm/t-sign.c: Rewritten.
- \* gpg/t-encrypt.c: Check for invalid recipients.
- \* gpgsm/t-encrypt.c: Likewise.
- \* gpg/t-import.c (check\_result): Really use FPR.
- \* gpgsm/t-import.c (check\_result): Rewritten.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-import.c: Rewritten.
- \* gpgsm/t-genkey.c: Rewritten.
- \* gpgsm/Makefile.am (noinst\_PROGRAMS): Add t-genkey.
- \* gpg/t-genkey.c: Include <stdlib.h>.
- (main): Check result->fpr before checking its length.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-genkey.c: Rewritten to match new semantics.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-decrypt.c (passphrase\_cb): Fix to new prototype.
- \* gpg/t-decrypt-verify.c (passphrase\_cb): Likewise.
- \* gpg/t-edit.c (passphrase\_cb): Likewise.
- \* gpg/t-encrypt-sign.c (passphrase\_cb): Likewise.
- \* gpg/t-encrypt-sym.c (passphrase\_cb): Likewise.
- \* gpg/t-sign.c (passphrase\_cb): Likewise.
- \*



gpg/t-signers.c (passphrase\_cb): Likewise.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

\* t-engine-info.c: Use file\_name instead path throughout.

\* Makefile.am (TESTS): Add t-engine-info.

\* t-engine-info.c: New file.

\* gpg/t-encrypt.c (main): Don't print engine info.

\* gpg/t-eventloop.c (main): Likewise.

\* gpg/t-encrypt-sign.c (main): Likewise.

\* gpgsm/t-encrypt.c (main): Likewise.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (main): Adjust caller of gpgme\_op\_verify.

\* gpg/t-verify.c (main): Likewise.

\* gpg/t-decrypt-verify.c (main): Likewise for  
gpgme\_op\_decrypt\_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (./gpgsm.conf): Add a faked system time to  
avoid certification's expiry.

\* gpgsm/t-encrypt.c (main): Use the short certification name.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-genkey.c (main): Add missing argument to gpgme\_op\_genkey  
invocation.

2002-10-09 Marcus Brinkmann

<marcus@g10code.de>

\* gpg/t-decrypt.c (print\_data): Update to new gpgme\_data\_read  
interface, and use gpgme\_engine\_check\_version instead  
gpgme\_check\_version.

\* gpg/t-decrypt-verify.c (print\_data): Likewise.

\* gpg/t-edit.c (main): Likewise.

\* gpg/t-encrypt.c (print\_data): Likewise.

\* gpg/t-encrypt-sign.c (print\_data): Likewise.

\* gpg/t-encrypt-sym.c (print\_data): Likewise.

\* gpg/t-eventloop.c (print\_data): Likewise.

\* gpg/t-export.c (print\_data): Likewise.

\* gpg/t-sign.c (print\_data): Likewise.

\* gpg/t-signers.c (print\_data): Likewise.

\* gpgsm/t-decrypt.c (print\_data): Likewise.

\* gpgsm/t-encrypt.c (print\_data): Likewise.

\* gpgsm/t-export.c (print\_data): Likewise.  
\* gpgsm/t-sign.c (print\_data): Likewise.  
\* gpg/t-verify.c (main): Likewise for gpgme\_op\_verify.  
\* gpgsm/t-verify.c (main): Likewise for gpgme\_op\_verify.  
\* t-data.c (read\_once\_test): Likewise.  
(write\_test): Update for new behaviour of data objects.  
(main): Remove type test.

2002-09-30 Werner Koch <wk@gnupg.org>

\*

gpgsm/t-keylist.c (doit): Add arg SECRET.  
(main): Add option --secret.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

\* t-version.c: Include <string.h>. Reported by Stphane Corthsy.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-keylist.c (main): Test PATTERN for NULL before printing.  
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-08-01 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-edit.c: Also add a test for the expire command (testing  
the passphrase callback).

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-edit.c: New file.  
\* gpg/Makefile (TESTS): Add t-edit.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-encrypt-sym.c (main): Change type of I to size\_t and  
rename to LEN.  
\* gpg/t-verify.c (main): Likewise. Submitted by Stphane  
Corthsy.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-eventloop.c: New file.  
\* gpg/Makefile (TESTS): Add t-eventloop.

2002-06-26 Werner Koch <wk@gnupg.org>

\*

gpgsm/t-import.c (print\_op\_info): New.  
(main): Print operation info.

2002-06-25 Werner Koch <wk@gnupg.org>

\* gpgsm/Makefile.am (DISTCLEANFILES): new.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (TESTS): Add t-export.  
gpgsm/t-export.c: New file.

2002-06-20 Werner Koch <wk@gnupg.org>

\* gpgsm/t-sign.c (main): Also test a normal signature.

\* gpg/Makefile (TESTS\_ENVIRONMENT): Set GPG\_AGENT\_INFO empty.

\* gpg/t-signers.c, gpg/t-sign.c, gpg/t-encrypt-sym.c

\* gpg/t-encrypt-sign.c, gpg/t-decrypt.c

\* gpg/t-decrypt-verify.c (main): Changed the GPG\_AGENT\_INFO check to  
match the one in ../../gpgme/rungpg.c.

2002-06-12 Werner Koch <wk@gnupg.org>

\* gpgsm/t-keylist.c (doit): Print operation info if available.

2002-06-10 Werner Koch <wk@gnupg.org>

\* gpgsm/t-verify.c (print\_sig\_stat): Print the error token.

2002-06-04 Werner Koch <wk@gnupg.org>

\* gpgsm/t-encrypt.c (main): Add a simple option parser and allow  
to specify an encryption  
key.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (all-local): Remove dependency on ./secring.gpg.

(./secring.gpg): Remove target, and move all rules for this target  
to ...

(./pubring.gpg): ... here. This was necessary because GnuPG 1.0.7  
does create an empty secring.gpg file when importing public keys.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (validity\_string): New.

(print\_sig\_stat): Print expire time and validity.

(status\_string): Add new expired stati.

2002-05-03 Werner Koch <wk@gnupg.org>

\* gpg/t-verify.c (validity\_string): New.

(print\_sig\_stat): Print expire time and validity.

(status\_string): Add new expired stati.

2002-04-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (./trustlist.txt): Put more into this file to prevent use of gpg-agent.

(./gpg-agent.conf): Remove target.

(all-local): Remove ./gpg-agent.conf.

2002-04-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c

(main): Use gpgme\_engine\_check\_version instead gpgme\_check\_engine.

\* gpgsm/t-encrypt.c (main): Likewise.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-encrypt-sym.c: New file.

\* gpg/Makefile.am (TESTS): Add t-encrypt-sym.

2002-03-05 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (CLEANFILES): Remove random\_seed, which is now in DISTCLEANFILES.

2002-03-04 Werner Koch <wk@gnupg.org>

\* gpg/Makefile.am (DISTCLEANFILES): Added.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-verify.c (main): Add a few more sanity checks, and a check for normal signatures.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-encrypt-sign.c: New file.

\* gpg/Makefile.am (TESTS): Add t-encrypt-sign.

2002-02-13 Werner Koch <wk@gnupg.org>

\* gpgsm/Makefile.am (private-keys-v1.d): Don't fail when the directory already exists.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (CLEANFILES): New target.  
(distclean-local): Rename to  
...  
(clean-local): ... this.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (./private-keys-v1.d/\$(key\_id).key): Fix rule.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-genkey.c: New file (not added to Makefile.am because of gpg-agent bug).

2002-02-08 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (key\_id): Update value.  
(all-local): Add .key to keyid filename.  
(./private-keys-v1.d/\$(key\_id)): Renamed to ...  
(./private-keys-v1.d/\$(key\_id).key): ... this.  
(all-local): Add ./gpgsm.conf, ./trustlist.txt.  
(./gpgsm.conf, ./trustlist.txt): New target.  
\* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Renamed to ...  
\* gpgsm/32100C27173EF6E9C4E9A25D3D69F86D37A4F939: ... this.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-import.c (print\_op\_info): New function.  
(main): Use it.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-signers.c (passphrase\_cb): Change type of r\_hd to void\*\*.  
\* gpg/t-sign.c (passphrase\_cb):  
Likewise.  
\* gpg/t-decrypt-verify.c (passphrase\_cb): Likewise.  
\* gpg/t-decrypt.c (passphrase\_cb): Likewise.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-decrypt-verify.c: Don't include `mcheck.h'. Reported by Stphane Corthsy.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (EXTRA\_DIST): Add missing line continuation.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (EXTRA\_DIST): Add \$(key\_id).

2001-12-16 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile: Rename `pubcerts.kbx' to `pubring.kbx'.

2001-12-15 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (check\_two\_contexts): Set protocols.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-sign.c: New file.

\* gpgsm/Makefile.am (TESTS): Add t-sign.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-decrypt.c: New file.

\* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Likewise.

\* gpgsm/Makefile.am (TESTS): Add

t-decrypt.

(key\_id): New variable.

(all-local): New target ./private-keys-v1.d/\$(key\_id) added.

(./private-keys-v1.d/\$(key\_id)): New target.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c: New file.

\* gpgsm/Makefile.am (TESTS): Add t-verify.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (GPG): Set to @GPG\_PATH@.

(./pubring.gpg): Use \$(GPG) instead gpg.

(./secring.gpg): Likewise.

\* gpgsm/t-import.c (main): Remove third test case.

\* gpgsm/Makefile.am (GPGSM): Set to @GPGSM@.

(all-local): New target.

(./pubcerts.kbx): Likewise.

\* gpgsm/t-encrypt.c: New file.

\* gpgsm/Makefile.am (TESTS): Add t-encrypt.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpgsm/t-keylist.c: New file.
- \* gpgsm/Makefile.am (TESTS): Add t-keylist.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

- \* gpgsm/cert\_dfn\_pca01.der: New file.
- \* gpgsm/cert\_dfn\_pca15.der: Likewise.
- \* gpgsm/cert\_g10code\_test1.der: Likewise.
- \* gpgsm/t-import.c: Likewise.
- \*
- gpgsm/Makefile.am (EXTRADIST): Add new files.
- (TESTS): Add t-import.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/: New directory.
- \* Makefile.am, t-verify.c, t-encrypt.c, t-signers.c, t-trustlist.c, t-sign.c, t-keylist.c, t-import.c, t-genkey.c, t-export.c, t-decrypt-verify.c, t-decrypt.c, t-version.c, t-data.c, mkdemodirs. cipher-1.asc, cipher-2.asc, geheim.txt, pubdemo.asc, pubkey-1.asc, secdemo.asc, seckey-1.asc): Move to sub directory gpg/.
- \* gpg/Makefile.am (INCLUDES): Include gpgme/, not include/ and intl/.
- (LDD): Correct relative path to gpgme library.
- (TESTS): Remove t-version and t-data.
- \* gpg/t-verify.c, gpg/t-encrypt.c, gpg/t-signers.c, gpg/t-trustlist.c, gpg/t-sign.c, gpg/t-keylist.c, gpg/t-import.c, gpg/t-genkey.c, gpg/t-export.c, gpg/t-decrypt-verify.c, gpg/t-decrypt.c, t-version.c, t-data.c): Include gpgme.h, not "../gpgme/gpgme.h".
- \* Makefile.am: New file.
- \* gpgsm/: New directory.
- \* gpgsm/Makefile.am: New file.

2001-11-16 Marcus  
Brinkmann <marcus@g10code.de>

- \* Makefile.am (TESTS): Add t-decrypt-verify.
- \* t-decrypt-verify.c: New file.
- \* cipher-2.asc: Likewise.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

- \* t-data.c: Include stddef.h.

(read\_once\_test): Change type of READ to size\_t.

(read\_test): Likewise.

(write\_test): Likewise.

2001-10-29 Marcus Brinkmann <marcus@g10code.de>

\* t-signers.c: New file.

\* Makefile.am (TESTS): Add t-signers.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (TEST\_ENVIRONMENT): Revert last change.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (TEST\_ENVIRONMENT): Set environment to \$(srcdir), not current directory.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* t-data.c (write\_test): New function.

(main): Invoke write\_test for all rounds except TEST\_OUT\_CB.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (INCLUDES): Remove spurious duplicate to silence automake.

2001-10-16 Marcus Brinkmann <marcus@g10code.de>

\*

t-version.c: New file.

\* t-data.c: Likewise.

\* t-data-1.txt: Likewise.

\* t-data-2.txt: Likewise.

\* Makefile.am (TESTS): Add t-version, t-data.

2001-09-17 Werner Koch <wk@gnupg.org>

\* t-keylist.c (check\_two\_contexts): New.

2001-09-03 Werner Koch <wk@gnupg.org>

\* t-encrypt.c (print\_op\_info): New and use it after each operation.

2001-08-28 Werner Koch <wk@gnupg.org>

\* t-sign.c (print\_op\_info): New and use it after each operation.



2001-03-15 Werner Koch <wk@gnupg.org>

\* t-keylist.c (doit): List subkeys too, show caps.

2001-02-13 Werner Koch <wk@gnupg.org>

\* t-verify.c (print\_sig\_stat): Repaled ulong by unsigned long because we don't use the config stuff here.

2001-02-12 Werner Koch <wk@gnupg.org>

\* tests/t-verify.c (print\_sig\_stat): Print info about the keys.

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```
{
 "type": "ciphertext",
 "base64": true
}
(11:private-key(3:dsa(1:p129:eC_L&$2,6tx.gh1VirIqI9
,^g3.$DveUvX1'oIj)(1:q21: #UfK2z(tuVG)(1:g128:zu^Rab;qeQQA B?/6/aspfE/
gx!Mr0YY*oMrJc2xWG:.r6)(1:y128:Uf]j^@oEn4j#QrRq" RcEa E/}4C[3A
5+~~.#!+
)W&5d)j)(1:x21:`)))
{
 "success": true
}
libgpgme.vers - List of symbols to export.
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#
This file is part of GPGME.
#
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it under the terms of the GNU Lesser general Public License as
published by the Free Software Foundation; either version 2.1 of
the License, or (at your option) any later version.
#
```

```
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License along with this program; if not, see <https://www.gnu.org/licenses/>.
```

```
#-----
Please remember to add new functions also to gpgme.def
#-----
```

```
GPGME_1.1 {
 global:
 gpgme_set_engine_info;

 gpgme_ctx_get_engine_info;
 gpgme_ctx_set_engine_info;

 gpgme_data_set_file_name;
 gpgme_data_get_file_name;
 gpgme_data_identify;

 gpgme_sig_notation_clear;
 gpgme_sig_notation_add;
 gpgme_sig_notation_get;

 gpgme_free;

 gpgme_op_getauditlog_start;
 gpgme_op_getauditlog;

 gpgme_conf_release;
 gpgme_conf_arg_new;
 gpgme_conf_arg_release;
 gpgme_conf_opt_change;
 gpgme_op_conf_load;
 gpgme_op_conf_save;
 gpgme_op_conf_dir;

 gpgme_cancel_async;

 gpgme_op_assuan_result;
 gpgme_op_assuan_transact;
 gpgme_op_assuan_transact_start;

 gpgme_check_version_internal;
```

gpgme\_io\_read;  
gpgme\_io\_write;

gpgme\_result\_ref;  
gpgme\_result\_unref;

gpgme\_op\_import\_keys;  
gpgme\_op\_import\_keys\_start;  
gpgme\_op\_export\_keys;  
gpgme\_op\_export\_keys\_start;

gpgme\_op\_assuan\_transact\_ext;

gpgme\_wait\_ext;

gpgme\_op\_vfs\_mount\_result;  
gpgme\_op\_vfs\_mount;  
gpgme\_op\_vfs\_create;

gpgme\_key\_from\_uid;  
gpgme\_set\_sub\_protocol;  
gpgme\_get\_sub\_protocol;

gpgme\_op\_passwd\_start;  
gpgme\_op\_passwd;

gpgme\_set\_global\_flag;

gpgme\_io\_writen;

gpgme\_set\_pinentry\_mode;  
gpgme\_get\_pinentry\_mode;

gpgme\_get\_dirinfo;

gpgme\_op\_spawn\_start;  
gpgme\_op\_spawn;

gpgme\_set\_offline;  
gpgme\_get\_offline;

gpgme\_set\_status\_cb;  
gpgme\_get\_status\_cb;

gpgme\_pubkey\_algo\_string;  
gpgme\_set\_ctx\_flag;  
gpgme\_get\_ctx\_flag;  
gpgme\_data\_set\_flag;



gpgme\_data\_get\_encoding;  
gpgme\_data\_new;  
gpgme\_data\_new\_from\_cbs;  
gpgme\_data\_new\_from\_fd;  
gpgme\_data\_new\_from\_file;  
gpgme\_data\_new\_from\_filepart;  
gpgme\_data\_new\_from\_mem;  
gpgme\_data\_new\_from\_stream;  
gpgme\_data\_read;  
gpgme\_data\_release;  
gpgme\_data\_release\_and\_get\_mem;  
gpgme\_data\_seek;  
gpgme\_data\_set\_encoding;  
gpgme\_data\_write;

gpgme\_get\_protocol\_name;  
gpgme\_hash\_algo\_name;  
gpgme\_pubkey\_algo\_name;

gpgme\_new;  
gpgme\_get\_armor;  
gpgme\_get\_include\_certs;  
gpgme\_get\_io\_cbs;  
gpgme\_get\_keylist\_mode;  
gpgme\_get\_passphrase\_cb;  
gpgme\_get\_progress\_cb;  
gpgme\_get\_protocol;  
gpgme\_get\_textmode;  
gpgme\_release;  
gpgme\_set\_armor;  
gpgme\_set\_include\_certs;  
gpgme\_set\_io\_cbs;  
gpgme\_set\_keylist\_mode;  
gpgme\_set\_locale;  
gpgme\_set\_passphrase\_cb;  
gpgme\_set\_progress\_cb;  
gpgme\_set\_protocol;  
gpgme\_set\_textmode;  
gpgme\_signers\_add;  
gpgme\_signers\_clear;  
gpgme\_signers\_count;  
gpgme\_signers\_enum;

gpgme\_key\_ref;  
gpgme\_key\_unref;  
gpgme\_key\_release;

gpgme\_trust\_item\_ref;  
gpgme\_trust\_item\_unref;

gpgme\_cancel;  
gpgme\_op\_card\_edit;  
gpgme\_op\_card\_edit\_start;  
gpgme\_op\_decrypt;  
gpgme\_op\_decrypt\_result;  
gpgme\_op\_decrypt\_start;  
gpgme\_op\_decrypt\_verify;  
gpgme\_op\_decrypt\_verify\_start;  
gpgme\_op\_delete;  
gpgme\_op\_delete\_start;  
gpgme\_op\_delete\_ext;  
gpgme\_op\_delete\_ext\_start;  
gpgme\_op\_edit;  
gpgme\_op\_edit\_start;  
gpgme\_op\_encrypt;  
gpgme\_op\_encrypt\_start;  
gpgme\_op\_encrypt\_ext;  
gpgme\_op\_encrypt\_ext\_start;  
gpgme\_op\_encrypt\_sign;  
gpgme\_op\_encrypt\_sign\_ext;  
gpgme\_op\_encrypt\_sign\_start;  
gpgme\_op\_encrypt\_sign\_ext\_start;  
gpgme\_op\_encrypt\_result;

gpgme\_op\_export;  
gpgme\_op\_export\_ext;  
gpgme\_op\_export\_ext\_start;  
gpgme\_op\_export\_start;  
gpgme\_op\_genkey;  
gpgme\_op\_genkey\_result;  
gpgme\_op\_genkey\_start;  
gpgme\_get\_key;  
gpgme\_op\_import;  
gpgme\_op\_import\_result;  
gpgme\_op\_import\_start;  
gpgme\_op\_keylist\_end;  
gpgme\_op\_keylist\_ext\_start;  
gpgme\_op\_keylist\_from\_data\_start;  
gpgme\_op\_keylist\_next;  
gpgme\_op\_keylist\_result;  
gpgme\_op\_keylist\_start;  
gpgme\_op\_sign;  
gpgme\_op\_sign\_result;  
gpgme\_op\_sign\_start;  
gpgme\_op\_trustlist\_end;

```
gpgme_op_trustlist_next;
gpgme_op_trustlist_start;
gpgme_op_verify;
gpgme_op_verify_result;
gpgme_op_verify_start;
gpgme_wait;
```

```
gpgme_data_new_with_read_cb;
gpgme_data_rewind;
gpgme_get_sig_status;
gpgme_get_sig_string_attr;
gpgme_get_sig_ulong_attr;
gpgme_get_sig_key;
gpgme_key_get_string_attr;
gpgme_key_get_ulong_attr;
gpgme_key_sig_get_string_attr;
gpgme_key_sig_get_ulong_attr;
gpgme_op_import_ext;
gpgme_trust_item_get_int_attr;
gpgme_trust_item_get_string_attr;
gpgme_trust_item_release;
```

```
gpgme_err_code_from_syserror;
gpgme_err_set_errno;
```

```
gpgme_op_setexpire;
gpgme_op_setexpire_start;
```

```
gpgme_op_revsig;
gpgme_op_revsig_start;
```

```
local:
```

```
 *;
```

```
};
```

```
-*- mode: org -*-
```

```
#+TITLE: What's New in the GPGME Python Bindings and Documentation
```

```
#+AUTHOR: Ben McGinnes
```

```
#+LATEX_COMPILER: xelatex
```

```
#+LATEX_CLASS: article
```

```
#+LATEX_CLASS_OPTIONS: [12pt]
```

```
#+LATEX_HEADER: \usepackage{xltextra}
```

```
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
```

```
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
```

```
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

```
* What's New
```

:PROPERTIES:  
:CUSTOM\_ID: new-stuff  
:END:

Version:	0.0.1
GPGME Version:	1.13.0
Author:	Ben McGinnes <ben@gnupg.org>
Author GPG Key:	DB4724E6FA4286C92B4E55C4321E4E2373590E5D
Language:	Australian English, British English
xml:lang:	en-AU, en-GB, en

Last time the most obviously new thing was adding the /What's New/  
section to the HOWTO. Now it's moving it out of the HOWTO.

\*\* New in GPGME 1130

:PROPERTIES:  
:CUSTOM\_ID: new-stuff-1-13-0  
:END:

Additions since GPGME 1.12.0 include:

- Moving the /What's New/ section out of the basic [\[\[file:gpgme-python-howto.org\]\]](http://file.gpgme-python-howto.org) document and into its own file so as to more readily include other documents beyond that HOWTO.
- Moving the preceding, archival, segments into [\[\[file:what-was-new.org\]\]](http://file.what-was-new.org) another file].
- Added `=gpg.version.versionintlist=` to make it easier for Python developers to check for a specific version number, even with beta versions (it will drop the "-betaN" part).
- Added expanded detail on issues pertaining to installing for Windows users.
- Bindings enter [\[\[file:maintenance-mode\]\]](http://file:maintenance-mode) maintenance mode]] from January, 2019.
- Added documentation on maintenance mode and what changes can be made to the code when in that status. Essentially that boils down to bug fixes only and no feature requests.
- The `import-keys-hkp.py` example script, which uses the `=hkp4py=` module to search the SKS servers for a key, has been tightened up to search for both hexadecimal key IDs and user ID strings with reduced chance of unnecessary repetition. There may still be some repetition if a key includes a user ID matching the hexadecimal value of a key ID.

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[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

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a)

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with any other library

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It is safest to attach them to the start of each source file

to most

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<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

That's all there is to it!

d97206d060321451439b7c122cd4e699

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{
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 "more": true,
 "response": "*"
}
{
 "op": "config_opt",
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 "option": "default-key"
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}
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 "dec_info": {
 "wrong_key_usage": false,
 "is_de_vs": false,
 "is_mime": false,
 "legacy_cipher_nomdc": false,
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 "status_code": 0
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"type": "plaintext",
"base64": false,
"data": "Hello\n"
}
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ft(1)
Fn('Helvetica-Bold')
Fs(18)
dstyle('Text')
fp((0,1,0.498))
ft(1)
lp((0,0,0))
lw(0.283465)
lc(1)
lj(0)
ld()
la1()
la2()
dstyle('Application Box')
layer('Layer 1',1,1,0,0,(0,0,0))
lw(1)
r(0,0,0,0,688.145,44.1554)
lw(1)
r(0,0,0,0,682.363,85.0359)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(605.383,329.758,0)
bs(605.383,230.546,0)
lw(1)
r(0,0,0,0,807.414,53.6148)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(480.134,240.945,0)
bs(480.358,325.277,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))

```

b()  
bs(474.803,432.284,0)  
bs(475.334,360.243,0)  
lw(3.25)  
ld((1, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(354.331,432.284,0)  
bs(352.806,361.417,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(212.598,432.284,0)  
bs(212.598,361.417,0)  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5968,0,0,-56.6929,191.608,488.976,0.0603744,0.151107)  
lw(1)  
r(0,0,0,0,88.5492,390.805)  
lp((0.392,0.584,0.929))  
lw(4.25197)  
b()  
bs(226.772,524.409,0)  
bs(226.772,488.976,0)  
lp((0.392,0.584,0.929))  
lw(4.25)  
b()  
bs(403.937,528.718,0)  
bs(403.937,488.976,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1,  
1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(240.945,432.284,0)  
bs(240.574,394.994,0)  
bs(595.276,396.85,0)  
bs(595.276,361.417,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(333.071,432.284,0)  
bs(333.07,425.196,0)

bs(333.07,382.677,0)  
bs(240.945,382.677,0)  
bs(240.945,361.417,0)  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.347,318.897,354.331,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica-Bold')  
Fs(10)  
txt('GPG',(1,0,0,0.905764,344.004,335.686))  
G\_  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.3464,446.763,354.33,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('GpgConf',(0.552654,0,0,0.500564,481.802,340.184),1,1)  
G\_  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.347,191.338,354.331,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('GpgSM',(0.552654,0,0,0.500574,226.376,340.185),1,1)  
G\_  
lp((0.392,0.584,0.929))  
lw(4.25)  
b()  
bs(347.244,325.984,0)  
bs(347.244,325.984,0)  
bs(347.244,255.118,0)  
bs(304.724,255.118,0)  
bs(304.724,226.771,0)  
lp((0.392,0.584,0.929))  
lw(4.25)

b()  
bs(233.858,325.984,0)  
bs(233.858,255.118,0)  
bs(276.378,255.118,0)  
bs(276.378,226.771,0)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Palatino-Roman')  
txt('2008-07-17',(0.608301,0,0,0.608301,708.661,65.8308))  
lw(1)  
r(0,0,0,0,750.427,153.265)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1,  
1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(219.685,325.984,0)  
bs(219.685,198.425,0)  
bs(219.685,162.992,0)  
G()  
fp((1,1,1))  
lw(0.283465)  
r(113.386,0,0,-42.5196,35.4333,162.992,0.0670228,0.151107)  
fp((0,0,0))  
lw(0.283465)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('LDAP  
Server',(0.552654,0,0,0.552654,92.1261,148.819),1,1)  
fp((0,0,0))  
lw(0.283465)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('(CRLs, Certificates)',(0.552654,0,0,0.552654,92.1261,134.646),1,1)  
G\_  
G()  
fp((1,1,1))  
lw(0.283465)  
r(113.386,0,0,-42.5196,35.4331,99.2125,0.0670228,0.151107)  
fp((0,0,0))



lw(0.283465)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('HTTP Server',(0.552654,0,0,0.552654,92.1259,85.0394),1,1)  
fp((0,0,0))  
lw(0.283465)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('(CRLs)',(0.552654,0,0,0.552654,92.1259,70.8662),1,1)  
G\_  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.866,0,0,-31.2962,191.338,158.855,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('DirMgr',(0.552654,0,0,0.552654,224.02,142.978),1,1)  
G\_  
lw(2)  
ld((1, 1))  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
b()  
bs(219.15,126.18,0)  
bs(219.685,77.9528,0)  
bs(155.906,77.9528,0)  
lp((0.392,0.584,0.929))  
lw(3)  
b()  
bs(233.858,127.559,0)  
bs(233.858,99.2125,0)  
bs(276.378,99.2125,0)  
bs(276.378,85.0393,0)  
lp((0.392,0.584,0.929))  
lw(3)  
b()  
bs(248.031,127.559,0)  
bs(248.031,113.386,0)  
bs(375.59,113.386,0)

bs(375.59,85.0393,0)  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(99.2124,0,0,-28.3464,333.07,85.0393,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Certificate  
Cache',(0.552654,0,0,0.552654,382.606,69.8548),1,1)  
fp((1,0.647,0.31))  
lw(0.283465)  
r(70.5589,0,0,-28.3464,248.031,85.0393,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('CRL Cache',(0.552654,0,0,0.552654,284.147,70.6936),1,1)  
G\_  
lw(1)  
la2((( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
b()  
bs(503.149,240.945,0)  
bs(503.149,283.464,0)  
bs(588.189,283.465,0)  
bs(588.189,325.984,0)  
lw(1)  
la2((( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
b()  
bs(503.149,283.464,0)  
bs(503.149,283.464,0)  
bs(361.417,283.464,0)  
bs(361.417,325.984,0)  
lw(1)  
la2((( (-4.0,  
3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
b()  
bs(361.417,283.464,0)  
bs(205.512,283.465,0)  
bs(205.512,325.984,0)  
lw(1)

la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))  
b()  
bs(574.015,85.0393,0)  
bs(574.015,141.732,0)  
bs(262.204,141.732,0)  
lw(1)  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))  
b()  
bs(602.361,85.0393,0)  
bs(602.361,170.079,0)  
bs(439.37,170.079,0)  
bs(439.37,311.811,0)  
bs(460.629,311.811,0)  
bs(460.629,325.984,0)  
lw(1)  
ld((5, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))  
b()  
bs(389.763,240.945,0)  
bs(389.763,269.291,0)  
bs(290.551,269.291,0)  
bs(290.551,340.157,0)  
bs(262.204,340.157,0)  
lw(1)  
ld((5, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))  
b()  
bs(389.763,269.291,0)  
bs(559.843,269.291,0)  
bs(559.843,333.071,0)  
bs(574.016,333.071,0)  
lw(1)  
ld((5, 1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))  
b()  
bs(488.976,85.0393,0)  
bs(488.976,127.559,0)  
bs(389.763,127.559,0)  
bs(389.763,212.598,0)  
lw(2)  
ld((1,  
1))  
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))  
b()  
bs(205.512,127.559,0)  
bs(205.512,113.386,0)  
bs(170.079,113.386,0)  
bs(170.079,141.732,0)

bs(155.906,141.732,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1, 1))  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()  
bs(622.961,356.76,0)  
bs(622.961,518.503,0)  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.3459,573.199,354.33,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('GpgAgent',(0.552654,0,0,0.500554,608.238,340.185),1,1)  
G\_  
lp((0.392,0.584,0.929))  
lw(4.25)  
b()  
bs(721.712,467.717,0)  
bs(721.712,297.838,0)  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(70.5589,0,0,-28.3464,686.278,297.637,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('SCdaemon',(0.552654,0,0,0.500564,721.316,283.492),1,1)  
G\_  
fp((1,0.647,0.31))  
lw(0.283465)  
lj(1)  
r(86.162,0,0,-117.493,679.192,566.929,0.181818,0.333333)  
G()  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Smartcard',(0.552654,0,0,0.552654,698.127,491.036))

```
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-31.2962,686.279,557.593,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Card
Reader',(0.552654,0,0,0.552654,721.318,541.975),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(73.6353,0,0,-41.2944,587.066,565.703,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('PIN Entry',(0.57675,0,0,0.729211,623.632,545.097),1,1)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(643.758,340.157,0)
bs(643.758,340.157,0)
bs(707.539,340.158,0)
bs(707.539,304.724,0)
lw(1)
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.016,283.465,0)
bs(587.066,283.464,0)
bs(686.278,283.464,0)
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(98.9053,325.985,0)
bs(98.9053,240.945,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
```

r(70.5589,0,0,-28.3464,63.7795,354.331,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('WatchGnuPG',(0.552654,0,0,0.552654,98.8185,338.713),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(70.5589,0,0,-28.1194,63.7795,240.718,0.0670228,0.168178)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
txt('Log  
Socket',(0.552654,0,0,0.552654,98.8175,225.1),1,1)  
G\_()  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(85.0392,0,0,-28.3464,446.457,240.945,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Config Files',(0.552654,0,0,0.552654,485.621,226.772),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(85.0392,0,0,-28.3464,545.669,85.0394,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')

Fs(18)  
txt('Config Files',(0.552654,0,0,0.552654,584.834,70.8662),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(84.6546,0,0,-27.3609,347.245,239.959,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Help  
Files',(0.552654,0,0,0.552654,388.252,224.705),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(84.6546,0,0,-27.3609,446.457,85.0394,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Help Files',(0.552654,0,0,0.552654,487.464,69.7854),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))  
lw(0.283465)  
r(85.0392,0,0,-28.3464,248.032,240.945,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Keybox Files',(0.552654,0,0,0.552654,289.59,226.322),1,1)  
G\_()  
G()  
fp((1,0.647,0.31))

lw(0.283465)  
r(70.866,0,0,-28.3464,574.016,240.945,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Private Keys',(0.552654,0,0,0.552654,609.449,226.772),1,1)  
G\_()  
G()  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(24)  
txt('Scute',(0.552654,0,0,0.599958,224.978,465.775),1,1)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Times-Roman')  
Fs(10)  
txt('(pkcs#11)',(1,0,0,1.08559,206.081,445.011))  
G\_()  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(198.827,0,0,-56.6929,304.322,488.976,0.0603744,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(36)  
txt('GPGME  
Library',(0.552654,0,0,0.552654,404.952,457.853),1,1)  
G\_()  
G()  
lw(1)  
style('Application Box')  
r(197.598,0,0,-42.5187,304.724,566.928,0.0152672,0.0677968)



```

fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('GPGME aware Application',(0.98062,0,0,0.937018,334.892,540.985))
G_()
G()
lw(1)
style('Application Box')
r(127.829,0,0,-41.7496,162.992,566.159,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('Legacy Application',(174.688,540.01))
G_()
G()
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(749.296,162.296,0)
bs(705.89,162.296,0)
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0,
-3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,100.083,0)
bs(744.472,100.083,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,131.189,0)
bs(744.472,131.189,0)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('execute/access',(0.31891,0,0,0.280771,726.951,87.3768),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')

```

```

Fs(14)
style('Text')
txt('closely linked',(0.31891,0,0,0.280771,724.715,149.589),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Assuan protocol',(0.31891,0,0,0.280771,728.535,118.483),1,1)
G_()
lw(1)
r(56.6929,0,0,-92.126,701.575,170.079)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(248.031,325.984,0)
bs(248.031,297.638,0)
bs(538.583,297.638,0)
bs(538.583,340.157,0)
bs(566.929,340.157,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(375.591,325.984,0)
bs(375.591,304.724,0)
bs(531.496,304.724,0)
bs(531.496,347.244,0)
bs(566.929,347.244,0)
guidelayer('Guide
Lines',1,0,0,1,(0,0,1))
grid((0,0,7.08661,7.08661),1,(0,0,1),'Grid')
00~0
*H
0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10
011203093638Z
021203093638Z0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 100

```

\*H

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Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10U00

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# -\* - mode: org -\* -

#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)

#+AUTHOR: Ben McGinnes

#+LATEX\_COMPILER: xelatex

#+LATEX\_CLASS: article

#+LATEX\_CLASS\_OPTIONS: [12pt]

#+LATEX\_HEADER: \usepackage{xltextra}

#+LATEX\_HEADER: \usepackage[margin=1in]{geometry}

#+LATEX\_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

#+LATEX\_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

\* Introduction

:PROPERTIES:

:CUSTOM\_ID: intro

:END:

Version:	0.1.5
GPGME Version:	1.13.0
Author:	Ben McGinnes <ben@gnupg.org>
Author GPG Key:	DB4724E6FA4286C92B4E55C4321E4E2373590E5D
Language:	Australian English, British English
Language codes:	en-AU, en-GB, en

This document provides basic instruction in how to use the GPGME Python bindings to programmatically leverage the GPGME library.

\*\* Python 2 versus Python

3

:PROPERTIES:

:CUSTOM\_ID: py2-vs-py3

:END:

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

#### \*\* Examples

```
:PROPERTIES:
:CUSTOM_ID: howto-python3-examples
:END:
```

All of the examples found in this document can be found as Python 3 scripts in the `=lang/python/examples/howto=` directory.

#### \*\* Unofficial Drafts

```
:PROPERTIES:
:CUSTOM_ID: unofficial-drafts
:END:
```

In addition to shipping with each release of GPGME, there is a section on locations to read or download [\[#draft-editions\]\[draft editions\]](#) of this document from at the end of it. These are unofficial versions produced in between major releases.

#### \*\* What's New

```
:PROPERTIES:
:CUSTOM_ID: new-stuff
:END:
```

Full details of what is new are now available in the [\[\[file:what-is-new.org\]\[What's New\]\]](http://file.what-is-new.org) file and archives of the preceding `/What's New/` sections are available in the [\[\[file:what-was-new\]\[What Was New\]\]](http://file.what-was-new) file.

\*\*\* New in GPGME 1130

```
:PROPERTIES:
:CUSTOM_ID:
new-stuff-1-13-0
:END:
```

See the [\[\[file:what-is-new#new-stuff-1-13-0\]\[What's New\]\]](#) document for what is new in version 1.13.0.

```
*** New in GPGME 1120
:PROPERTIES:
:CUSTOM_ID: new-stuff-1-12-0
:END:
```

See the [\[\[file:what-was-new#new-stuff-1-12-0\]\[What Was New\]\]](#) document for what was new in version 1.12.0.

```
* GPGME Concepts
:PROPERTIES:
:CUSTOM_ID: gpgme-concepts
:END:
```

```
** A C API
:PROPERTIES:
:CUSTOM_ID: gpgme-c-api
:END:
```

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `=gpgme.h=` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some

means of providing an interface to those languages. This is where the need for bindings in various languages stems.

```
** Python bindings
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings
:END:
```

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides

a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of `=gpgme.h=` generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of `=gpgme.h=`.

```
** Difference between the Python bindings and other GnuPG Python packages
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings-diffs
:END:
```

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

```
*** The python-gnupg package maintained
by Vinay Sajip
:PROPERTIES:
:CUSTOM_ID: diffs-python-gnupg
:END:
```

This is arguably the most popular means of integrating GPG with Python. The package utilises the `=subprocess=` module to implement wrappers for the `=gpg=` and `=gpg2=` executables normally invoked on the command line (`=gpg.exe=` and `=gpg2.exe=` on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the `=subprocess=` calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The `python-gnupg` package is available under the MIT license.

```
*** The gnupg package created
and maintained by Isis Lovecruft
:PROPERTIES:
```

```
:CUSTOM_ID: diffs-isis-gnupg
:END:
```

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the python-gnupg package as just gnupg. This new package also relied on subprocess to call the =gpg= or =gpg2= binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original python-gnupg and since its functions were called in a different manner to python-gnupg, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License version 3.0 (or any later version).

```
*** The PyME package maintained by Martin Albrecht
:PROPERTIES:
:CUSTOM_ID: diffs-pyme
:END:
```

This package is the origin of these bindings, though they are somewhat different now.

For details of when and how the PyME package was folded back into GPGME itself see the [\[\[file:short-history.org\]\]](http://file:short-history.org) [Short History] document.[fn:1]

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the =python-gnupg= or =gnupg= packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

```
* GPGME Python bindings installation
:PROPERTIES:
```

```
:CUSTOM_ID: gpgme-python-install
```

```
:END:
```

```
** No PyPI
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: do-not-use-pypi
```

```
:END:
```

Most

third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against `gpgme.h` and `gpgme.h` is generated from `gpgme.h.in` at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding [CFFI and SWIG](#) at the end of this section for further details.

```
** Requirements
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: gpgme-python-requirements
```

```
:END:
```

The GPGME Python bindings only have three requirements:

1. A suitable version of Python 2 or Python 3. With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.
2. <https://www.swig.org> [SWIG].
3. GPGME itself. Which also means that all of GPGME's dependencies must be installed too.

```
*** Recommended Additions
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: gpgme-python-recommendations
```

```
:END:
```



Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

1. If possible, use Python 3 instead of 2.
2. Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.
3. If possible add the following Python modules which are not part of the standard library: [\[\[http://docs.python-requests.org/en/latest/index.html\]\]](http://docs.python-requests.org/en/latest/index.html)[\[\[Requests\]\]](#), [\[\[https://cython.org/\]\]](https://cython.org/)[\[\[Cython\]\]](#), [\[\[https://pendulum.eustace.io/\]\]](https://pendulum.eustace.io/)[\[\[Pendulum\]\]](#) and [\[\[https://github.com/Selfnet/hkp4py\]\]](https://github.com/Selfnet/hkp4py)[\[\[hkp4py\]\]](#).

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

#### \*\* Installation

```
:PROPERTIES:
:CUSTOM_ID: installation
:END:
```

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your `=PATH=`.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in `=PATH=`. It specifically checks for the `=python=` and `=python3=` executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: `=python=`, `=python2=` and `=python2.7=`.

For Python 3 it checks for these executables in this order: `=python3=`, `=python3.7=`, `=python3.6=`, `=python3.5=` and `=python3.4=`.[\[fn:2\]](#)

On systems where `=python=` is actually `=python3=` and not `=python2=` it may be possible that `=python2=` may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred Python versions has been changed to move Python 3.7 ahead of Python 3.6.

### \*\*\* Installing GPGME

```
:PROPERTIES:
:CUSTOM_ID: install-gpgme
:END:
```

See the GPGME `=README=` file for details of how to install GPGME from source.

### \*\* Known Issues

```
:PROPERTIES:
:CUSTOM_ID: snafu
:END:
```

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should they be encountered.

### \*\*\* Breaking Builds

```
:PROPERTIES:
:CUSTOM_ID: snafu-a-swig-of-this-builds-character
:END:
```

Occasionally when installing GPGME with the Python bindings included it may be observed that the `=make=` portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with `=make check=` and `=make install=` appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in

the first place. So the entire process will always produce `=lang/python/python2-gpg/=` and `=lang/python/python3-gpg/=` directories. These should contain the build output generated during compilation, including the complete bindings and module installed into `=site-packages=`.

Occasionally the errors in the early part or some other conflict (e.g. not installing as `*/root/*` or `*/su/*`) may result in nothing being installed to the relevant `=site-packages=` directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the `*root*` user or prepended with `=sudo -H=[fn:3]` in the `=lang/python/=` directory:

```
#+BEGIN_SRC shell
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py install
#+END_SRC
```

Yes, the build command does need to be run twice. Yes, you still need to run the potentially failing or incomplete steps during the `=configure=`, `=make=` and `=make install=` steps with installing GPGME. This is because those steps generate a lot of essential files needed, both by and in order to create, the bindings (including both the `=setup.py=` and `=gpgme.h=` files).

\*\*\*\* IMPORTANT Note

```
:PROPERTIES:
:CUSTOM_ID: snafu-swig-build-note
:END:
```

If specifying a selected number of languages to create bindings for, try to leave Python last. Currently the majority of the other language bindings are also preceding Python of either version when listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative `=configure=` steps for GPGME using the `==enable-languages=$LANGUAGE=` option.

Alternatively

`=make=` (or `=gmake=`, depending on your platform) may be run with the `=-k=` option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

\*\*\* Reinstalling Responsibly

```
:PROPERTIES:
:CUSTOM_ID: snafu-lessons-for-the-lazy
:END:
```

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant `site-packages` directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing

the previous version(s) is simply a matter of changing to the relevant `site-packages` directory for the version of Python in question and removing the `=gpg/=` directory and any accompanying `egg-info` files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

\*\*\* Multiple installations

```
:PROPERTIES:
:CUSTOM_ID: snafu-the-full-monty
:END:
```

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (`build`, `build`, `install`) as described in the previous section for each Python installation the

bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings *must* match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME [<https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e>][1.12.1] the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, and so on up until the current dev branch that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the `=$PATH=` when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

\*\*\* Won't Work With Windows

```
:PROPERTIES:
:CUSTOM_ID: snafu-runtime-not-funtime
:END:
```

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the [<https://python.org>][Python website] (i.e. mostly MSI installers, sometimes self-extracting `.exe` files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is /considerably/ more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

1. Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

2. Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

Do *\*not\** use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following

table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released [<https://www.python.org/downloads/windows/>][for Windows]:

CPython	Microsoft product name	runtime filename
2.7.6	Visual Studio 2008	MSVCR90.DLL
3.4.0	Visual Studio 2010	MSVCR100.DLL
3.5.0	Visual Studio 2015	<i>*see below*</i>
3.6.0	Visual Studio 2015	<i>*see below*</i>
3.7.0	Visual Studio 2017*	<i>*see below*</i>

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus *\*incompatible\** with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds

of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [\[\[https://matthew-brett.github.io/pydagogue/python\\_msvc.html\]\]](https://matthew-brett.github.io/pydagogue/python_msvc.html)[[Using Microsoft Visual C with Python]]. It is also worth reading the Microsoft Developer Network blog post on [\[\[http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx\]\]](http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx)[[the universal CRT]] and Steve Dower's blog posts on Python extensions ([\[\[http://stevedower.id.au/blog/building-for-python-3-5\]\]](http://stevedower.id.au/blog/building-for-python-3-5)[[part 1]] and [\[\[http://stevedower.id.au/blog/building-for-python-3-5-part-two\]\]](http://stevedower.id.au/blog/building-for-python-3-5-part-two)[[part 2]]).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [\[\[https://wiki.python.org/moin/WindowsCompilers\]\]](https://wiki.python.org/moin/WindowsCompilers)[[Windows compilers]] wiki page on the CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare \*minimum\*, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from `=python.org=` the advanced options available which utilise `[[#cython]]`[[Cython]] will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

1. Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.
2. Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).
3. Compile both CPython and GPGME with these bindings using the tools selected in step 2.
4. Ignore MingW, Msys2 and the official CPython binary installers.
5. Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

```
*** CFFI is the Best and GPGME should use it instead of SWIG
:PROPERTIES:
:CUSTOM_ID: snafu-cffi
:END:
```

There are many reasons for favouring [\[\[https://cffi.readthedocs.io/en/latest/overview.html\]\]](https://cffi.readthedocs.io/en/latest/overview.html) [CFFI] and proponents of it are quite happy to repeat these things as if all it would take to switch from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the bindings to Python using the =gpgme.h= file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable codebase. If there were some means of applying SWIG's dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.



If you're actually seriously considering doing so, then I'd suggest taking the `=gpgme-tool.c=` file in the GPGME `=src/=` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

\*\*\*

Virtualised Environments

:PROPERTIES:

:CUSTOM\_ID: snafu-venv

:END:

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with `virtualenv`, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like `=usr/local=` or `=opt/local=` then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a `virtualenv` of the same major and minor version matching the build. Alternatively it is possible to utilise a `=sites.pth=` file in the `=site-packages/=` directory of a `virtualenv` installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. [\[\[https://docs.pytest.org/en/latest/index.html\]\]](https://docs.pytest.org/en/latest/index.html)`[[pytest]]`) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. [\[\[https://www.virtualbox.org/\]\]](https://www.virtualbox.org/)`[[VirtualBox]]`), a hardware emulation layer (e.g. [\[\[https://www.qemu.org/\]\]](https://www.qemu.org/)`[[QEMU]]`) or an application container (e.g. [\[\[https://www.docker.com/why-docker\]\]](https://www.docker.com/why-docker)`[[Docker]]`).

Finally it should be noted that the limited tests conducted thus far have been using the `=virtualenv=` command in a new directory to create the virtual python environment. As opposed to the standard `=python3 -m venv=` and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command `=python3 -m virtualenv /path/to/install/virtual/thingy=` instead.

```
*** Post installation
:PROPERTIES:
:CUSTOM_ID: snafu-docs
:END:
```

Following installation it is recommended to move the `=post_installer.py=` script from the `=lang/python/examples/howto/=` directory to the `=lang/python/=` directory and run it. This will fix or restore files needed by Sphinx which may be removed during a distribution build for release. It will also generate reST files from Org mode files with Pandoc and generate Texinfo files from Org mode files with GNU Emacs and Org mode (in batch mode). Additionally it will fix the UTF-8 declaration line in the Texinfo files (Emacs expects "UTF-8" to be "utf-8").

```
* Fundamentals
:PROPERTIES:
:CUSTOM_ID: howto-fund-a-mental
:END:
```

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

```
** No REST
:PROPERTIES:
:CUSTOM_ID: no-rest-for-the-wicked
:END:
```

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is *not* a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

```
** Context
:PROPERTIES:
:CUSTOM_ID: howto-get-context
:END:
```

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily:

they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

\* Working with keys

```
:PROPERTIES:
:CUSTOM_ID: howto-keys
:END:
```

\*\* Key selection

```
:PROPERTIES:
:CUSTOM_ID: howto-keys-selection
:END:
```

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

This is passable and very likely to be common:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

And this is a really bad idea:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
#+END_SRC
```

Alternatively it may be that the intention is to create a list of keys which all match a particular search string. For instance all the addresses at a particular domain, like this:

```
#+BEGIN_SRC python -i
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
#+END_SRC
```

```
*** Counting keys
:PROPERTIES:
:CUSTOM_ID: howto-keys-counting
:END:
```

Counting the number of keys in your public keybox (=pubring.kbx=), the format which has superseded the old keyring format (=pubring.gpg= and =secring.gpg=), or the number of secret keys is a very simple task.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)
```

```

publist = list(pubkeys)
pubnum = len(publist)

print("""
Number of secret keys: {0}
Number of public keys: {1}
""".format(secnum, pubnum))
#+END_SRC

```

NOTE: The [\[\[#cython\]\[Cython\]\]](#) introduction in the [\[\[#advanced-use\]\[Advanced and Experimental\]\]](#) section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

```

** Get key
:PROPERTIES:
:CUSTOM_ID: howto-get-key
:END:

```

An alternative method of getting a single key via its fingerprint is available directly within a Context with `=Context().get_key=`. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

```

#+BEGIN_SRC python -i
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
#+END_SRC

```

Whereas this example demonstrates selecting the author's current key with the `=secret=` key word argument set to `=True=`:

```

#+BEGIN_SRC python -i

```

```
import gpg
```

```
fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
#+END_SRC
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
** Importing keys
:PROPERTIES:
:CUSTOM_ID: howto-import-key
:END:
```

Importing keys is possible with the `key_import()` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS key servers via the web using the `requests` module. Since `requests` returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-key servers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result
= c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
 print(result)
elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
```

```

new_sigs = result.new_signatures
new_subs = result.new_sub_keys
new_uids = result.new_user_ids
new_sctr = result.secret_imported
nochange = result.unchanged
print("""
The total number of keys considered for import was: {0}

 Number of keys revoked: {1}
 Number of new signatures: {2}
 Number of new subkeys: {3}
 Number of new user IDs: {4}
 Number of new secret keys: {5}
 Number of unchanged keys: {6}

The key IDs for all considered keys were:
""").format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_sctr,
 nochange))
for i in range(num_keys):
 print("{0}\n".format(result.imports[i].fpr))
else:
 pass
#+END_SRC

```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading =0x= indicative of hexadecimal be included. Also note that the old short key IDs (e.g. =0xDEADBEEF=) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal value which may be missing the leading =0x= is a simple matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a ValueError simply results in treating the string as a string. This is the method and logic utilised in the =import-keys-hkp.py= script (see below).

```

*** Working with ProtonMail
:PROPERTIES:
:CUSTOM_ID: import-protonmail
:END:

```

Here is a variation on the example above which checks the constrained



ProtonMail keyserver for ProtonMail  
public keys.

```
#+BEGIN_SRC python -i
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
 keyterm = sys.argv[1]
else:
 keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
 ksearch.append("{0}@protonmail.com".format(keyterm))
 ksearch.append("{0}@protonmail.ch".format(keyterm))
 ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") ==
2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
else:
```

```

ksearch.append(keyterm)

for k in ksearch:
 payload = {"op": "get", "search": k}
 try:
 r = requests.get(url, verify=True, params=payload)
 if r.ok is True:
 result = c.key_import(r.content)
 elif r.ok is False:
 result = r.content
 except Exception as e:
 result = None

 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None
and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_s crt = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

 {1}

 Number of keys revoked: {2}
 Number of new signatures: {3}
 Number of new subkeys: {4}
 Number of new user IDs: {5}
 Number of new secret keys: {6}
 Number of unchanged keys: {7}

The key IDs for all considered keys were:
""").format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_s crt,
 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
 elif result is None:
 print(e)
#+END_SRC

```

Both the above example, `[./examples/howto/pmkey-import.py][pmkey-import.py]`, and a version which prompts for an alternative GnuPG home directory, `[./examples/howto/pmkey-import-alt.py][pmkey-import-alt.py]`, are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers, their server is related more to their API and is not feature complete by comparison to the servers in the SKS pool. One notable difference being that the ProtonMail server does not permit non ProtonMail users to update their own keys, which could be a vector for attacking ProtonMail users who may not receive a key's revocation if it had been compromised.

\*\*\* Importing with HKP for Python

```
:PROPERTIES:
:CUSTOM_ID: import-hkp4py
:END:
```

Performing the same tasks with the `[https://github.com/Selfnet/hkp4py][hkp4py module]` (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some

checks on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The `hkp4py` module permits such checks prior to the importing of the keys found.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import sys
```

```
c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []
```

```
if len(sys.argv) > 2:
 pattern = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
 pattern = sys.argv[1]
else:
 pattern = input("Enter the pattern to search for keys or user IDs: ")
```

```
if pattern is not None:
 try:
```

```

 key = server.search(hex(int(pattern, 16)))
 keyed = True
except ValueError as ve:
 key = server.search(pattern)
 keyed = False

if key is not None:
 keys.append(key[0])
 if keyed is True:
 try:
 fob = server.search(pattern)
 except:
 fob = None
 if fob is not
None:
 keys.append(fob[0])
 else:
 pass
 else:
 pass

for logrus in pattern.split():
 try:
 key = server.search(hex(int(logrus, 16)))
 hexed = True
 except ValueError as ve:
 key = server.search(logrus)
 hexed = False

if key is not None:
 keys.append(key[0])
 if hexed is True:
 try:
 fob = server.search(logrus)
 except:
 fob = None
 if fob is not None:
 keys.append(fob[0])
 else:
 pass
 else:
 pass

if len(keys) > 0:
 for key in keys:
 import_result = c.key_import(key.key_blob)
 results.append(import_result)

```

```

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print(result)
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scert = result.secret_imported
 nochange = result.unchanged
 print("""

```

The total number of keys considered for import was: {0}

```

 Number of keys revoked: {1}
 Number of new signatures: {2}
 Number of new subkeys: {3}
 Number of new user IDs: {4}
 Number of new secret keys: {5}
 Number of unchanged keys: {6}

```

The key IDs for all considered keys were:

```

 """.format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scert,
 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
else:
 pass
#+END_SRC

```

Since the hkp4py module handles multiple keys just as effectively as one (=keys= is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

```

*** Importing from ProtonMail with HKP for Python
:PROPERTIES:
:CUSTOM_ID: import-protonmail-hkp4py
:END:

```

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

```
**** Import from ProtonMail via HKP for Python Example no. 1
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm1
:END:
```

The following script is available with the rest of the examples under the somewhat less than original name, =pmkey-import-hkp.py=.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage: pmkey-import-hkp.py [search strings]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
 keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
```

```

keyterm = sys.argv[1]
keyterms.append(keyterm)
else:
 key_term = input("Enter the key ID, UID or search string: ")
 keyterms = key_term.split()

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{}@pm.me".format(keyterm[1:]))
 elif keyterm.count("@") == 0:
 ksearch.append("{}@protonmail.com".format(keyterm))
 ksearch.append("{}@protonmail.ch".format(keyterm))
 ksearch.append("{}@pm.me".format(keyterm))
 elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
 ksearch.append("{}@protonmail.ch".format(uid))
 ksearch.append("{}@pm.me".format(uid))
 elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
 ksearch.append("{}@protonmail.ch".format(uid))
 ksearch.append("{}@pm.me".format(uid))
 else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking for key for: {}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)
 except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None

```

```
except Exception as e:
 import_result = None
results.append(import_result)
```

for result in results:

```
if result is not None and hasattr(result, "considered") is False:
```

```
 print("{0} for {1}".format(result.decode(), k))
```

```
elif result is not None and hasattr(result, "considered") is True:
```

```
 num_keys = len(result.imports)
```

```
 new_revs = result.new_revocations
```

```
 new_sigs = result.new_signatures
```

```
 new_subs = result.new_sub_keys
```

```
 new_uids = result.new_user_ids
```

```
 new_s crt = result.secret_imported
```

```
 nochange = result.unchanged
```

```
 print("""
```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

Number of keys revoked: {2}

Number of new signatures: {3}

Number of new subkeys: {4}

Number of new user IDs: {5}

Number of new secret keys: {6}

Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_s crt,
 nochange))
```

```
for i in range(num_keys):
```

```
 print(result.imports[i].fpr)
```

```
 print("")
```

```
elif result is None:
```

```
 pass
```

```
#+END_SRC
```

\*\*\*\* Import from ProtonMail via HKP for Python Example no. 2

```
:PROPERTIES:
```

```
:CUSTOM_ID: import-hkp4py-pm2
```

```
:END:
```

Like

its counterpart above, this script can also be found with the rest of the examples, by the name pmkey-import-hkp-alt.py.



With this script a modicum of effort has been made to treat anything passed as a `=homedir=` which either does not exist or which is not a directory, as also being a possible user ID to check for. It's not guaranteed to pick up on all such cases, but it should cover most of them.

```
#!/usr/bin/python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it. Optionally enables specifying a different GnuPG home directory.

Usage: pmkey-import-hkp.py [homedir] [search string]
or: pmkey-import-hkp.py [search string]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 3:
 homedir = sys.argv[1]
 keyterms = sys.argv[2:]
elif len(sys.argv) == 3:
 homedir = sys.argv[1]
 keyterm = sys.argv[2]
 keyterms.append(keyterm)
elif len(sys.argv) == 2:
 homedir = ""
 keyterm = sys.argv[1]
 keyterms.append(keyterm)
else:
 keyterm = input("Enter the key ID, UID or search string: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
 keyterms.append(keyterm)

if len(homedir) == 0:
```

```

homedir = None
homeless = False

if homedir is not None:
 if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 if os.path.isdir(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.realpath(os.path.expanduser(homedir))
 else:
 homeless = True
 else:
 homeless = True
 elif os.path.exists(os.path.realpath(homedir)) is True:
 if os.path.isdir(os.path.realpath(homedir)) is True:
 c.home_dir = os.path.realpath(homedir)
 else:
 homeless = True
 else:
 homeless = True

First check to see if the homedir really is a homedir and if not, treat it as
a search string.
if homeless is True:
 keyterms.append(homedir)
 c.home_dir = None
else:
 pass

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{0}@pm.me".format(keyterm[1:]))
 elif keyterm.count("@") == 0:
 ksearch.append("{0}@protonmail.com".format(keyterm))
 ksearch.append("{0}@protonmail.ch".format(keyterm))
 ksearch.append("{0}@pm.me".format(keyterm))
 elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")

for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))

```

```

elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
 else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking for key for: {0}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)
 except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None
 except Exception
 as e:
 import_result = None
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scert = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

{1}

Number of keys revoked: {2}
Number of new signatures: {3}

```

Number of new subkeys: {4}  
Number of new user IDs: {5}  
Number of new secret keys: {6}  
Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"""format(num_keys, k, new_revs, new_sigs,
new_subs, new_uids, new_scert,
nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)
print("")
elif result is None:
 pass
#+END_SRC
```

```
** Exporting keys
:PROPERTIES:
:CUSTOM_ID: howto-export-key
:END:
```

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

```
*** Exporting public keys
:PROPERTIES:
:CUSTOM_ID: howto-export-public-key
:END:
```

There are two methods of exporting public keys, both of which are very similar to the other. The default method, `=key_export()`, will export a public key or keys matching a specified pattern as normal. The alternative, the `=key_export_minimal()` method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

```
#+BEGIN_SRC
python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
```

```

""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif
os.path.exists(homedir) is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export(pattern=logrus)
except:
 result = c.key_export(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
else:
 pass
#+END_SRC

```

It should be noted that the result will only return =None= when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to =None= this triggers the exporting of the entire public keybox.

```

#+BEGIN_SRC python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus
 = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif os.path.exists(homedir) is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_minimal(pattern=logrus)
except:
 result = c.key_export_minimal(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)

```

```
else:
 pass
#+END_SRC
```

```
*** Exporting secret keys
:PROPERTIES:
:CUSTOM_ID: howto-export-secret-key
:END:
```

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of `pinentry` via `gpg-agent` in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```
#+BEGIN_SRC python -i
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
```

```

homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_secret(pattern=logrus)
except:
 result = c.key_export_secret(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
 os.chmod(keyfile, 0o600)
else:
 pass
#+END_SRC

```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (=gpg=) and ASCII armoured (=asc=) files.

```
#+BEGIN_SRC python -i
```



```

import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
 gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
 gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:

```

```

homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir
= homedir
else:
 pass

if c.home_dir is not None:
 if c.home_dir.endswith("/"):
 gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
 else:
 gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
 if os.path.exists(os.environ["GNUPGHOME"]) is True:
 hd = os.environ["GNUPGHOME"]
 else:
 try:
 hd = subprocess.getoutput(gpgconfcmd)
 except:
 process = subprocess.Popen(gpgconfcmd.split(),
 stdout=subprocess.PIPE)
 procom = process.communicate()
 if sys.version_info[0] == 2:
 hd = procom[0].strip()
 else:
 hd = procom[0].decode().strip()
 gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
 ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
 a_result = a.key_export_secret(pattern=logrus)
 b_result
= b.key_export_secret(pattern=logrus)
except:
 a_result = a.key_export_secret(pattern=None)
 b_result = b.key_export_secret(pattern=None)

```

```

if a_result is not None:
 with open(ascfile, "wb") as f:
 f.write(a_result)
 os.chmod(ascfile, 0o600)
else:
 pass

```

```

if b_result is not None:
 with open(gpgfile, "wb") as f:
 f.write(b_result)
 os.chmod(gpgfile, 0o600)
else:
 pass
#+END_SRC

```

```

*** Sending public keys to the SKS Keyservers
:PROPERTIES:
:CUSTOM_ID: howto-send-public-key
:END:

```

As with the previous section on importing keys, the `hkp4py` module adds another option with exporting keys in order to send them to the public key servers.

The following example demonstrates how this may be done.

```

#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS key servers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server
= hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if len(sys.argv) > 2:
 logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
 logrus = sys.argv[1]
else:
 logrus = input("Enter the UID matching the key(s) to send: ")

```

```

if len(logrus) > 0:
 try:
 export_result = c.key_export(pattern=logrus)
 except Exception as e:
 print(e)
 export_result = None
else:
 export_result = c.key_export(pattern=None)

if export_result is not None:
 try:
 try:
 send_result = server.add(export_result)
 except:
 send_result = server.add(export_result.decode())
 if send_result is not None:
 print(send_result)
 else:
 pass
 except Exception as e:
 print(e)
else:
 pass
#+END_SRC

```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as =send-key-to-keyserver.py=.

The =hkp4py= module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

```

* Basic Functions
:PROPERTIES:
:CUSTOM_ID: howto-the-basics
:END:

```

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

```
** Encryption
:PROPERTIES:
:CUSTOM_ID: howto-basic-encryption
:END:
```

Encrypting is very straight forward. In the first example below the message, =text=, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

```
*** Encrypting to one key
:PROPERTIES:
:CUSTOM_ID: howto-basic-encryption-single
:END:
```

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the =gpg.Context().encrypt()= method.

Those keyword arguments are: =recipients=, a list of keys encrypted to (covered in greater detail in the following section); =sign=, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to =True=); =sink=, to write results or partial results to a secure sink instead of returning it (defaults to =None=); =passphrase=, only used when utilising symmetric encryption (defaults to =None=); =always\_trust=, used to override the trust model settings for recipient keys (defaults to =False=); =add\_encrypt\_to=, utilises any preconfigured =encrypt-to= or =default-key= settings in the user's =gpg.conf= file (defaults to =False=); =prepare=, prepare for encryption (defaults to =False=); =expect\_sign=, prepare for signing (defaults to =False=); =compress=, compresses the plaintext prior to encryption (defaults to =True=).

```
#+BEGIN_SRC python -i
import
gpg

a_key = "0x12345678DEADBEEF"
text = b""Some text to test with.
```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```

```
c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
#+END_SRC
```

Though this is even more likely to be used like this; with the plaintext input read from a file, the recipient keys used for encryption regardless of key trust status and the encrypted output also encrypted to any preconfigured keys set in the `=gpg.conf=` file:

```
#+BEGIN_SRC python -i
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
 text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext,
result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
 always_trust=True,
 add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
#+END_SRC
```

If the `=recipients=` parameter is empty then the plaintext is encrypted symmetrically. If no `=passphrase=` is supplied as a parameter or via a callback registered with the `=Context()=` then an out-of-band prompt for the passphrase via `pinentry` will be invoked.

```
*** Encrypting to multiple keys
:PROPERTIES:
:CUSTOM_ID: howto-basic-encryption-multiple
:END:
```

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (`=text=`) to everyone with an email address on the `=gnupg.org=` domain, `[fn:4]` but does `/not/` encrypt to a default key or other key which is configured to

normally encrypt

to.

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
text = b"""Oh look, another test message.
```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an input() prompt.

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```

```
c = gpg.Context(armor=True)
```

```
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
```

```
logrus = []
```

```
for i in range(len(rpattern)):
```

```
 if rpattern[i].can_encrypt == 1:
```

```
 logrus.append(rpattern[i])
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 sign=False, always_trust=True)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
```

```
 afile.write(ciphertext)
```

```
#+END_SRC
```

All it would take to change the above example to sign

the message

and also encrypt the message to any configured default keys would be to change the =c.encrypt= line to this:

```
#+BEGIN_SRC python -i
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
```

```
 always_trust=True,
```

```
 add_encrypt_to=True)
```

```
#+END_SRC
```

The only keyword arguments requiring modification are those for which the default values are changing. The default value of =sign= is =True=, the default of =always\_trust= is =False=, the default of

`=add_encrypt_to=` is `=False=`.

If `=always_trust=` is not set to `=True=` and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
#+BEGIN_SRC python -i
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
 text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org",
 secret=False))
logrus = []

for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])

 try:
 ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 add_encrypt_to=True)
 except gpg.errors.InvalidRecipients as e:
 for i in range(len(e.recipients)):
 for n in range(len(logrus)):
 if logrus[n].fpr == e.recipients[i].fpr:
 logrus.remove(logrus[n])
 else:
 pass
 try:
 ciphertext, result, sign_result = c.encrypt(text,
 recipients=logrus,
 add_encrypt_to=True)
 with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
 except:
 pass
#+END_SRC
```

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

\*\* Decryption



```
:PROPERTIES:
:CUSTOM_ID: howto-basic-decryption
:END:
```

Decrypting something encrypted to a key in one's secret keyring is fairly straight forward.

In this example code, however, preconfiguring either `=gpg.Context()` or `=gpg.core.Context()` as `=c=` is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to `=c=` simply adds lines for no gain.

```
#+BEGIN_SRC python -i
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
 try:
 plaintext, result, verify_result = gpg.Context().decrypt(cfile)
 except gpg.errors.GPGMEError as e:
 plaintext = None
 print(e)

if plaintext is not None:
 with open(newfile, "wb") as nfile:
 nfile.write(plaintext)

else:
 pass
#+END_SRC
```

The data available in `=plaintext=` in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in `=result=` and the results of verifying any signatures of the data in `=verify_result=`.

If `=gpg.Context().decrypt(cfile, verify=False)=` is called instead, then `=verify_result=` will be returned as `=None=` and the rest remains as described here.

```
** Signing text and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing
:END:
```

The following sections demonstrate how to specify keys to sign with.

\*\*\* Signing key selection

```
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-signers
:END:
```

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

```
#+BEGIN_SRC python -i
import gpg

logrus = input("Enter
the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
#+END_SRC
```

The signing examples in the following sections include the explicitly designated `=signers=` parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the `patten` expects a string, bytes or None and not a list. A string with two fingerprints won't match any single key.

\*\*\* Normal or default signing messages or files

```
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-normal
:END:
```

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded

and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of `=pgg.Context().armor=`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
 afile.write(signed_data.decode())
#+END_SRC
```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
 text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
 afile.write(signed_data)
#+END_SRC
```

```
*** Detached signing messages and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-detached
```

:END:

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc",
"wb") as afile:
 afile.write(signed_data.decode())
#+END_SRC
```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
 text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
 afile.write(signed_data)
#+END_SRC
```

```
*** Clearsigning messages or text
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-clear
:END:
```

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

```

#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with
open("/path/to/statement.txt.asc", "w") as afile:
 afile.write(signed_data.decode())
#+END_SRC

```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```

#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
 text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
 afile.write(signed_data)
#+END_SRC

```

```

** Signature verification
:PROPERTIES:
:CUSTOM_ID: howto-basic-verification
:END:

```

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```

#+BEGIN_SRC python

```

```

-i
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
 data, result = c.verify(open(gpg_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
#+END_SRC

```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

```

```

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
else:
 pass
#+END_SRC

```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `=data=` to see if it matches with something like this:

```

#+BEGIN_SRC python -i
with open(filename, "rb") as afile:
 text = afile.read()

if text == data:
 print("Good signature.")
else:
 pass
#+END_SRC

```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `=c.verify=`. So `=data=` is `=None=` and only the information in `=result=` is available.

```

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
 data,
 result = c.verify(open(filename), open(sig_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False

```

```

print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
#+END_SRC

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(filename), open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
#+END_SRC

*
Creating keys and subkeys
:PROPERTIES:

```



```
:CUSTOM_ID: key-generation
```

```
:END:
```

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to =SECRET= level clearance, so his keys will be 3072-bit keys.

The pre-configured =gpg.conf= file which sets cipher, digest and other preferences contains the following configuration parameters:

```
#+BEGIN_SRC conf
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128
AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences ZLIB BZIP2 ZIP Uncompressed
#+END_SRC
```

```
** Primary key
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: keygen-primary
```

```
:END:
```

Generating a primary key uses the =create\_key= method in a Context.

It contains multiple arguments and keyword arguments, including:

=userid=, =algorithm=, =expires\_in=, =expires=, =sign=, =encrypt=, =certify=, =authenticate=, =passphrase= and =force=. The defaults for all of those except =userid=, =algorithm=, =expires\_in=, =expires= and =passphrase= is =False=. The defaults for =algorithm= and =passphrase= is =None=. The default for =expires\_in= is =0=. The default for =expires= is =True=. There is no default for =userid=.

If `=passphrase=` is left as `=None=` then the key will not be generated with a passphrase, if `=passphrase=` is set to a string then that will be the passphrase and if `=passphrase=` is set to `=True=` then `gpg-agent` will launch `pinentry` to prompt for a passphrase. For the sake of convenience, these examples will keep `=passphrase=` set to `=None=`.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()

c.home_dir = "~/gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
 sign=True, certify=True)
#+END_SRC
```

One thing to note here is the use of setting the `=c.home_dir=` parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, `=~/gnupg=`, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The `=temp-homedir-config.py=` script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned `=GenkeyResult=` object, which includes the following data:

```
#+BEGIN_SRC python -i
print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""").format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
 dmkey.uid)
#+END_SRC
```

Alternatively the information can be confirmed using the command line program:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
#+END_SRC
```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the `=gpg.conf=` file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own `=gpg.conf=` file in order to be able to generate this:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

sec rsa3072/026D2F19E99E63AA
 created: 2018-03-15 expires: 2019-03-15 usage: SC
 trust: ultimate validity: ultimate
[ultimate] (1). Danger Mouse <dm@secret.example.net>

[ultimate] (1). Danger Mouse <dm@secret.example.net>
 Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
IDEA, CAST5, 3DES
 Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
 Compression: ZLIB, BZIP2, ZIP, Uncompressed
 Features: MDC, Keyserver
no-modify

bash-4.4$
#+END_SRC
```

```
** Subkeys
:PROPERTIES:
:CUSTOM_ID: keygen-subkeys
:END:
```

Adding subkeys to a primary key is fairly similar to creating the primary key with the `=create_subkey=` method. Most of the arguments are the same, but not quite all. Instead of the `=userid=` argument there is now a `=key=` argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
 encrypt=True)
#+END_SRC
```

As with the primary key, the results here can be checked with:

```
#+BEGIN_SRC python -i
print("""
Fingerprint: {0}
Primary Key: {1}
 Public Key: {2}
 Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""").format(dmsub.fpr, dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
 dmsub.uid)
#+END_SRC
```

As well as on the command line with:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
```

```
#+END_SRC
```

```
** User IDs
```

```
:PROPERTIES:
:CUSTOM_ID: keygen-uids
:END:
```

```
*** Adding User IDs
```

```
:PROPERTIES:
:CUSTOM_ID: keygen-uids-add
:END:
```

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is `=key_add_uid=` and the only arguments it takes are for the `=key=` and the new `=uid=`.

```
#+BEGIN_SRC python -i
import gpg
```

```
c = gpg.Context()
c.home_dir = "~/gnupg-dm"
```

```
dmfpr
= "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"
```

```
c.key_add_uid(key, uid)
#+END_SRC
```

Unsurprisingly the result of this is:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid [ultimate] Danger Mouse <dm@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
#+END_SRC
```

\*\*\* Revoking User IDs

```
:PROPERTIES:
:CUSTOM_ID: keygen-uids-revoke
:END:
```

Revoking a user ID is a fairly similar process, except that it uses the `=key_revoke_uid=` method.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
= "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
#+END_SRC
```

\*\* Key certification

```
:PROPERTIES:
:CUSTOM_ID: key-sign
:END:
```

Since key certification is more frequently referred to as key signing, the method used to perform this function is `=key_sign=`.

The `=key_sign=` method takes four arguments: `=key=`, `=uids=`, `=expires_in=` and `=local=`. The default value of `=uids=` is `=None=` and which results in all user IDs being selected. The default value of both `=expires_in=` and `=local=` is `=False=`; which results in the signature never expiring and being able to be exported.

The `=key=` is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the `=uids=` value is not `=None=` then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
#+END_SRC
```

```
*** Verifying key certifications
:PROPERTIES:
:CUSTOM_ID: key-sign-verify
:END:
```

```
#+BEGIN_SRC python -i
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("{}{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
#+END_SRC
```

Which for Danger Mouse displays the following:

```
#+BEGIN_EXAMPLE
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@adversary.org>
#+END_EXAMPLE
```

The two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year. Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```

#+BEGIN_SRC python -i
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys
= list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
#+END_SRC

```

Note that this final code block includes the use of a module which is *not* part of Python's standard library, the [\[\[https://pendulum.eustace.io/\]\[pendulum module\]\]](https://pendulum.eustace.io/). Unlike the standard datetime module, pendulum makes working with dates and times significantly easier in Python; just as the requests module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using the GPGME Python bindings, they are both highly recommended more generally.

\* Advanced or Experimental Use Cases

:PROPERTIES:

:CUSTOM\_ID: advanced-use

:END:



```
** C plus Python plus SWIG plus Cython
:PROPERTIES:
:CUSTOM_ID: cython
:END:
```

In

spite of the apparent incongruence of using Python bindings to a C interface only to generate more C from the Python; it is in fact quite possible to use the GPGME bindings with [\[\[http://docs.cython.org/en/latest/index.html\]\]](http://docs.cython.org/en/latest/index.html) [Cython]. Though in many cases the benefits may not be obvious since the most computationally intensive work never leaves the level of the C code with which GPGME itself is interacting with.

Nevertheless, there are some situations where the benefits are demonstrable. One of the better and easier examples being the one of the early examples in this HOWTO, the [\[\[#howto-keys-counting\]\]](#) [key counting] code. Running that example as an executable Python script, `=keycount.py=` (available in the `=examples/howto/=` directory), will take a noticeable amount of time to run on most systems where the public keybox or keyring contains a few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that script on my laptop; as I tend to do periodically and timed it using `=time=` utility, with the following results:

```
#+BEGIN_SRC shell
bash-4.4$ time keycount.py
```

```
Number of secret keys: 23
Number of public keys: 12112
```

```
real 11m52.945s
user 0m0.913s
sys 0m0.752s
```

```
bash-4.4$
#+END_SRC
```

Sometime after that I imported another key and followed it with a little test of Cython. This test was kept fairly basic, essentially lifting the material from the [\[\[http://docs.cython.org/en/latest/src/tutorial/cython\\_tutorial.html\]\]](http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html) [Cython Basic Tutorial] to demonstrate compiling Python code to C. The first step was to take the example

key counting code quoted previously, essentially from the importing of the `=gpg=` module to the end of the script:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
 Number of secret keys: {0}
 Number
of public keys: {1}

""".format(secnum, pubnum))
#+END_SRC
```

Save that into a file called `=keycount.pyx=` and then create a `=setup.py=` file which contains this:

```
#+BEGIN_SRC python -i
from distutils.core import setup
from Cython.Build import cythonize

setup(
 ext_modules = cythonize("keycount.pyx")
)
#+END_SRC
```

Compile it:

```
#+BEGIN_SRC shell
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
#+END_SRC
```

Then run it in a similar manner to `=keycount.py=`:

```
#+BEGIN_SRC shell
bash-4.4$ time python3.7 -c "import keycount"
```

Number of secret keys: 23  
Number of public keys: 12113

```
real 6m47.905s
user 0m0.785s
sys 0m0.331s
```

```
bash-4.4$
#+END_SRC
```

Cython turned `=keycount.pyx=` into an 81KB `=keycount.o=` file in the `=build/=` directory, a 24KB `=keycount.cpython-37m-darwin.so=` file to be imported into Python 3.7 and a 113KB `=keycount.c=` generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the `=keycount.pyx=` file or the full 1,452 bytes of the full executable `=keycount.py=` example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The `=keycount.pyx=` and `=setup.py=` files used to generate this example have been added to the `=examples/howto/advanced/cython/=` directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the [\[\[http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd\]\]](http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd) `[[Magic Attributes]]` section of the Cython documentation.

```
* Miscellaneous extras and work-arounds
:PROPERTIES:
:CUSTOM_ID: cheats-and-hacks
:END:
```

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with `[[#group-lines]]` `[[group lines]]`.

```
** Group lines
:PROPERTIES:
:CUSTOM_ID: group-lines
:END:
```

There is not yet an easy way to access groups configured in the `gpg.conf` file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
#+BEGIN_SRC python -i
import subprocess
import sys

if sys.platform == "win32":
 gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
 gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
 lines = procom[0].splitlines()
else:
 lines = procom[0].decode().splitlines()

for line in lines:
 if line.startswith("group") is True:
 break

groups = line.split(":")[-1].replace("'",
 ").split(',')

group_lines = []
group_lists = []

for group in groups:
 group_lines.append(group.split("="))
 group_lists.append(group.split("="))

for glist in group_lists:
 glist[1] = glist[1].split()
#+END_SRC
```

The result of that code is that `group_lines` is a list of lists where `group_lines[i][0]` is the name of the group and `group_lines[i][1]` is the key IDs of the group as a string.

The `=group_lists=` result is very similar in that it is a list of lists. The first part, `=group_lists[i][0]=` matches `=group_lines[i][0]=` as the name of the group, but `=group_lists[i][1]=` is the key IDs of the group as a list.

A demonstration of using the `=groups.py=` module is also available in the form of the executable `=mutt-groups.py=` script. This second script reads all the group entries in a user's `=gpg.conf=` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

```
** Keyserver access for Python
```

```
:PROPERTIES:
```

```
:CUSTOM_ID:
```

```
hkp4py
```

```
:END:
```

The [\[\[https://github.com/Selfnet/hkp4py\]\[hkp4py\]\]](https://github.com/Selfnet/hkp4py) module by Marcel Fest was originally a port of the old [\[\[https://github.com/dgladkov/python-hkp\]\[python-hkp\]\]](https://github.com/dgladkov/python-hkp) module from Python 2 to Python 3 and updated to use the [\[\[http://docs.python-requests.org/en/latest/index.html\]\[requests\]\]](http://docs.python-requests.org/en/latest/index.html) module instead. It has since been modified to provide support for Python 2.7 as well and is available via PyPI.

Since it rewrites the `=hkp=` protocol prefix as `=http=` and `=hkps=` as `=https=`, the module is able to be used even with servers which do not support the full scope of keyserver functions.<sup>[fn:5]</sup> It also works quite readily when incorporated into a [\[\[#cython\]\[Cython\]\]](#) generated and compiled version of any code.

```
*** Key import format
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: hkp4py-strings
```

```
:END:
```

The `hkp4py` module returns key data via requests as string literals (`=r.text=`) instead of byte literals (`=r.content=`). This means that the returned key data must be encoded to UTF-8 when importing that key material using a `=gpg.Context().key_import()=` method.

For this reason an alternative method has been added to the `=search=` function of `=hkp4py.KeyServer()=` which returns the key in the correct format as expected by `=key_import=`. When importing using this module, it is now possible to import with this:

```
#+BEGIN_SRC python -i
```

```

for key in keys:
 if key.revoked is False:
 gpg.Context().key_import(key.key_blob)
 else:
 pass
#+END_SRC

```

Without that recent addition it would have been necessary to encode the contents of each `=hkp4py.KeyServer().search()[i].key=` in `=hkp4py.KeyServer().search()=` before trying to import it.

An example of this is included in the `[[#howto-import-key][Importing Keys]]` section of this HOWTO and the corresponding executable version of that example is available in the `=lang/python/examples/howto=` directory as normal; the executable version is the `=import-keys-hkp.py=` file.

```

** GPGME version checking
:PROPERTIES:
:CUSTOM_ID: gpgme-version-check
:END:

```

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the `=gpg.version.versionstr=` and `=gpg.version.versionlist=` methods have been quite sufficient. The former returns the same string as `=gpgme-config --version=`, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

```

#+BEGIN_SRC python -i
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
 stdout=subprocess.PIPE,
 stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
 gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0]

```

```

>= 3:
 gpgme_version = gpgme_version_str[0].decode().strip()
else:
 gpgme_version = None

if gpgme_version is not None:
 if gpgme_version == gpg.version.versionstr:
 print("The GPGME Python bindings match libgpgme.")
 else:
 print("The GPGME Python bindings do NOT match libgpgme.")
else:
 print("Upgrade Python and reinstall the GPGME Python bindings.")
#+END_SRC

```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the `=gpg.version.versionintlist=` method (added in version `=1.12.1-beta79=`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```

#+BEGIN_SRC python -i
import gpg

try:
 if gpg.version.is_beta is True:
 print("The installed GPGME Python bindings were built from beta code.")
 else:
 print("The installed GPGME Python bindings are a released version.")
except Exception as e:
 print(e)

try:
 if gpg.version.versionintlist[0] == 1:
 if gpg.version.versionintlist[1] == 12:
 if gpg.version.versionintlist[2] == 1:
 print("This is the minimum version for using versionintlist.")
 elif gpg.version.versionintlist[2] > 1:
 print("The versionintlist method is available.")
 else:
 pass
 elif gpg.version.versionintlist[1] > 12:
 print("The versionintlist method is available.")
 else:
 pass
 elif gpg.version.versionintlist[0] > 1:

```

```

 print("The versionintlist method is available.")
else:
 pass
except Exception as e:
 print(e)
#+END_SRC

```

The points where `=pass=` is used in the above example will most likely also produce an `=Exception=` error since those results should only occur in versions which do not have the `=gpgme.version.is_beta=` and `=gpgme.version.versionintlist=` methods available.

\* Copyright and Licensing

```

:PROPERTIES:
:CUSTOM_ID: copyright-and-license
:END:

```

\*\* Copyright

```

:PROPERTIES:
:CUSTOM_ID: copyright
:END:

```

Copyright The GnuPG Project, 2018.

\*\* Draft Editions of this HOWTO

```

:PROPERTIES:
:CUSTOM_ID: draft-editions
:END:

```

Draft editions of this HOWTO may be periodically available directly from the author at any of the following URLs:

- [[<https://files.au.adversary.org/crypto/gpgme-python-howto.html>][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]
- [[<http://files.au.adversary.org/crypto/gpgme-python-howto.html>][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]
- [[<https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html>][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 SSL)]]
- [[<http://files.au.adversary.org/crypto/gpgme-python-howto/index.html>][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 no SSL)]]

These draft versions have been generated from this document via GNU

Emacs [[<https://orgmode.org/>][Org mode]] to `=.texi=` and [[<https://www.gnu.org/software/texinfo/>][GNU Texinfo]]



to HTML. Though it is likely that the specific [\[\[https://files.au.adversary.org/crypto/gpgme-python-howto\]\]](https://files.au.adversary.org/crypto/gpgme-python-howto) [\[\[http://files.au.adversary.org/crypto/gpgme-python-howto.org\]\]](http://files.au.adversary.org/crypto/gpgme-python-howto.org) [\[\[version\]\]](http://files.au.adversary.org/crypto/gpgme-python-howto.org) used will be on the same server with the generated output formats. Occasionally I may include the Org mode generated XHTML versions:

- [\[\[https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml\]\]](https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml) [GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]
- [\[\[http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml\]\]](http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml) [GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]

That XHTML version, however, is exported in a way which inherits a colour scheme from [\[\[https://github.com/holomorph/emacs-zenburn\]\]](https://github.com/holomorph/emacs-zenburn) [the author's Emacs theme] (which is a higher contrast version of [\[\[http://kippura.org/zenburnpage/\]\]](http://kippura.org/zenburnpage/) [Zenburn] ported by [\[\[https://github.com/holomorph\]\]](https://github.com/holomorph) [Holomorph]). So it's fine for people who prefer dark themed web pages, but not so great for everyone else.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

```
#+BEGIN_SRC shell
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
#+END_SRC
```

The reStructuredText format is also generated from the Org mode source file, except it is generated using [\[\[https://pandoc.org\]\]](https://pandoc.org) [Pandoc] with either of the following commands (depending on the filename):

```
#+BEGIN_SRC shell
pandoc -f org -t rst+smart -o gpgme-python-howto.rst
gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
#+END_SRC
```

Note that the Org mode source files are identified as such via a mode line at the top of each file and have had their `.org=` file extensions dropped in order to make scripted generation of output formats easier and not require renaming files post-conversion.

Due to a bug in Org mode's texinfo conversion method, the recommended steps for generating the Texinfo files for all the files in the

=lang/python/doc/src/= directory are as follows:

```
#+BEGIN_SRC shell
for x in * ; do
 emacs $x --batch -f org-texinfo-export-to-texinfo --kill
 cat $x.texi | sed -e 's/@documentencoding UTF-8/@documentencoding utf-8/g' > ../texinfo/$x.texi
 pandoc -f org -t rst+smart -o ../rst/$x.rst $x
done ;
rm -fv *.texi
cd ../texinfo
mkdir info
mkdir html
for x in *.texi ; do
 makeinfo -v $x
 makeinfo --html --no-split $x
done ;
mv *.info info/
mv
*.html html/
#+END_SRC
```

This code snippet includes the generation of the reStructuredText files and would be expected to be run from the =doc/src/= directory containing the Org mode source files. It also assumes that the commands are being run on POSIX compliant systems with basic tools like sed, the Bourne shell and GNU Emacs[fn:6] available. The code snippet also includes the steps for generating the Emacs Info files and HTML files from the Texinfo files. Using reStructuredText files with Sphinx is best left for the documentation of that project.

In addition to these there is a significantly less frequently updated version as a HTML [[https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html][WebHelp site]] (AWS S3 SSL); generated from DITA XML source files, which can be found in [[https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/][an alternative branch]] of the GPGME git repository.

Various generated output formats may occasionally be found in subdirectories of the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python][gpgme-python]] directory. In particular within the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita][DITA]], [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst][reStructuredText]] and [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo][Texinfo]] subdirectories. The =rst= directory contains output files generated with Sphinx and may include a considerable number of its possible output formats, but there are no guarantees as to how recent these are or even if they are present.

These draft editions are not official documents and the version of documentation in the master branch or which ships with released versions is the only official documentation. Nevertheless, these draft editions may occasionally be of use by providing more accessible web versions which are updated between releases. They are provided on the understanding

that they may contain errors or may contain content subject to change prior to an official release.

\*\* License GPL compatible

:PROPERTIES:

:CUSTOM\_ID: license

:END:

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\* Footnotes

[fn:1] =short-history= and/or =short-history.html=.

[fn:2] With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported minor release is quite possible too.

[fn:3] Yes, even if you use virtualenv with everything you do in Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the /entire/ GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it).

[fn:4] You probably don't really want to do this. Searching the key servers for "gnupg.org" produces over 400 results, the majority of

which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.

[fn:5] Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as HKP or HKPS within the Python Code. The =hkp4py= module will rewrite these appropriately when the connection is made to the server.

[fn:6] Okay, Emacs might not necessarily qualify as a basic tool, but it is common enough that having it installed on a system isn't too great an expectation, nor is it difficult to add to most POSIX systems, even if the users of those systems do not personally use it.

```
{
 "fingerprint": "*"
}
{
 "op": "delete",
 "key": "E8143C489C8D41124DC40D0B47AF4B6961F04784"
}
{
 "op": "createkey",
 "userid": "foo@bar.baz",
 "algo": "rsa1024"
}
{
 "op": "sign",
 "keys": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
 "sender": "alpha@example.net",
 "data": "Hello world",
 "armor": true,
 "base64": false
}
```

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

- \* Makefile.am: Remove build rules for libpgpme-pth.
- \* pgpme.m4: Remove support for libpgpme-pth.

2011-05-26 Marcus Brinkmann <marcus@g10code.com>

- \* decrypt.c (gpgme\_op\_decrypt\_start, gpgme\_op\_decrypt): Check CTX.
- \* decrypt-verify.c (gpgme\_op\_decrypt\_verify\_start  
(gpgme\_op\_decrypt\_verify): Likewise.
- \* delete.c (gpgme\_op\_delete\_start, gpgme\_op\_delete): Likewise.
- \* edit.c (gpgme\_op\_edit\_start, gpgme\_op\_edit)  
(gpgme\_op\_card\_edit\_start, gpgme\_op\_card\_edit): Likewise.
- \* encrypt.c (gpgme\_op\_encrypt\_start, gpgme\_op\_encrypt): Likewise.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign\_start  
(gpgme\_op\_encrypt\_sign): Likewise.
- \* export.c (gpgme\_op\_export\_start,  
gpgme\_op\_export)  
(gpgme\_op\_export\_ext\_start, gpgme\_op\_export\_ext)  
(gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): Likewise.
- \* genkey.c (gpgme\_op\_genkey\_start, gpgme\_op\_genkey): Likewise.
- \* getauditlog.c (gpgme\_op\_getauditlog\_start  
(gpgme\_op\_getauditlog): Likewise.
- \* gpgconf.c (gpgme\_op\_conf\_load, gpgme\_op\_conf\_save): Likewise.
- \* import.c (gpgme\_op\_import\_start, gpgme\_op\_import\_keys\_start  
(gpgme\_op\_import\_keys, gpgme\_op\_import): Likewise.
- \* keylist.c (gpgme\_op\_keylist\_start, gpgme\_op\_keylist\_ext\_start):  
Likewise.
- \* opassuan.c (gpgme\_op\_assuan\_transact\_start  
(gpgme\_op\_assuan\_transact\_ext): Likewise.
- \* passwd.c (gpgme\_op\_passwd\_start, gpgme\_op\_passwd): Likewise.
- \* sign.c (gpgme\_op\_sign\_start, gpgme\_op\_sign): Likewise.
- \* trustlist.c (gpgme\_op\_trustlist\_start  
(gpgme\_op\_trustlist\_next): Likewise.
- \* verify.c (gpgme\_op\_verify\_start, gpgme\_get\_sig\_key): Likewise.
- \* op-support.c (\_gpgme\_op\_data\_lookup): Likewise.
- \* vfs-create.c (gpgme\_op\_vfs\_transact, gpgme\_op\_vfs\_create):  
Likewise.
- \* vfs-mount.c (gpgme\_op\_vfs\_mount, gpgme\_op\_vfs\_transact): Likewise.
- \* gpgme.c (gpgme\_set\_protocol)  
(gpgme\_set\_sub\_protocol)  
(gpgme\_set\_armor, gpgme\_set\_include\_certs)  
(gpgme\_set\_keylist\_mode, gpgme\_set\_passphrase\_cb)  
(gpgme\_set\_progress\_cb, gpgme\_set\_io\_cbs, gpgme\_set\_locale)  
(gpgme\_ctx\_set\_engine\_info, gpgme\_sig\_notation\_clear): Likewise.
- \* gpgme.c (gpgme\_new): Check for valid R\_CTX.  
(gpgme\_cancel, gpgme\_cancel\_async, gpgme\_release): Likewise.

2011-04-06 Werner Koch <wk@g10code.com>

- \* gpgme-config.in: Add option --host. Change options --cflags and --libs to collapse duplicate include and lib dirs. Try to put extra libs at the end.

- \* gpgme.h.in: Use INSERT\_\_TYPEDEFS\_FOR\_GPGME\_H to include platform

specific typedefs.

2011-02-03 Werner Koch <wk@g10code.com>

- \* extra-stati.h: New.
- \* mkstatus: Extend to also process extra-stati.h
- \* Makefile.am (main\_sources): Add extra-stati.h (status-table.h): Depend on extra-stati.h and adjust rule.

2011-02-03

Marcus Brinkmann <marcus@g10code.com>

- \* w32-io.c (\_gpgme\_io\_socket): Return fd, not res.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

- \* assuan-support.c (my\_socket, my\_connect): New functions. (\_gpgme\_assuan\_system\_hooks): Add my\_Socket, my\_connect.
- \* priv-io.h (\_gpgme\_io\_socket): New prototype.
- \* w32-io.c (pid\_to\_handle, handle\_to\_oid, fd\_to\_handle): Remove macros. (is\_socket): Remove function. (\_gpgme\_io\_spawn) [HAVE\_W32CE\_SYSTEM]: Remove some dead code. (\_gpgme\_io\_spawn): Translate handles before DuplicateHandle them.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

- \* w32-util.c (mkstemp): Don't use CreateFile instead of open (the function is not used on Windows CE, and the callers were not adjusted).

2011-01-21 Marcus Brinkmann <mb@g10code.com>

- \* engine-gpgconf.c (\_gpgme\_conf\_opt\_change): Fix the case that is not self-assignment.

2010-12-08 Werner Koch <wk@g10code.com>

- \* gpgme-tool.c (strcpy\_escaped\_plus): New. (DIM, xtoi\_1, xtoi\_2): New. (cmd\_keylist): Allow for multiple patterns.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

- \* w32-io.c (create\_reader, create\_writer): Use small stack size on Windows CE.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

\* gpgme.h.in (gpgme\_conf\_arg\_new): Make VALUE arg const void \*.  
\* gpgconf.c (\_gpgme\_conf\_arg\_new): Likewise.  
(gpgme\_conf\_arg\_new): Likewise.  
\* engine-gpgconf.c (\_gpgme\_conf\_arg\_new): Likewise.  
(gpgconf\_write): Remove debug hack.

2010-11-19 Marcus Brinkmann <mb@g10code.com>

\* engine-gpgconf.c (\_gpgme\_conf\_opt\_change): Support self-assignment. Requested by Marc Mutz.

2010-11-17 Marcus Brinkmann <mb@g10code.com>

\* vasprintf.c (int\_vasprintf) [HAVE\_W32CE\_SYSTEM]: Just use a fixed size buffer, as va\_copy is not easy to fake.

2010-11-15 Marcus Brinkmann <mb@g10code.com>

\* w32-ce.h (strcasecmp, strdup) [\_MSC\_VER]: Define.  
\* genkey.c, passphrase.c: Include util.h.  
  
\* w32-util.c (\_gpgme\_w32ce\_get\_debug\_envvar): Fix return value.

2010-11-15 Werner Koch <wk@g10code.com>

\*  
data-compat.c (gpgme\_data\_new\_from\_filepart)  
(gpgme\_data\_new\_from\_file) [W32CE && \_MSC\_VER]: Return not GPG\_ERR\_NOT\_IMPLEMENTED.  
  
\* w32-ce.h (HKEY\_PERFORMANCE\_DATA, HKEY\_CURRENT\_CONFIG, \_IOLBF) (abort) [\_MSC\_VER]: Provide these macros.  
  
\* ath.h [W32CE && \_MSC\_VER]: Include winsock2.h.  
  
\* ath.c (ath\_read, ath\_write) [W32CE && \_MSC\_VER]: Do not call non-available functions.

2010-11-04 Werner Koch <wk@g10code.com>

\* w32-ce.h [\_MSC\_VER && W32CE]: Undef leave.  
\* export.c: Include util.h so that we get the above undef.  
  
\* memrchr.c: Remove. Used to be a replacement function required by the formerly included assuan code.

2010-11-03 Werner Koch <wk@g10code.com>

\* debug.c (\_gpgme\_debug) [W32CE]: Replace localtime by GetLocalTime.

\* signers.c (gpgme\_signers\_clear): Remove useless return.  
Reported by Patrick Spendrin.

\* w32-util.c: s/\_\_\_inline\_\_\_/GPG\_ERR\_INLINE/

\* setenv.c: Include string.h due to our strerror replacement.

\* w32-ce.h (access, bsearch):

New macros.

\* w32-ce.c (\_gpgme\_wince\_access): New.

(RegQueryValueExA): Change DATA to a void\*.

(\_gpgme\_wince\_bsearch): New. Taken from glibc 2.6.

Guard include of sys/stat.h and sys/types.h.

2010-11-02 Werner Koch <wk@g10code.com>

\* data-fd.c (read, write, lseek) [W32CE && ! \_\_MINGW32CE\_\_]: New.  
Taken from Pedro Alves Public Domain code.

\* w32-ce.h (SHGetSpecialFolderPath): Remove our defines and  
prototypes. We use the system provided prototypes now.

\* w32-ce.c: Include shlobj.h

(\_WIN32\_IE): Define to 0x0400

(CreateFileA): New.

\* w32-util.c: Explicitly include windows headers before util.h.

(\_gpgme\_w32ce\_get\_debug\_envvar): Do not use wchar\_t strings for  
read\_w32\_registry\_string.

(mkstemp): Use CreateFile instead of open.

\* w32-io.c (handle\_to\_fd, fd\_tohandle): Add. We need them for W32.

\* w32-util.c (\_WIN32\_IE): Define to 0x0400.

\* util.h [W32]: Include windows.h.

\* w32-sema.c: Do not include windows.h directly.

\* ath.c (ssize\_t, pid\_t)[\_MSC\_VER]: Add new  
types.

\* gpgme.c (gpgme\_result\_ref, gpgme\_result\_unref): Do not use a  
void pointer in pointer arithmetic.

\* w32-util.c: Include util.h prior to ath.h. Don't include  
windows.h directly.

(F\_OK): Define if not defined.

\* w32-ce.c: Include string.h.

(RegQueryValueExA): Use WINAPI modifier to match the declaration.

\* vfs-create.c: Include string.h because under W32CE with MSC we



get a warning related to our strerror replacement.  
\* encrypt-sign.c: Include stdlib.h, string.h and errno.h.  
\* priv-io.h [W32CE]: Include w32-ce.h  
\* w32-ce.h: Include winsock2.h and ws2tcpip.h.  
(\_MSV\_VER): Remove useless macro.  
(pid\_t): Add typedef.

Guard all includes of unistd.h and sys/time.h.

2010-10-28 Marcus Brinkmann <marcus@g10code.com>

\* opassuan.c (gpgme\_op\_assuan\_transact\_ext): Fix uninitialized value use. Reported by Marc Mutz.

2010-10-07 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (ARGP\_ERR\_UNKNOWN): Use EDEADLK if available.

\* w32-util.c (\_gpgme\_w32ce\_get\_debug\_envvar) [W32CE]:  
New.

\* debug.c (debug\_init) [W32CE]: Use new function.

2010-09-16 Werner Koch <wk@g10code.com>

\* import.c: Include "util.h".  
(parse\_import): Return GPG\_ERR\_MISSING\_ISSUER\_CERT.

\* util.h: Add fallback define for GPG\_ERR\_MISSING\_ISSUER\_CERT.

\* op-support.c: Include "util.h".  
(\_gpgme\_parse\_inv\_recp): Handle new code 12.

2010-09-02 Marcus Brinkmann <marcus@g10code.de>

\* error.c (gpgme\_err\_code\_to\_errno): Fix cut and paste bug (thanks to Marc Mutz).

2010-09-01 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c: Revert change from 2009-06-18, as it created a race condition.

2010-08-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.def: Add gpgme\_err\_code\_from\_syserror and gpgme\_err\_set\_errno.

\* libgpgme.vers: Likewise.

\* gpgme.h.in (gpgme\_error\_from\_errno): Fix return type to gpgme\_error\_t.

(gpgme\_err\_code\_from\_syserror, gpgme\_err\_set\_errno): New prototype.

(gpgme\_error\_from\_syserror): New inline function (why are gpgme\_err\_make\_from\_errno and gpgme\_error\_from\_errno not inline functions?).

\* error.c (gpgme\_error\_from\_errno): Fix return type to gpgme\_error\_t.  
(gpgme\_err\_set\_errno, gpgme\_err\_code\_from\_syserror): New functions.

2010-08-03 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (result\_encrypt\_to\_xml, result\_sign\_to\_xml)  
(result\_verify\_to\_xml, result\_import\_to\_xml)  
(result\_genkey\_to\_xml): Check vigorously for null pointers.

\* w32-io.c (GPGCEDEV\_IOCTL\_ASSIGN\_RVID): New macro.  
(\_gpgme\_io\_spawn): Use ASSIGN\_RVID.

2010-06-11 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (\_gpgme\_io\_spawn): Remove debug printf.

2010-06-10 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (gpgme\_server): Use special hack for Windows CE to get at stdin and stdout.

\* engine-gpgsm.c (gpgsm\_new): Translate returned achild\_fds back to child\_fds.

\* debug.h (TRACE\_SUC6): New macro.

\* w32-io.c (MAX\_SLAFD): New macro.

(fd\_table): New static variable.

(new\_fd, release\_fd): New functions.

(fd\_to\_handle, handle\_to\_fd, handle\_to\_socket):

Remove macros.

(MAX\_READERS, MAX\_WRITERS): Increase to 64.

(notify\_table): Increase to MAX\_SLAFD.

(struct reader\_context\_s, struct writer\_context\_s): Add member file\_sock.

(reader, writer): Use file\_hd vs file\_sock to decide if socket operations to use. Remove auto-detect mode.

(create\_reader, create\_writer): Set file\_sock. Unblock pending thread only if this is a pipe fd.

(\_gpgme\_io\_pipe): Allocate fds from table and return slot indices instead of windows handles. This allows to properly handle RVIDs.

(\_gpgme\_io\_close): Handle dup'ed file descriptors.

(build\_commandline) [HAVE\_W32\_SYSTEM]: Use RVID from fd table now.

(\_gpgme\_io\_spawn): Use fd table now.

(\_gpgme\_io\_fd2str): Use RVID from fd table now.

(\_gpgme\_io\_dup): Implement using fd table.

(\_gpgme\_io\_socket): Allocate fds from table.

(\_gpgme\_io\_connect): Use fd from table.

\* w32-glib-io.c (find\_channel): Check that the slot is used.

2010-06-09 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c [HAVE\_W32CE\_SYSTEM]:

Include assuan.h and winioctl.h.

(GPGCEDEV\_IOCTL\_UNBLOCK) [HAVE\_W32CE\_SYSTEM]: Define.

(set\_synchronize) [HAVE\_W32CE\_SYSTEM]: Stub it out.

(is\_socket): Allow to return -1 for auto-detect (old behaviour).

(is\_socket) [HAVE\_W32CE\_SYSTEM]: Return -1.

(reader): Handle auto-detect case. Handle ctx->stop\_me before checking for EOF.

(destroy\_reader) [HAVE\_W32CE\_SYSTEM]: Unblock a pending reader.

(writer): Handle auto-detect case. Handle ctx->stop\_me with ERROR\_BUSY.

(destroy\_writer) [HAVE\_W32CE\_SYSTEM]: Unblock a pending writer.

(\_gpgme\_io\_pipe) [HAVE\_W32CE\_SYSTEM]: Implement in terms of a half-pipe.

(build\_commandline) [HAVE\_W32CE\_SYSTEM]: New function.

(\_gpgme\_io\_spawn) [HAVE\_W32CE\_SYSTEM]: Implement it differently for this platform.

(\_gpgme\_io\_fd2str) [HAVE\_W32CE\_SYSTEM]: Implement it for RVIDs.

(\_gpgme\_io\_dup) [HAVE\_W32CE\_SYSTEM]: Stub it out.

\* gpgme-tool.c (result\_add\_timestamp): Add missing NULL argument.

(result\_sign\_to\_xml): Protect against NULL fingerprint.

(struct server): New members input\_fd, input\_filename, input\_stream output\_fd, output\_filename, output\_stream, message\_filename, message\_stream.

(server\_reset\_fds): Deallocate those.

(server\_parse\_fd): New function.

(server\_data\_obj): Take optional filename argument and direction argument. Also take new argument to return a filestream that needs to be closed after destroying the data object.

Change all callers, too.

(input\_notify, output\_notify): Removed.

(cmd\_input, cmd\_output): New functions.

(gpgme\_server): Do not register input and output notifier.

(register\_commands): Use cmd\_input and cmd\_output.

(cmd\_message): Rewritten to use server\_parse\_fd.

(cmd\_delete, cmd\_keylist): Fix inverted option check.

(main) [HAVE\_W32CE\_SYSTEM]: Sleep a bit to work around bug in ssh.

\* genkey.c (gpgme\_op\_genkey): Return err with TRACE\_ERR.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c (\_gpgme\_timegm) [HAVE\_W32\_SYSTEM]: New static function.

(\_gpgme\_parse\_timestamp)

[HAVE\_W32\_SYSTEM]: Use it.

\* gpgme-tool.c (main): Protect call to setlocale with HAVE\_SETLOCALE.

\* Makefile.am (system\_components): Remove custom cppflags from RCCOMPILER (because gpg-error adds -idirafter that makes RC bail. [HAVE\_W32CE\_SYSTEM]: Add w32-ce.h and w32-ce.c, clear libexec\_PROGRAMS.

\* w32-ce.h, w32-ce.c: New files.

\* priv-io.h: Include <sys/types.h>

\* util.h: Likewise.

2010-05-11 Marcus Brinkmann <marcus@g10code.de>

\* w32-util.c: Include ath.h

(HAVE\_ALLOW\_SET\_FOREGROUND\_WINDOW) [!HAVE\_W32CE\_SYSTEM]: Define it.

(RTLD\_LAZY, dlopen, dlsym,

dlclose) [!HAVE\_ALLOW\_SET\_FOREGROUND\_WINDOW]: Don't define anymore.

(\_gpgme\_allow\_set\_foreground\_window) [!HAVE\_ALLOW\_SET\_FOREGROUND\_WINDOW]:

Make it a stub.

(read\_w32\_registry\_string): Use FooA variants of Windows functions instead of Foo (which dispatches depending on UNICODE).

[!HAVE\_W32CE\_SYSTEM]: Don't check environment.

(w32\_shgetfolderpath): Remove.

(find\_program\_at\_standard\_place): Call

SHGetSpecialFolderPath

(which is available on all Windows systems

and also Windows CE).

(mkstemp): Use ath\_self instead of getpid.

(\_gpgme\_mkstemp): Use GetTempPathA instead of GetTempPath.

\* gpgme.h.in: Use \_WIN32 instead of \_MSC\_VER. Include time.h for time\_t.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

\* engine-g13.c, gpgme.c, engine-gpgsm.c, engine-gpg.c,

op-support.c, engine-assuan.c, gpgme-tool.c: Include <locale.h>

only if available with HAVE\_LOCALE\_H and conditionalize use of LC\_CTYPE on its definition.

\* engine-gpgconf.c: Do not include <locale.h>.

\* engine-gpgsm.c (gpgsm\_new, start): Cast between int and assuan\_fd\_t.

\* assuan-support.c (my\_pipe, my\_close, my\_read, my\_write): Likewise.

\* gpgme-tool.c (server\_data\_obj, server\_reset\_fds, gpgme\_server), (my\_recvmsg, my\_sendmsg, my\_spawn): Likewise.

\* engine-assuan.c (start): Likewise.

\* engine-g13.c (start): Likewise.

2010-05-06 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c, w32-io.c, w32-qt-io.cpp,

w32-sema.c, w32-util.c:

Do not include <signal.h>.

\* sign.c, data-user.c, conversion.c, debug.c, verify.c, data.c, decrypt.c, delete.c, assuan-support.c, import.c, engine-gpgsm.c, data-mem.c, op-support.c, w32-io.c, w32-util.c, data-compat.c: Use gpg\_error\_from\_syserror instead gpg\_error\_from\_errno, and use gpg\_err\_set\_errno to set error number.

\* setenv.c: Include <gpg-error.h> and define \_\_set\_errno to use gpg\_err\_set\_errno.

\* gpgme-tool.c (ARGP\_ERR\_UNKNOWN): Define to EDEADLOCK (which is mapped in Windows CE) instead of E2BIG (which is not).

(gt\_import\_keys): Initialize err.

2010-04-19 Marcus Brinkmann <marcus@g10code.de>

\* assuan-support.c (my\_spawn): Cast to avoid warning.

\* engine-g13.c (g13\_new): Make ARGV array of pointer to const char.

(g13\_assuan\_simple\_command) [!USE\_DESCRIPTOR\_FUNCTION]: Don't define.

\* ops.h (\_gpgme\_key\_append\_name): Same in prototype.

\* key.c (\_gpgme\_key\_append\_name): Make SRC argument pointer to const char.

\* posix-util.c

(\_gpgme\_get\_uiserver\_socket\_path): Make HOMEDIR const.

\* vfs-mount.c (gpgme\_op\_vfs\_transact\_start): Never define this potentially useful but currently unused function.

\* vfs-create.c (gpgme\_op\_vfs\_transact\_start): Likewise.

2010-04-16 Werner Koch <wk@g10code.com>

\* w32-io.c (is\_socket): New.

(reader, writer): Use it to figure out the API to use.

2010-03-15 Werner Koch <wk@g10code.com>

\* gpgme.h.in: Add autoconf template to set generated file to read-only in an emacs buffer.

2010-03-12 Werner Koch <wk@g10code.com>

\* gpgme.h.in (GPGME\_STATUS\_SUCCESS): Use the right file for the change; see below.

\* passwd.c (op\_data\_t): New.

(passwd\_start): Setup OPD.

(passwd\_status\_handler): Return GPG\_ERR\_NOT\_SUPPORTED if needed.

\* context.h (OPDATA\_PASSWD): New.

\* gpgme.h (GPGME\_STATUS\_SUCCESS): New.

2010-03-09 Werner Koch <wk@g10code.com>

\* engine-gpgsm.c (gpgsm\_keylist): Try to start the agent.

2010-02-17 Werner Koch <wk@g10code.com>

\* posix-io.c (notify\_table):

Change implementation.

(notify\_table\_item\_t, notify\_table\_size, notify\_table\_lock): New.

(\_gpgme\_io\_close, \_gpgme\_io\_set\_close\_notify): Adjust for new implementation.

2010-02-16 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (spacep, has\_option, skip\_options): New.

(cmd\_export): Implement option --minimal.

\* gpgme.h.in (GPGME\_EXPORT\_MODE\_MINIMAL): New.

\* export.c (export\_start, export\_ext\_start): Implement it.

\* engine-gpg.c (export\_common): Ditto.

2010-01-25 Werner Koch <wk@g10code.com>

\* w32-io.c (\_gpgme\_io\_connect): Fix return code check to make it work.

\* version.c (do\_subsystem\_inits): Remove superfluous second WSASStartup.

2010-01-22 Werner Koch <wk@g10code.com>

\* w32-io.c (writer): Try to use send first.  
(reader): Try to use recv first.

2010-01-08 Werner Koch <wk@g10code.com>

\* engine-gpg.c (gpg\_passwd): New.  
(\_gpgme\_engine\_ops\_gpg): Register.  
\* passwd.c (parse\_error): New.  
(passwd\_status\_handler): Use it.

2010-01-07 Marcus Brinkmann <marcus@g10code.de>

\*  
gpgme-tool.c (result\_xml\_write\_cb\_t, struct result\_xml\_state):  
New types.  
(MAX\_TAGS): New macro.  
(result\_init, result\_xml\_indent, result\_xml\_tag\_start)  
(result\_xml\_tag\_data, result\_xml\_tag\_end, result\_add\_error)  
(result\_add\_pubkey\_algo, result\_add\_hash\_algo, result\_add\_keyid)  
(result\_add\_fpr, result\_add\_timestamp, result\_add\_sig\_mode)  
(result\_add\_value, result\_add\_string, result\_encrypt\_to\_xml)  
(result\_decrypt\_to\_xml, result\_sign\_to\_xml)  
(result\_verify\_to\_xml, result\_import\_to\_xml)  
(result\_genkey\_to\_xml, result\_keylist\_to\_xml)  
(result\_vfs\_mount\_to\_xml): New functions.  
(gt\_result): Rewritten.

2010-01-05 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (gt\_passwd, cmd\_passwd): New.  
(register\_commands): Register.  
  
\* gpgme.h.in (gpgme\_op\_passwd\_start, gpgme\_op\_passwd): New.  
\* libgpgme.vers, gpgme.def: Add new functions.  
\* passwd.c: New.  
\* Makefile.am (main\_sources): Add passwd.c  
\* engine.c, engine.h (\_gpgme\_engine\_op\_passwd): New.  
\* engine-backend.h (struct  
engine\_ops): Add PASSWD.  
\* engine-gpgsm.c (gpgsm\_passwd): New.  
(\_gpgme\_engine\_ops\_gpgsm): Register.  
(gpgsm\_reset): Reset only if we have a connection.  
  
\* gpgme.h.in (GPGME\_PK\_ECDSA, GPGME\_PK\_ECDH): New.  
\* gpgme.c (gpgme\_pubkey\_algo\_name): Add them.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

\* debug.c: Test for TLS, not \_\_GNU\_\_

2009-12-15 Marcus Brinkmann <marcus@g10code.de>

\* assuan-support.c (my\_spawn): Calloc, not malloc, the fd\_items.

2009-12-10 Werner Koch <wk@g10code.com>

\* debug.c (debug\_init): Test on sgid process.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (LTRCCOMPILER): Refactor with ...

(RCCOMPILER): ... this new macro.

(SUFFIXES): Add .lo.

(gpgme\_res\_ldflag): Removed.

(gpgme\_res): Use libtool object file name here.

(libgpgme\_la\_LDFLAGS): Remove gpgme\_res\_ldflag usage.

(libgpgme\_la\_LIBADD): Add gpgme\_res.

\* ath.c (ath\_self) [HAVE\_W32\_SYSTEM]: Fix typo.

2009-12-02 Werner Koch <wk@g10code.com>

\* gpgconf.c (gpgme\_conf\_arg\_release):

No return in a function

returning void. Reported by Wyllys Ingersoll.

2009-12-01 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (cmd\_getauditlog): Add flag --html.

(hlp\_getauditlog): New.

\* gpgme-tool.c (GT\_GCC\_A\_SENTINEL, GT\_GCC\_A\_PRINTF): New.

(gt\_write\_status): Use sentinel.

(argp\_error, log\_error): Use printf attribute.

(argp\_parse): Remove extra argument to argp\_error.

(\_gt\_progress\_cb, gt\_get\_engine\_info, gt\_get\_keylist\_mode)

(gt\_result): Add NULL arg.

2009-11-26 Marcus Brinkmann <marcus@g10code.de>

\* opassuan.c (opassuan\_start): Allocate result structure before beginning operation.

2009-11-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (gpgme\_server): Use assuan\_fd\_t and assuan\_fdopen



on fds.

2009-11-13 <wk@g10code.com>

- \* sign.c (\_gpgme\_sign\_status\_handler): Handle SIG\_CREATED\_SEEN.
- \* engine-uiserver.c (uiserver\_sign): Make sending SENDER optional.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

- \* op-support.c (\_gpgme\_op\_reset):  
Instead of last change, only set  
sub protocol if it is not the default.

2009-11-10 Werner Koch <wk@g10code.com>

- \* op-support.c (\_gpgme\_op\_reset): Ignore GPG\_ERR\_NOT\_IMPLEMENTED  
while setting the sub protocol.
- \* engine-uiserver.c (uiserver\_new): Pass fdpassing flag to  
assuan\_socket\_connect.  
(set\_recipients): Replace fingerprint by user id.
- \* engine-gpgsm.c (set\_recipients): Fix non-terminating loop in  
case of a missing key.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_new): Set default sub protocol.
- \* gpgme-tool.c: Implement get sub protocol.
- \* gpgme.h.in (gpgme\_get\_sub\_protocol): Add prototype.
- \* gpgme.def, libgpgme.vers: Add gpgme\_get\_sub\_protocol.
- \* context.h (struct gpgme\_context): New member sub\_protocol.
- \* gpgme.c (gpgme\_set\_sub\_protocol): Set CTX->sub\_protocol.  
(gpgme\_get\_sub\_protocol): New function.
- \* op-support.c (\_gpgme\_op\_reset): Set sub protocol.
- \* Makefile.am (uiserver\_components): New variable.  
(main\_sources):  
Add it.
- \* ops.h, key.c (\_gpgme\_key\_append\_name): Take CONVERT argument,  
implement it. Adjust callers.  
(gpgme\_key\_from\_uid): New function.
- \* gpgme.h.in (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_DEFAULT.  
(gpgme\_encrypt\_flags\_t): Add GPGME\_ENCRYPT\_PREPARE,  
GPGME\_ENCRYPT\_EXPECT\_SIGN.
- (gpgme\_set\_sub\_protocol, gpgme\_key\_from\_uid): New functions.
- \* libgpgme.vers, gpgme.def: Add new functions.

\* gpgme.c (gpgme\_set\_protocol): Add UIServer protocol.  
(gpgme\_set\_sub\_protocol): New function.  
(gpgme\_get\_protocol\_name): Add UIServer and default protocol.  
\* assuan-support.c: Return correct error values, implement  
socketpair for POSIX.  
\* priv-io.h, posix-io.c, w32-io.c, w32-glib-io.c,  
w32-qt-io.cpp (\_gpgme\_io\_spawn): Add ATFORK and ATFORKVALUE  
arguments. Implement it for POSIX. Adjust all callers.  
\* engine.h, engine-backend.h (\_gpgme\_engine\_set\_protocol)  
(\_gpgme\_engine\_op\_decrypt\_verify): New prototypes. Adjust all  
users.  
\* engine.c (engine\_ops, gpgme\_get\_engine\_info): Add UIServer  
engine.  
(\_gpgme\_engine\_set\_protocol,  
\_gpgme\_engine\_op\_decrypt\_verify): New  
function.  
\* decrypt-verify.c (decrypt\_verify\_start): Call  
\_gpgme\_engine\_op\_decrypt\_verify.  
\* util.h, posix-util.c,  
w32-util.c (\_gpgme\_get\_uiserver\_socket\_path): New function.  
\* engine-gpgsm.c (gpgsm\_set\_fd): Fix \_gpgme\_io\_pipe invocation.  
\* gpgme-tool.c: Some support for UIServer protocol.  
\* engine-uiserver.c: New file.

2009-11-09 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Close server side FDs.

2009-11-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (struct gpgme\_tool): New members write\_data and  
write\_data\_hook.  
(gt\_write\_data): New function.  
(gt\_result): Output vfs\_mount result.  
(server\_write\_data): New function.  
(gpgme\_server): Initialize write\_data members.

2009-11-05 Marcus Brinkmann <marcus@g10code.de>

\* engine-g13.c (struct engine\_g13): Remove members RESULT\_CB and  
RESULT\_CB\_VALUE.  
(g13\_assuan\_simple\_command, status\_handler): Don't use those  
anymore.  
(g13\_transact): Remove them from argument list, too.  
\* vfs-mount.c (\_gpgme\_vfs\_mount\_status\_handler): New function.  
(\_gpgme\_op\_vfs\_mount): Pass it to transact.  
  
\* engine-assuan.c (lass\_new): Update use of assuan\_socket\_connect.

- \* engine-gpgsm.c (gpgsm\_new): Update use of assuan\_pipe\_connect.
- \* engine-g13.c (g13\_new): Likewise.
  
- \* priv-io.h (IOspawn\_FLAG\_NOCLOSE): New flag.
- \* w32-io.c (\_gpgme\_io\_spawn): Implement this flag.
- \* posix-io.c (\_gpgme\_io\_spawn): Likewise.
- \* w32-glib-io.c (\_gpgme\_io\_spawn): Likewise.
- \* assuan-support.c (my\_spawn): Set this flag.
  
- \* decrypt.c (gpgme\_op\_decrypt\_start): Fix use of debug macro.
- \* decrypt-verify.c (gpgme\_op\_decrypt\_verify\_start): Likewise.
- \* delete.c (gpgme\_op\_delete\_start): Likewise.
- \* edit.c (gpgme\_op\_edit\_start, gpgme\_op\_card\_edit\_start):  
Likewise.
- \* encrypt.c (gpgme\_op\_encrypt\_start): Likewise.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* export.c (gpgme\_op\_export\_start, gpgme\_op\_export\_ext\_start)  
(gpgme\_op\_export\_keys\_start,  
gpgme\_op\_export\_keys): Likewise.
- \* genkey.c (gpgme\_op\_genkey\_start): Likewise.
- \* getauditlog.c (gpgme\_op\_getauditlog\_start): Likewise.
- \* import.c (gpgme\_op\_import\_start, gpgme\_op\_import\_keys\_start):  
Likewise.
- \* opassuan.c (gpgme\_op\_assuan\_transact\_start): Likewise.
- \* sign.c (gpgme\_op\_sign\_start): Likewise.
- \* verify.c (gpgme\_op\_verify\_start): Likewise.
- \* vfs-create.c (gpgme\_op\_vfs\_create): Likewise.
- \* vfs-mount.c (gpgme\_op\_vfs\_mount): Likewise.

2009-11-04 Marcus Brinkmann <marcus@g10code.de>

- \* ath.h (ath\_self): New prototype. Include <stdint.h>
- \* ath.c, ath-pth.c, ath-pthread.c (ath\_self): New function.
- \* debug.h: Rewrite most macros to beautify debug output.  
(\_gpgme\_debug\_buffer): Remove tagname and tag argument.  
(\_gpgme\_debug\_frame\_begin, \_gpgme\_debug\_frame\_end): New prototypes.
- \* debug.c: Include <time.h>. Don't include assuan.h.  
(frame\_nr, FRAME\_NR): New thread-specific variable and macro.  
(debug\_init): Do not initialize assuan.  
Call \_gpgme\_debug after  
initialization instead using printf directly.  
(\_gpgme\_debug): Do not call debug\_init (we now ensure proper  
initialization by user). Add timestamp and thread/process ID.  
(\_gpgme\_debug\_buffer): Do not take tagname and tag argument.  
(\_gpgme\_debug\_frame\_begin, \_gpgme\_debug\_frame\_end): New functions.
- \* version.c (gpgme\_check\_version\_internal, gpgme\_check\_version):  
Fix debug string. Do not initialize assuan.
- \* posix-io.c (get\_max\_fds): Use 0 not NULL (nicer debug output).

2009-11-04 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (register\_commands): Add HELP feature.

2009-11-03 Werner Koch <wk@g10code.com>

\* gpgme.h.in (GPGME\_PROTOCOL\_UISEVER): New.

2009-11-03 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (main\_sources): Change g13.c to vfs-mount.c. Add  
vfs-create.c

\* vfs-create.c: New file.

\* g13.c: Renamed to ...

\* vfs-mount.c: ... this new file.

\* gpgme.h.in (gpgme\_op\_vfs\_create): New prototype.

\* gpgme.def, libgpgme.vers: Add gpgme\_op\_vfs\_create.

\*

gpgme-tool.c (gt\_vfs\_create, cmd\_vfs\_create): New functions.

(register\_commands): Add VFS\_CREATE and CREAET.

2009-11-02 Marcus Brinkmann <marcus@g10code.de>

\* debug.h (\_gpgme\_debug\_buffer): Make TAG argument const const.

\* debug.c (\_gpgme\_debug\_buffer): Likewise.

\* gpgme-tool.c (input\_notify, output\_notify): Adjust type to new  
assuan interface.

\* decrypt.c (gpgme\_op\_decrypt\_result): Remove unused variable.

\* opassuan.c (gpgme\_op\_assuan\_transact): Fix return value.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (noinst\_PROGRAMS): New target gpgme-tool.

(gpgme\_tool\_LDADD): New variable.

\* gpgme-tool.c: New file.

\* ops.h (\_gpgme\_sig\_notation\_clearm \_gpgme\_signers\_clear): New  
prototypes.

\* gpgme.c (gpgme\_set\_protocol): Allow GPGME\_PROTOCOL\_GPGCONF (when  
had that gone missing?).

(\_gpgme\_sig\_notation\_clear): New function without debug output.

(gpgme\_release): Call it and \_gpgme\_signers\_clear.

\* signers.c (\_gpgme\_signers\_clear): New

function without debug output.

\* g13.c (gpgme\_op\_vfs\_mount): Add debug output.

\* assuan-support.c (my\_spawn): Allow fd\_child\_list to be NULL.

\* conversion.c (\_gpgme\_encode\_percent\_string): Fix infinite loop.

\* debug.h: Put tag in front of debug lines, should make for nicer

output.

- \* engine-assuan.c (lass\_new): Use our new system hooks for libassuan.
- \* engine-g13.c (g13\_new): Remove redundant assuan context allocation.
- \* version.c (gpgme\_check\_version\_internal): Delay debug output until after gpgme\_check\_version was called.

2009-10-28 Marcus Brinkmann <marcus@g10code.de>

- \* signers.c, encrypt-sign.c, encrypt.c, delete.c, keylist.c, edit.c, import.c, export.c: Fix last change in debug output.

2009-10-27 Marcus Brinkmann <marcus@g10code.de>

- \* edit.c (gpgme\_op\_edit\_start, gpgme\_op\_edit) (gpgme\_op\_card\_edit\_start, gpgme\_op\_card\_edit): Add debug output.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign\_start) (gpgme\_op\_encrypt\_sign): Likewise.
- \* encrypt.c (gpgme\_op\_encrypt\_start, gpgme\_op\_encrypt) (gpgme\_op\_encrypt\_result): Likewise.
- \* export.c (gpgme\_op\_export\_start, gpgme\_op\_export) (gpgme\_op\_export\_ext\_start, gpgme\_op\_export\_ext) (gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): Likewise.
- \* genkey.c (gpgme\_op\_genkey\_start, gpgme\_op\_genkey) (gpgme\_op\_genkey\_result): Likewise.
- \* getauditlog.c (gpgme\_op\_getauditlog\_start) (gpgme\_op\_getauditlog): Likewise.
- \* import.c (gpgme\_op\_import\_result, gpgme\_op\_import\_start) (gpgme\_op\_import): Likewise.
- \* keylist.c (gpgme\_op\_keylist\_result, keylist\_colon\_handler) (gpgme\_op\_keylist\_start, gpgme\_op\_keylist\_ext\_start) (gpgme\_op\_keylist\_next, gpgme\_op\_keylist\_end, gpgme\_get\_key): Likewise.
- \* opassuan.c (gpgme\_op\_assuan\_transact\_start) (gpgme\_op\_assuan\_transact\_ext, gpgme\_op\_assuan\_result) (gpgme\_op\_assuan\_transact): Likewise.
- \* signers.c (gpgme\_signers\_add, gpgme\_signers\_clear): Likewise.
- \* trustlist.c (gpgme\_op\_trustlist\_start) (gpgme\_op\_trustlist\_next, gpgme\_op\_trustlist\_end): Likewise.
- \* verify.c (gpgme\_op\_verify\_start, gpgme\_op\_verify) (gpgme\_op\_verify\_result): Likewise.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h.in (struct gpgme\_io\_event\_done\_data) (gpgme\_io\_event\_done\_data\_t): New types.
- (struct \_gpgme\_op\_assuan\_result): Deprecate the err member.
- (gpgme\_op\_assuan\_result): Deprecate (for now).

(gpgme\_op\_assuan\_transact\_ext): New prototype.

(gpgme\_op\_assuan\_transact): Deprecate.

(struct\_gpgme\_op\_g13\_result): Replace with ...

(struct\_gpgme\_op\_vfs\_mount\_result): ... this.

(gpgme\_op\_g13\_mount): Replace with ...

(gpgme\_op\_vfs\_mount): ... this.

\* gpgme.def (gpgme\_op\_assuan\_transact\_ext, gpgme\_wait\_ext)  
(gpgme\_op\_vfs\_mount\_result, gpgme\_op\_vfs\_mount): New.

(gpgme\_op\_g13\_mount): Remove.

\* libgpgme.vers: Likewise.

\* engine-backend.h (struct engine\_ops): Remove RESULT\_CB and  
RESULT\_CB\_VALUE args in opassuan\_transact member. Add CANCEL\_OP  
member.

\* ops.h (\_gpgme\_cancel\_with\_err, \_gpgme\_wait\_on\_condition): Add  
OP\_ERR argument.

(\_gpgme\_wait\_one\_ext):  
New prototype.

\* context.h (ctx\_op\_data\_id\_t): Add OPDATA\_VFS\_MOUNT.

\* engine-g13.c (g13\_cancel\_op): New function.

(parse\_status): Remove declaration.

(g13\_assuan\_simple\_command): Do nothing with status lines for now.

(status\_handler): Update opaque value access.

(\_gpgme\_engine\_ops\_g13): Add new cancel\_op member.

\* gpgme.c (\_gpgme\_cancel\_with\_err): Add new parameter OP\_ERR.  
Handle operational errors.

(gpgme\_cancel, gpgme\_io\_read, gpgme\_io\_write): Add debug output.

\* data.c (\_gpgme\_data\_inbound\_handler)  
(\_gpgme\_data\_outbound\_handler): Adjust opaque value access.

\* engine-gpg.c (command\_handler, status\_handler)  
(colon\_line\_handler): Likewise.

\* engine-gpgsm.c (status\_handler): Likewise.

\* engine-gpg.c (\_gpgme\_engine\_ops\_gpg): Add cancel\_op member.

\* engine-gpgsm.c (\_gpgme\_engine\_ops\_gpgsm): Likewise.

\* g13.c: Rewritten (and will be rewritten again).

\* engine.h (\_gpgme\_engine\_op\_assuan\_transact): Remove result\_cb  
and result\_cb\_value parameters from prototype.

(\_gpgme\_engine\_cancel\_op):  
New prototype.

\* engine.c (engine\_ops) [! ENABLE\_ASSUAN]: Add missing comma.

(\_gpgme\_engine\_op\_assuan\_transact): Remove result\_cb and  
result\_cb\_value parameter.

(\_gpgme\_engine\_cancel\_op): New function.

\* wait.h (\_gpgme\_run\_io\_cb): Add new argument OP\_ERR.

(struct io\_cb\_data): New struct to pass opaque data and get a  
op\_err return value. Needed because we can't modify I/O callback  
handler signature because it is exposed to the user.

\* wait.c (\_gpgme\_run\_io\_cb): Add OP\_ERR parameter. Handle  
operational errors.

- \* wait-user.c (`_gpgme_user_io_cb_handler`): Handle operational errors.
- \* wait-private.c (`_gpgme_wait_on_condition`): New argument to retrieve the operational result. Handle operational errors in session based protocols.
- (`_gpgme_wait_one_ext`): New function.
- (`_gpgme_wait_one`): Pass argument in invocation of `_gpgme_wait_on_condition`.
- \* wait-global.c (struct `ctx_list_item`): Add member `OP_ERR`.
- (`ctx_done`): New argument `OP_ERR`.
- (`ctx_wait`): New argument `OP_ERR`.
- (`gpgme_wait_ext`): New function based on `gpgme_wait` but handling operational errors.
- (`gpgme_wait`): Implement in term of `gpgme_wait_ext`.
- \* keylist.c (`gpgme_op_keylist_next`): Pass argument in invocation of `_gpgme_wait_on_condition`.
- \* trustlist.c (`gpgme_op_trustlist_next`): Pass argument in invocation of `_gpgme_wait_on_condition`.
- \* engine-assuan.c (struct `engine_lllass`): Replace members `RESULT_CB` and `RESULT_CB_VALUE` by `LAST_OP_ERR`.
- (`_gpgme_engine_assuan_last_op_err`): Add this hack function.
- (`lllass_cancel_op`): New function.
- (`_gpgme_engine_lllass_ops`): Add `cancel_op` member.
- (`lllass_status_handler`): Update opaque value access.
- (`lllass_transact`): Remove `RESULT_CB` and `RESULT_CB_VALUE` arguments.
- \* opassuan.c: Move compat hacks to the end of file.
- (`opassuan_start`): Do not set `OPD->result.err`.
- Do not pass `RESULT_Cb` and `CTX` to `_gpgme_engine_op_assuan_transact`.
- (`gpgme_op_assuan_transact_ext`): New function.
  
- \* debug.h (`DEBUG_GLOBAL`): New debug level.
- \* conversion.c (`gnupg_errors`, `_gpgme_map_gnupg_error`): Removed.
- \* data-user.c (`gpgme_data_new_from_cbs`): Add debug output.
- \* data-fd.c (`gpgme_data_new_from_fd`): Likewise.
- \* data-stream.c (`gpgme_data_new_from_stream`): Likewise.
- \* decrypt.c (`gpgme_op_decrypt_result`, `gpgme_op_decrypt_start`) (`gpgme_op_decrypt`): Likewise.
- \* delete.c (`gpgme_op_delete_start`, `gpgme_op_delete`): Likewise.
- \* decrypt-verify.c (`gpgme_op_decrypt_verify_start`) (`gpgme_op_decrypt_verify`): Likewise.
- \* sign.c (`gpgme_op_sign_result`): Fix debug message.
- \* data-mem.c (`gpgme_data_new`): Improve debug output.
- \* verify.c (`parse_trust`): Use `atoi` instead of `_gpgme_map_gnupg_error`.
- \* decrypt.c (`_gpgme_decrypt_status_handler`): Likewise.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am: Remove @NETLIBS@ from LIBADDs.
- (g13\_components): New variable.
- (main\_sources): Add \$(g13\_components).
- \* g13.c, engine-g13.c: New files.
- \* engine.c (engine\_ops): Check for assuan for assuan engine, add g13 engine.
- \* util.h (\_gpgme\_get\_g13\_path, \_gpgme\_encode\_percent\_string): New prototypes.
- \* conversion.c (\_gpgme\_encode\_percent\_string): New function.
- \* gpgme.h.in (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_G13.
- (struct \_gpgme\_op\_g13\_result, gpgme\_g13\_result\_t): New types.
- (gpgme\_op\_g13\_mount): New function.
- \* gpgme.def, libgpgme.vers: Add gpgme\_op\_g13\_mount.
- \* gpgme.c (gpgme\_set\_protocol): Allow GPGME\_PROTOCOL\_G13.
- (gpgme\_get\_protocol\_name): Add GPGME\_PROTOCOL\_G13.
- \* posix-util.c (\_gpgme\_get\_g13\_path): New function.
- \* w32-util.c (\_gpgme\_get\_g13\_path): New function.
- \* engine-backend.h (\_gpgme\_engine\_ops\_g13): New declaration.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme-config.in (netlibs): Remove.
- (assuan\_cflags, assuan\_libs): Add.
  
- \* Makefile.am (assuan\_cppflags, assuan\_libobjs): Removed.
- (gpgsm\_components): Move engine-assuan.c to ...
- (assuan\_components): ... this new variable.
- (main\_sources): Add this new variable.
- (AM\_CPPFLAGS): Remove \$(assuan\_cppflags).
- (AM\_CFLAGS): Add @LIBASSUAN\_CFLAGS@.
- (libgpgme\_la\_DEPENDENCIES, libgpgme\_pth\_la\_DEPENDENCIES)
- (libgpgme\_glib\_la\_DEPENDENCIES, libgpgme\_qt\_la\_DEPENDENCIES)
- (libgpgme\_pthread\_la\_DEPENDENCIES): Remove \$(assuan\_libobjs).
- (libgpgme\_la\_LIBADD, libgpgme\_pth\_la\_LIBADD)
- (libgpgme\_glib\_la\_LIBADD, libgpgme\_qt\_la\_LIBADD))
- (libgpgme\_pthread\_la\_LIBADD): Replace \$(assuan\_libobjs) by @LIBASSUAN\_LIBS@.
- \* priv-io.h (![HAVE\_W32\_SYSTEM]): Declare \_gpgme\_io\_recvmsg, \_gpgme\_io\_sendmsg, \_gpgme\_io\_waitpid.
- \* engine-backend.h: Define with [ENABLE\_ASSUAN] instead of [ENABLE\_GPGSM].
- \* posix-io.c (\_gpgme\_io\_waitpid): Make non-static.
- \* util.h (ENABLE\_ASSUAN): Declare \_gpgme\_assuan\_system\_hooks, \_gpgme\_assuan\_malloc\_hooks, \_gpgme\_assuan\_log\_cb.



\* engine-gpgsm.c: Don't map assuan error codes. Use  
assuan\_release instead of assuan\_disconnect.  
(map\_assuan\_error): Remove function.  
(gpgsm\_new): Use new assuan context interface.  
\* engine-assuan.c: Use assuan\_release instead of  
assuan\_disconnect.  
(lass\_new): Use new assuan context  
interface.

2009-10-07 <wk@g10code.com>

\* priv-io.h [W32]: Include windows.h instead of sys/socket.h.

2009-08-06 Werner Koch <wk@g10code.com>

\* op-support.c (\_gpgme\_parse\_inv\_recp): Allow for no fingerprint.

\* engine-gpgsm.c (gpgsm\_sign): Hook up the status func for the  
SIGNER command.  
\* gpgme.h.in (GPGME\_STATUS\_INV\_SGMR, GPGME\_STATUS\_NO\_SGMR): New.  
\* sign.c (op\_data\_t): Add fields IGNORE\_INV\_RECP and INV\_SGMR\_SEEN.  
(\_gpgme\_op\_sign\_init\_result): Factor code out to ...  
(sign\_init\_result): .. new. Init new fields.  
(sign\_start): Use sign\_init\_result.  
(\_gpgme\_sign\_status\_handler): Take care of the new INV\_SGMR.  
Return an error if no signature has been created.

2009-07-07 Werner Koch <wk@g10code.com>

\* engine-gpgsm.c (struct engine\_gpgsm): Add fields  
input\_helper\_data and input\_helper\_memory.  
(close\_notify\_handler): Release these new fields.  
(gpgsm\_import): Implement the keyarray feature.  
  
\* engine-gpg.c (gpg\_import): Actually return GPG\_ERR\_INV\_VALUE.

\*  
engine-gpgsm.c (gpgsm\_import): Return an error for unknown data  
encodings.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

\* debug.h: Everywhere, use %p instead of 0x%x to print pointer.  
[HAVE\_STDINT\_H]: Include <stdint.h>.  
(\_TRACE, TRACE, TRACE0, TRACE1, TRACE2, TRACE3, TRACE6): Cast tag  
to (uintptr\_t) before casting it to (void\*) to silence GCC  
warning.

- \* gpgme.h.in (\_GPGME\_DEPRECATED\_OUTSIDE\_GPGME): New macro.
- \* sign.c (\_GPGME\_IN\_GPGME): Define it.
- \* keylist.c (\_GPGME\_IN\_GPGME): Define it.
  
- \* debug.c (\_gpgme\_debug\_begin, \_gpgme\_debug\_add): Handle error in vasprintf and asprintf.
  
- \* priv-io.h: Include <sys/socket.h>. Declare \_gpgme\_io\_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h.in (GPGME\_CONF\_PATHNAME): Revert last change, it's back! (GPA still uses it...).
  
- \* gpgme.def: Fix stupid typo.
- \* w32-io.c (\_gpgme\_io\_pipe): Add missing declaration.
  
- \* gpgme.h.in (GPGME\_CONF\_PATHNAME): Remove obsolete macro.
  
- \* w32-io.c (\_gpgme\_io\_pipe): Allocate reader/writer thread right away.  
(\_gpgme\_io\_read, \_gpgme\_io\_write, \_gpgme\_io\_select)  
(\_gpgme\_io\_dup): Never allocate threads here.  
(find\_writer, find\_reader): Check return value of thread creation function.
  
- \* context.h (CTX\_OP\_DATA\_MAGIC): New macro.  
(struct ctx\_op\_data): New member MAGIC.
- \* op-support.c (\_gpgme\_op\_data\_lookup): Initialize magic.
- \* gpgme.c (gpgme\_result\_unref, gpgme\_result\_ref): Check magic.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_result\_unref): Hot fix to release a lock.
  
- \* gpgme.c (result\_ref\_lock): New global variable.  
(gpgme\_result\_ref, gpgme\_result\_unref): use it.

2009-06-16 Werner Koch <wk@g10code.com>

- \* version.c: Include stdlib.h.
  
- \* gpgme.h.in (gpgme\_data\_encoding\_t): Add GPGME\_DATA\_ENCODING\_URL, GPGME\_DATA\_ENCODING URLESC, GPGME\_DATA\_ENCODING\_URL0.
- \* data.c (gpgme\_data\_set\_encoding): Adjust for new values.
- \* engine-gpg.c (string\_from\_data): New.  
(gpg\_import): Implement --fetch-key feature.

\* gpgme.h.in  
(gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): New.  
\* gpgme.def, libgpgme.vers: Add them.  
\* export.c (gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): New.  
(export\_keys\_start): New.

\* gpgme.h.in (gpgme\_export\_mode\_t, GPGME\_EXPORT\_MODE\_EXTERN): New.  
(gpgme\_op\_export\_start, gpgme\_op\_export, gpgme\_op\_export\_ext\_start)  
(gpgme\_op\_export\_ext): Change arg RESERVED to MODE of new  
compatible type.  
\* export.c (gpgme\_export\_ext\_start, gpgme\_op\_export)  
(gpgme\_op\_export\_ext\_start, gpgme\_op\_export\_ext): Ditto.  
(export\_start): Ditto.  
\* engine.c (\_gpgme\_engine\_op\_export): Ditto.  
\* engine-backend.h (struct engine\_ops): Ditto.  
\* engine-gpgsm.c (gpgsm\_export, gpgsm\_export\_ext): Ditto.  
\* engine-gpg.c (gpg\_export, gpg\_export\_ext): Ditto. Implement  
mode EXTERN.  
(gpg\_export, gpg\_export\_ext): Factor common code out to ..  
(export\_common): .. this.

\* gpgme.h.in (gpgme\_op\_import\_keys\_start, gpgme\_op\_import\_keys): New.  
\* gpgme.def, libgpgme.vers: Add them.  
\* import.c (gpgme\_op\_import\_keys\_start,  
gpgme\_op\_import\_keys): New.  
(\_gpgme\_op\_import\_keys\_start): New.  
\* engine.c (\_gpgme\_engine\_op\_import): Add arg KEYARRAY.  
\* engine-backend.h (struct engine\_ops): Ditto.  
\* engine-gpgsm.c (gpgsm\_import): Ditto. Not functional.  
\* engine-gpg.c (gpg\_import): Ditto. Implement it.

2009-06-15 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in (gpgme\_result\_ref, gpgme\_result\_unref): Add  
prototypes.  
\* gpgme.def, libgpgme.vers (gpgme\_result\_ref, gpgme\_result\_unref):  
Add these.  
\* context.h (struct ctx\_op\_data): Add member "references".  
\* gpgme.c (gpgme\_result\_ref, gpgme\_result\_unref): New functions.  
(\_gpgme\_release\_result): Use gpgme\_result\_unref.  
\* op-support.c (\_gpgme\_op\_data\_lookup): Initialize references.

2009-06-12 Werner Koch <wk@g10code.com>

\* gpgme-w32spawn.c (translate\_get\_from\_file): Parse optional spawn  
flags. Add new arg R\_FLAGS. Fix segv on file w/o LF.  
(translate\_handles): Add new arg R\_FLAGS. Avoid possible segv.

(main): Pass flags for my\_spawn.

(my\_spawn):

Add arg FLAGS and implement AllowSetForegroundWindow.

\* priv-io.h (IOSPAWN\_FLAG\_ALLOW\_SET\_FG): New.

\* w32-io.c (\_gpgme\_io\_spawn): Add arg FLAGS and implement it.

\* w32-glib-io.c (\_gpgme\_io\_spawn): Ditto.

\* w32-qt-io.cpp (\_gpgme\_io\_spawn): Ditto.

\* posix-io.c (\_gpgme\_io\_spawn): Add dummy arg FLAGS.

\* engine-gpg.c (start): Call spawn with new flag.

\* w32-util.c (\_gpgme\_allow\_set\_foreground\_window): Rename to  
\_gpgme\_allow\_set\_foreground\_window. Change all callers.

\* posix-util.c (\_gpgme\_allow\_set\_foreground\_window): Ditto.

2009-06-10 Werner Koch <wk@g10code.com>

\* w32-util.c (\_gpgme\_allow\_set\_foreground\_window): Add trace support.

2009-06-09 Werner Koch <wk@g10code.com>

\* engine-gpg.c (gpg\_io\_event): Test for cmd.fd.

\* version.c (gpgme\_check\_version\_internal): Make result const.

\* gpgme.c: Include priv-io.h.

(gpgme\_io\_read, gpgme\_io\_write): New.

\* libgpgme.vers (GPGME\_1.1): Add them.

\* gpgme.def: Ditto.

\* Makefile.am (main\_sources): Remove gpgme.h.

(include\_HEADERS):

Rename to nodist\_include\_HEADERS so that a

VPATH build won't use the distributed one.

\* util.h (GPG\_ERR\_NOT\_OPERATIONAL): Define.

2009-05-28 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in (gpgme\_check\_version\_internal): New prototype.

(gpgme\_check\_version): New macro, overriding function of the same  
name.

\* libgpgme.vers, gpgme.def: Add gpgme\_check\_version\_internal.o

\* context.h (\_gpgme\_selftest): New variable declaration.

\* version.c: Include "context.h".

(gpgme\_check\_version): Set \_gpgme\_selftest on success.

(gpgme\_check\_version\_internal): New function.

\* gpgme.c (\_gpgme\_selftest): Define it.

(gpgme\_new): Check the selftest result.

2009-05-18 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h.in (gpgme\_encrypt\_flags\_t): Add GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO.
- \* engine-gpg.c (gpg\_encrypt): Pass --no-encrypt-to to gpg if GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO flag is set.

2009-05-14 Werner Koch <wk@g10code.com>

- \* gpgme.h.in (gpgme\_status\_code\_t): Explicitly initialize for better maintainability and to help debugging.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h.in: Add compile time check for \_FILE\_OFFSET\_BITS.

2009-04-15 Marcus Brinkmann <marcus@g10code.de>

- \* posix-io.c (\_gpgme\_io\_socket, \_gpgme\_io\_connect): New functions.
- \* w32-io.c (\_gpgme\_io\_connect): Fix stupid error.

2009-04-08 Marcus Brinkmann <marcus@g10code.de>

- \* w32-glib-io.c (giochannel\_table): New members used, fd, socket. (find\_channel): Drop CREATE argument. (new\_dummy\_channel\_from\_fd, new\_channel\_from\_fd) (new\_channel\_from\_socket): New functions. (\_gpgme\_io\_fd2str): Implement for sockets. (\_gpgme\_io\_write, \_gpgme\_io\_read): Translate EAGAIN errors correctly. (\_gpgme\_io\_pipe): Fix for new channel bookkeeping. (\_gpgme\_io\_close, \_gpgme\_io\_dup): Likewise. (wsa2errno, \_gpgme\_io\_socket, \_gpgme\_io\_connect): New.
- \* w32-io.c (MAX\_READERS, MAX\_WRITERS): Bump up to 40. (wsa2errno, \_gpgme\_io\_socket, \_gpgme\_io\_connect): New.
- \* w32-qt-io.cpp (\_gpgme\_io\_socket, \_gpgme\_io\_connect): New stubs.
- \* version.c [HAVE\_W32\_SYSTEM]: Include "windows.h. (do\_subsystem\_inits) [HAVE\_W32\_SYSTEM]: Call WSAStartup.
- \* engine-assuan.c (lass\_status\_handler): Ignore EAGAIN errors.

2009-03-18 Werner Koch <wk@g10code.com>

- \* gpgme.h.in (GPGME\_KEYLIST\_MODE\_EPHEMERAL): New.
- \* engine-gpgsm.c (gpgsm\_keylist): Send new option.

2009-03-13 Werner Koch <wk@g10code.com>

\* gpgme-config.in: Make sure locale is set to C.

2009-02-24 Werner Koch <wk@g10code.com>

\* gpgme.h.in (struct \_gpgme\_op\_assuan\_result): New.  
(gpgme\_assuan\_result\_t): New.  
(gpgme\_op\_assuan\_result): Change return type.  
(struct \_gpgme\_assuan\_sendfnc\_ctx)  
(gpgme\_assuan\_sendfnc\_ctx\_t, gpgme\_assuan\_sendfnc\_t): Remove.  
(gpgme\_assuan\_inquire\_cb\_t): Changed.  
\* opassuan.c (op\_data\_t): Make use of a result structure.  
(gpgme\_op\_assuan\_result): Change return type.  
(opassuan\_start): Use result structure.  
(result\_cb): Ditto.  
\* engine-assuan.c (struct \_gpgme\_assuan\_sendfnc\_ctx):  
Remove.  
(inquire\_cb\_sendfnc): Remove.  
(inquire\_cb): Change for new callback scheme. Not yet finished.  
(llass\_status\_handler): Allow sending a CANCEL from the inquire CB.

2009-02-04 Werner Koch <wk@g10code.com>

\* w32-glib-io.c (\_gpgme\_io\_spawn): Make ARGV argument const to  
match prototype.  
\* w32-qt-io.cpp (\_gpgme\_io\_spawn): Ditto.

2009-02-03 Werner Koch <wk@g10code.com>

\* gpgme.h.in (struct \_gpgme\_subkey): Add fields IS\_CARDKEY and  
CARD\_NUMBER..  
\* key.c (gpgme\_key\_unref): Release field CARD\_NUMBER.  
\* keylist.c (keylist\_colon\_handler): Factor common code out to ...  
(parse\_sec\_field15): New. Set card number.

2009-01-26 Werner Koch <wk@g10code.com>

\* opassuan.c, dirinfo.c, engine-assuan.c: New.  
\* Makefile.am: Add them.  
\* engine-backend.h: Add \_gpgme\_engine\_ops\_assuan.  
(struct engine\_ops): Add field OPASSUAN\_TRANSACT. Update all  
engine initializers.  
\* Makefile.am (gpgsm\_components): Add engine-assuan.c.  
\* gpgme.h.in (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_ASSUAN.  
(gpgme\_assuan\_data\_cb\_t,

gpgme\_assuan\_sendfnc\_ctx\_t)  
(gpgme\_assuan\_inquire\_cb\_t, gpgme\_assuan\_status\_cb\_t): New.  
(gpgme\_op\_assuan\_transact\_start, gpgme\_op\_assuan\_transact): New.  
\* gpgme.c (gpgme\_get\_protocol\_name): Ditto.  
(gpgme\_set\_protocol): Support it.  
\* engine.c (gpgme\_get\_engine\_info): Ditto.  
(engine\_ops): Register it.  
(\_gpgme\_engine\_op\_assuan\_transact): New.  
\* libgpgme.vers (gpgme\_op\_assuan\_transact\_start)  
(gpgme\_op\_assuan\_transact): New.  
\* gpgme.def (gpgme\_op\_assuan\_transact\_start)  
(gpgme\_op\_assuan\_transact): New.  
\* engine-backend.h (struct engine\_ops): Add GET\_HOME\_DIR and  
initialize to NULL for all engines.  
\* engine.c (engine\_get\_home\_dir): New.  
(gpgme\_get\_engine\_info): Use it.  
(\_gpgme\_set\_engine\_info): Use it.  
\* engine.h (engine\_assuan\_result\_cb\_t): New.  
\* context.h (ctx\_op\_data\_id\_t): Add OPDATA\_ASSUAN.  
  
\* util.h (GPG\_ERR\_UNFINISHED): Define if not yet defined.  
  
\* version.c (gpgme\_check\_version): Protect trace arg against NULL.

2009-01-19 Werner

Koch <wk@g10code.com>

\* rungpg.c: Rename to engine-gpg.c  
\* Makefile.am (main\_sources): Ditto.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (status-table.h): Use \$(builddir) to find gpgme.h.

2008-11-18 Werner Koch <wk@g10code.com>

\* version.c (do\_subsystem\_inits): Always initialize I/O  
subsystem. Fixes regression from 2007-08-02.  
  
\* decrypt.c (\_gpgme\_decrypt\_status\_handler): Use  
\_gpgme\_map\_gnupg\_error to parse the error code for decrypt.algorithm.

2008-10-30 Marcus Brinkmann <marcus@g10code.de>

\* wait-private.c (\_gpgme\_wait\_on\_condition): Remove unused  
variable IDX.  
\* wait-global.c: Include ops.h to silence gcc warning.  
(\_gpgme\_wait\_global\_event\_cb): Pass error value directly.

\* wait-user.c: Include ops.h to silence gcc warning.

\* posix-io.c (\_gpgme\_io\_spawn): Make ARGV argument const to silence gcc warning. Cast argument to execv to silence warning.

\* w32-io.c (\_gpgme\_io\_spawn): Likewise.

\* priv-io.h (\_gpgme\_io\_spawn): Likewise for prototype.

2008-10-24 Werner Koch <wk@g10code.com>

\* runpg.c (gpg\_keylist\_preprocess): Escape backslashes too.

2008-10-23 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (gpg\_keylist\_preprocess): Convert percent escaped string to C coded string.

2008-10-20 Werner Koch <wk@g10code.com>

\* Makefile.am (EXTRA\_DIST): Add gpgme.h.in.

\* gpgme.h: Rename to gpgme.h.in.

\* gpgme.h.in (GPGME\_VERSION): Use autoconf substitution.

\* posix-io.c: Include sys/uio.h. Fixes bug #818.

2008-10-18 Marcus Brinkmann <marcus@g10code.com>

\* w32-util.c (find\_program\_in\_registry): Don't define.

(\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path)

(\_gpgme\_get\_gpgconf\_path): Do not check for fooProgram in the registry anymore. It is now no longer possible to overwrite the default location in that way.

2008-10-17 Werner Koch <wk@g10code.com>

\* w32-glib-io.c (\_gpgme\_io\_fd2str): Use "%d" and not "%ld" to work around a bug in mingw32.

2008-09-23 Marcus Brinkmann <marcus@g10code.com>

\*

gpgme.c (gpgme\_sig\_notation\_clear): Clear CTX->sig\_notations.

Submitted by "Daniel Mueller" <daniel@danm.de>

2008-09-16 Marcus Brinkmann <marcus@g10code.com>

\* runpg.c (gpg\_new): Don't use errno with ttyname\_r.



2008-08-11 Marcus Brinkmann <marcus@g10code.com>

- \* `rungpg.c` (`gpg_cancel`): Remove cmd fd before status fd.
- \* `gpgme.c` (`_gpgme_cancel_with_err`): New function.  
(`gpgme_cancel`): Reimplement in terms of `_gpgme_cancel_with_err`.
- \* `wait-private.c` (`_gpgme_wait_on_condition`): Use `_gpgme_cancel_with_err`.
- \* `wait-user.c` (`_gpgme_user_io_cb_handler`): Likewise.
- \* `wait-global.c` (`_gpgme_wait_global_event_cb`, `gpgme_wait`): Likewise.

2008-08-08 Marcus Brinkmann <marcus@g10code.com>

- \* `rungpg.c` (`command_handler`): Remove I/O callback on error, too.

2008-06-29 Marcus Brinkmann <marcus@g10code.com>

- \* `gpgme.c` (`gpgme_cancel_async`): Remove unused variable.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

- \* `libgpgme.vers`: Add `gpgme_cancel_async`.
- \* `gpgme.def`: Likewise.
  
- \* `context.h`:  
Include `"sema.h"`.  
(`struct gpgme_context`): New members `lock` and `canceled`.
- \* `gpgme.c` (`gpgme_new`): Initialize lock.
- (`gpgme_release`): Destroy lock.
- (`gpgme_cancel_async`): New function.
- \* `op-support.c` (`_gpgme_op_reset`): Reset the canceled flag.
- \* `wait-global.c` (`gpgme_wait`): Check cancel flag before processing any I/O callbacks.
- \* `wait-private.c` (`_gpgme_wait_on_condition`): Likewise.
- \* `wait-user.c` (`_gpgme_user_io_cb_handler`): Likewise.

2008-06-26 Werner Koch <wk@g10code.com>

- \* `w32-util.c` (`_gpgme_mkstemp`): Replace `sprint` by `stpcpy`.  
(`mkstemp`): Need to use `GetSystemTimeAsFileTime` for better compatibility.

2008-06-25 Marcus Brinkmann <marcus@g10code.de>

- \* `gpgme-w32spawn.c`: New file.
- \* `Makefile.am` (`libexec_PROGRAMS`) [`HAVE_W32_SYSTEM`]: New variable with `gpgme-w32spawn`.
- \* `engine-gpgsm.c` (`gpgsm_new`): Use server translated handles.

(gpgsm\_set\_locale): Return early if locale value is NULL.

\* util.h (\_gpgme\_mkstemp)

(\_gpgme\_get\_w32spawn\_path) [HAVE\_W32\_SYSTEM]: New function prototypes.

\*

w32-util.c: Include <stdint.h>, <sys/stat.h> and <unistd.h>.

(letters, mkstemp, \_gpgme\_mkstemp, \_gpgme\_get\_w32spawn\_path): New functions.

\* runpgg.c (gpg\_decrypt, gpg\_encrypt, gpg\_encrypt\_sign)

(gpg\_genkey, gpg\_import, gpg\_verify, gpg\_sign): Pass data over special filename FD rather than stdin.

(struct arg\_and\_data\_s): Add member ARG\_LOCP.

(struct fd\_data\_map\_s): Add member ARG\_LOC.

(struct engine\_gpg): Add member ARG\_LOC to status and colon.

(\_add\_arg, add\_arg\_with\_locp): New function.

(add\_arg\_ext): Reimplement in terms of \_add\_arg.

(gpg\_new): Remember argument location for status FD.

(build\_argv): Set argument location if requested. Also set argument location of fd\_data\_map for data items.

(start): Adjust caller of \_gpgme\_io\_spawn.

\* priv-io.h (struct spawn\_fd\_item\_s): Add members peer\_name and arg\_loc.

(\_gpgme\_io\_spawn): Remove parent fd list argument.

\* posix-io.c (get\_max\_fds): New function.

(\_gpgme\_io\_dup): Add tracing.

(\_gpgme\_io\_spawn):

Remove parent fd list. Change meaning of child fd list to contain all child fds that should be inherited. Close all other file descriptors after fork.

\* w32-io.c, w32-glib-io.c, w32-qt-io.c(\_gpgme\_io\_spawn): Remove parent fd list. Change meaning of child fd list to contain all child fds that should be inherited. Do not inherit any file descriptors, but DuplicateHandle them. Spawn process through wrapper process. Provide wrapper process with a temporary file containing handle translation data. Return translated handle names.

\* w32-io.c (reader): Add more tracing output.

(\_gpgme\_io\_read): Likewise.

\* engine-gpgconf.c (gpgconf\_read): Adjust caller of \_gpgme\_io\_spawn.

\* version.c (\_gpgme\_get\_program\_version): Likewise.

2008-06-20 Werner Koch <wk@g10code.com>

\* engine-gpgconf.c (gpgconf\_read): Change ARGV initialization for compatibility with old compilers. Fix amount of memmove. Fix CR removal.

2008-06-19 Werner Koch <wk@g10code.com>

- \* gpgme.h (GPGME\_CONF\_PATHNAME):  
Replace by GPGME\_CONF\_FILENAME,  
change all callers and provide compatibility macro.
- (gpgme\_conf\_type\_t): Add complex types 34..37.
- \* engine-gpgconf.c (gpgconf\_parse\_option, arg\_to\_data)  
(\_gpgme\_conf\_arg\_new, \_gpgme\_conf\_arg\_release): Add new types.

2008-06-19 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgconf.c (gpgconf\_parse\_option): Fix comma detection.

2008-05-09 Werner Koch <wk@g10code.com>

- \* engine-gpgconf.c (gpgconf\_read): Do not pass empty lines to the  
callback.

2008-05-07 Werner Koch <wk@g10code.com>

- \* engine-gpgconf.c (gpgconf\_write): Change argv[0] to a  
self-explaining string. Needs a proper fix, though.
- \* runpg.c (gpg\_keylist, gpg\_keylist\_ext): Factor common code out  
to ..
- (gpg\_build\_keylist\_options): .. new. Allow combination of extern  
and intern mode.
- (gpg\_new): DFT\_TTYNAME is an array, thus check the first character.

2008-05-06 Werner Koch <wk@g10code.com>

- \* version.c (extract\_version\_string): New.
- (\_gpgme\_get\_program\_version):  
Use it to allow for suffixes in the  
version line.

2008-04-28 Werner Koch <wk@g10code.com>

- \* engine-gpgconf.c (gpgconf\_read): Fixed segv. Avoid memmove for  
each line.

2008-04-22 Marcus Brinkmann <marcus@g10code.de>

- \* w32-qt-io.cpp, kdpipeiodevice.cpp: New versions from Frank  
Osterfeld, implement blocking select.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

\* data.c (gpgme\_data\_read, gpgme\_data\_write): Retry on EINTR.

2008-03-06 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_add\_sig): Terminate UID in case SRC is NULL.  
Reported by Marc Mutz.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

\* decrypt.c (release\_op\_data): Release OPD->result.recipients.  
\* encrypt.c (release\_op\_data): Release invalid\_recipient.

2008-02-15 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgconf.c (gpgconf\_read): Fix end-of-line handline.

2008-02-14 Werner Koch <wk@g10code.com>

\* w32-io.c (\_gpgme\_io\_spawn): Add arg R\_PID to return the pid.  
\* posix-io.c  
(\_gpgme\_io\_spawn): Ditto.  
\* w32-glib-io.c (\_gpgme\_io\_spawn): Ditto.  
\* w32-qt-io.cpp (\_gpgme\_io\_spawn): Ditto.  
\* priv-io.h (\_gpgme\_io\_spawn): Adjust prototyp and change all callers.  
\* runpgg.c (start): Call \_gpgme\_allow\_set\_foreground\_window.  
  
\* w32-util.c (\_gpgme\_allow\_set\_foreground\_window): New.  
\* posix-util.c (\_gpgme\_allow\_set\_foreground\_window): New.  
\* engine-gpgsm.c (default\_inq\_cb): New.  
(gpgsm\_new) [W32]: Enable pinentry notifications.  
(status\_handler): Handle inquiries.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

\* kdpipelinedevice.cpp: New version by Frank Osterfeld, fixes race condition.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (map\_input\_enc): Rename to ...  
(map\_data\_enc): ... this. Also change all callers.  
(gpgsm\_encrypt, gpgsm\_export, gpgsm\_export\_ext, gpgsm\_genkey)  
(gpgsm\_sign): Set encoding for output.

2008-01-28 Werner Koch <wk@g10code.com>

\* keylist.c (gpgme\_get\_key): Skip duplicated keys. Fixes bug 876.

2008-01-14

Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgconf.c (gpgconf\_config\_load\_cb): Fix program\_name field.

2008-01-10 Marcus Brinkmann <marcus@g10code.de>

\* kdpipelinedevice.cpp: New version from Frank Osterfeld.

\* engine-gpgconf.c (gpgconf\_config\_load\_cb2): Handle the flag NO\_ARG\_DESC.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (gpgconf\_components): New variable.  
(main\_sources): Add gpgconf.c.  
\* gpgme.h (gpgme\_protocol\_t): New protocol GPGME\_PROTOCOL\_GPGCONF.  
(gpgme\_conf\_level\_t, gpgme\_conf\_type\_t, gpgme\_conf\_arg\_t)  
(gpgme\_conf\_opt\_t, gpgme\_conf\_comp\_t, gpgme\_conf\_arg\_new)  
(gpgme\_conf\_arg\_release, gpgme\_conf\_opt\_change)  
(gpgme\_conf\_release, gpgme\_op\_conf\_load, gpgme\_op\_conf\_save): New types.  
\* gpgconf.c, engine-gpgconf.c: New files.  
\* engine.h: (\_gpgme\_engine\_op\_conf\_load, \_gpgme\_engine\_op\_conf\_save): New prototypes.  
\* op-support.c (\_gpgme\_op\_reset): Ignore not implemented locale function.  
\* posix-util.c (\_gpgme\_get\_gpgconf\_path): New function.  
\* w32-util.c (\_gpgme\_get\_gpgconf\_path): New function.  
\* engine-gpgsm.c:  
(\_gpgme\_engine\_ops\_gpgsm): Add stubs for conf\_load and conf\_save.  
\* runpgg.c:  
(\_gpgme\_engine\_ops\_gpg): Add stubs for conf\_load and conf\_save.  
\* gpgme.def: Add new gpgconf related interfaces.  
\* libgpgme.vers: Likewise.  
\* util.h (\_gpgme\_get\_gpgconf\_path): New prototype.  
\* gpgme.h (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_GPGCONF.  
\* engine-backend.h (\_gpgme\_engine\_ops\_gpgconf): New prototype.  
(struct engine\_ops): Add members for conf\_load and conf\_save.  
\* engine.c (engine\_ops): Add \_gpgme\_engine\_ops\_gpgconf.  
(\_gpgme\_engine\_op\_conf\_load, \_gpgme\_engine\_op\_conf\_save): New functions.  
(gpgme\_get\_engine\_info): Allow protocol GPGME\_PROTOCOL\_GPGCONF.

2007-11-28 Marcus Brinkmann <marcus@g10code.de>

\* w32-util.c (\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path): Search for installation directory. Remove old fallback default.  
(find\_program\_in\_inst\_dir): New function.

2007-11-26 Werner Koch <wk@g10code.com>

\*  
engine-gpgsm.c (struct engine\_gpgsm): Add field INLINE\_DATA and always reset it before calling start.  
(gpgsm\_new): Clear it.  
(status\_handler): Implement it.  
(gpgsm\_getauditlog) [USE\_DESCRIPTOR\_PASSING]: Use INLINE\_DATA.

2007-11-23 Werner Koch <wk@g10code.com>

\* op-support.c (\_gpgme\_op\_reset): Implement a no-reset flag.  
\* getauditlog.c (getauditlog\_start): Use that flag.

2007-11-20 Werner Koch <wk@g10code.com>

\* op-support.c (\_gpgme\_parse\_inv\_recp): Add new reason code 11.

2007-11-22 Werner Koch <wk@g10code.com>

\* gpgme.h (gpgme\_op\_getauditlog\_start, gpgme\_op\_getauditlog): New.  
\* libgpgme.vers: Ditto.  
\* gpgme.def: Ditto.  
\* getauditlog.c: New.  
\* engine-backend.h (struct engine\_ops): Add member GETAUDITLOG.  
\* engine-gpgsm.c (gpgsm\_getauditlog): New.  
(\_gpgme\_engine\_ops\_gpgsm): Insert new function.  
(gpgsm\_new): Try to enable audit log support.  
\* runpg.c (\_gpgme\_engine\_ops\_gpg): Insert dummy entry.

2007-11-12 Marcus Brinkmann <marcus@g10code.de>

\*  
kdpipelinedevice.cpp: New version from Frank Osterfeld.

2007-10-11 Marcus Brinkmann <marcus@g10code.de>

\* kdpipelinedevice.cpp: New version from Frank Osterfeld.

2007-10-09 Marcus Brinkmann <marcus@g10code.de>

\* kdpipelinedevice.cpp: New version from Frank Osterfeld and Marc Mutz.

2007-10-05 Marcus Brinkmann <marcus@g10code.de>

\* kdpipelinedevice.cpp, w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-04 Marcus Brinkmann <marcus@g10code.de>

\* kdpipelinedevice.h, kdpipelinedevice.cpp, kdpipelinedevice.moc, w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-02 Marcus Brinkmann <marcus@g10code.de>

\* kdpipelinedevice.cpp, kdpipelinedevice.moc: New versions.  
\* w32-qt-io.cpp (\_gpgme\_io\_fd2str): Print actual\_fd if available.  
(\_gpgme\_io\_dup): Only acquire a reference, do not actually dup.  
Submitted by Frank Osterfeld.

\* priv-io.h, engine-gpgsm.c: Add comments.  
\* w32-qt-io.cpp (\_gpgme\_io\_select): Remove code handling frozen FDs.  
\* w32-glib-io.c (\_gpgme\_io\_close):  
Always dereference the channel,  
even if not primary.  
(\_gpgme\_io\_dup): Acquire a reference. Replace unused  
implementation by assertion.

2007-09-28 Werner Koch <wk@g10code.com>

\* engine-gpgsm.c (iocb\_data\_t): Add SERVER\_FD\_STR.  
(gpgsm\_new): Set it.  
(gpgsm\_set\_fd): Use it.

\* w32-glib-io.c (find\_channel): Add a new primary flag.  
(\_gpgme\_io\_close): Close channel only if primary.  
(\_gpgme\_io\_dup): Put newfd into the table as shallow copy.

\* priv-io.h (struct io\_select\_fd\_s): Remove member FROZEN.  
\* w32-io.c (\_gpgme\_io\_select): Ditto.  
\* w32-glib-io.c (\_gpgme\_io\_select): Ditto.

\* posix-io.c (\_gpgme\_io\_select): Ditto.  
\* runpg.c (read\_status): Ditto.  
\* wait.c (fd\_table\_put): Ditto.

\* runpg.c (gpg\_io\_event): Add tracing.  
(start): Use gpg\_io\_event for sending the start event.  
\* engine-gpgsm.c (gpgsm\_io\_event): Add tracing.  
(start): Use gpgsm\_io\_event for sending the start event.  
\* wait.c (\_gpgme\_add\_io\_cb, \_gpgme\_run\_io\_cb): Add tracing.

2007-09-28 Marcus Brinkmann

<marcus@g10code.de>

\* kdpipelineio.moc, w32-qt-io.cpp, kdpipelineio.cpp: New versions from Frank Osterfeld.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (\_gpgme\_io\_spawn),  
w32-qt-io.cpp (\_gpgme\_io\_spawn), w32-io.c (\_gpgme\_io\_spawn): Close the process handle, return 0.

\* gpgme.h (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_UNKNOWN.  
\* gpgme.c (gpgme\_get\_protocol\_name): Implement support for GPGME\_PROTOCOL\_UNKNOWN.

\* kdpipelineio.h: Fix last change.

\* w32-glib-io.c (\_gpgme\_io\_pipe), w32-qt-io.c (\_gpgme\_io\_pipe),  
w32-io.c (\_gpgme\_io\_pipe), posix-io.c (\_gpgme\_io\_pipe): Fix debug output.

2007-09-25 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c, keylist.c: Include <sys/types.h>.

\* kdpipelineio.h: Use namespace \_gpgme\_.

\* kdpipelineio.cpp: Use namespace \_gpgme\_.

[Q\_OS\_WIN32 && NOMINMAX]: Do not define NOMINMAX again.

\* w32-qt-io.cpp: Change namespace of KDPipelineIODevice to \_gpgme\_::KDPipelineIODevice.

2007-09-17 Werner Koch <wk@g10code.com>

\*

rungpg.c (gpg\_new): Make robust against undefined ttyname or ttytype.

2007-09-14 Werner Koch <wk@g10code.com>

\* data-mem.c (gpgme\_data\_release\_and\_get\_mem): Fix tracing bug.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_release): Call gpgme\_sig\_notation\_clear.

2007-09-13 Marcus Brinkmann <marcus@g10code.de>



\* `rungpg.c` (`gpg_new`): Handle return value of `_gpgme_getenv` (fixes small memory leak).

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

\* `Makefile.am` (`libgpgme_qt_la_SOURCES`): Move `moc_kdpipeiodevice.cpp` to `EXTRA_DIST`, as this is only included by another file (it's more like a header file than a cpp file, but automake doesn't know that).

\* `w32-qt-io.cpp` (`_gpgme_io_spawn`): Fix several cast errors and typos.

\* `w32-io.c` (`_gpgme_io_write`): Use `TRACE_SYSRES` instead of `TRACE_SYS`.

(`libgpgme_qt_la_LIBADD`): Add `QT4_CORE_LIBS`, not `QT4_CORE_LIB`.

\* `kdpipeiodevice.h`, `kdpipeiodevice.cpp`, `moc_kdpipeiodevice.cpp`, `kdpipeiodevice.moc`, `w32-qt-io.c`:

New files.

\* `Makefile.am` (`ltlib_gpgme_extra`): Rename to `ltlib_gpgme_glib`.

(`ltlib_gpgme_qt`): New variable.

(`lib_LTLIBRARIES`): Add `$(ltlib_gpgme_qt)`.

(`libgpgme_qt_la_SOURCES`): New variable.

(`AM_CPPFLAGS`): Add `@QT4_CORE_INCLUDES@`

(`AM_CFLAGS`): Add `@QT4_CORE_CFLAGS@`.

(`libgpgme_qt_la_LDFLAGS`, `libgpgme_qt_la_DEPENDENCIES`)

(`libgpgme_qt_la_LIBADD`): New variables.

\* `sema.h` (`struct critsect_s`): Rename "private" to "priv" to make C++ users happy. Change users.

\* `posix-sema.c` (`_gpgme_sema_cs_enter`, `_gpgme_sema_cs_leave`)

(`_gpgme_sema_cs_destroy`): Likewise.

\* `w32-sema.c` (`critsect_init`, `_gpgme_sema_cs_enter`)

(`_gpgme_sema_cs_leave`, `_gpgme_sema_cs_destroy`): Likewise.

\* `w32-glib-io.c` (`gpgme_get_giochannel`): Change return type to `void*`.

(`gpgme_get_fdptr`): New function.

\* `w32-io.c` (`gpgme_get_fdptr`): New function

\* `gpgme.def`: Add `gpgme_get_fdptr`.

2007-08-22 Marcus Brinkmann <marcus@g10code.de>

\* `w32-io.c` (`_gpgme_io_write`): Return early if `COUNT` is zero.

(`writer`): Remove superfluous

check.

2007-08-20 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.h`: Move include of `gpg-error.h` out of extern "C".

2007-08-07 Werner Koch <wk@g10code.com>

- \* gpgme.h (struct \_gpgme\_signature): Add member CHAIN\_MODEL.
- \* verify.c (parse\_trust): Set Chain\_MODEL.

2007-08-02 Werner Koch <wk@g10code.com>

- \* w32-glib-io.c (\_gpgme\_io\_spawn): Use DETACHED\_PROCESS flag.
- \* w32-io.c (\_gpgme\_io\_spawn): Ditto.
- (\_gpgme\_io\_write): Map ERROR\_NO\_DATA to EPIPE.
- \* debug.c (\_gpgme\_debug): Enable assuan logging.
- (\_gpgme\_debug\_subsystem\_init): New.
- \* version.c (do\_subsystem\_inits): Disable assuan logging and initialize the debug system.
- (gpgme\_check\_version): Do not trace before the subsystems are initialized.

2007-07-17 Marcus Brinkmann <marcus@g10code.de>

- \* debug.c: Include <errno.h> and "debug.h".
- (\_gpgme\_debug): Save and restore ERRNO.
- (TOHEX): New macro.
- (\_gpgme\_debug\_buffer): New function.
- \* conversion.c, data-compat.c, data-mem.c, data.c, engine-gpgsm.c, gpgme.c, keylist.c, posix-io.c, runpgg.c, sign.c, version.c, w32-io.c, wait.c: Replace DEBUG macros by TRACE\_\* variants. In most of these files, add many more tracepoints.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c (status\_handler): Do not send BYE here.
- \* w32-io.c (struct reader\_context\_s, struct writer\_context\_s): New members REFCOUNT.
- (create\_reader, create\_writer): Initialize C->refcount to 1.
- (destroy\_reader, destroy\_writer): Only destroy if C->refcount drops to 0.
- (find\_reader, find\_writer, kill\_reader, kill\_writer): Beautify.
- \* priv-io.h (\_gpgme\_io\_dup): New prototype.
- \* posix-io.c (\_gpgme\_io\_dup): New function.
- \* w32-io.c (\_gpgme\_io\_dup): Likewise.
- \* w32-glib-io.c (\_gpgme\_io\_dup): Likewise.
- \* engine-gpgsm.c (start): Reverting to version 2007-07-10.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

\* data-user.c (user\_read, user\_write, user\_seek): Set errno and return -1 instead returning the error code directly.

\* data-compat.c (old\_user\_seek):  
Likewise.

\* gpgme.c (gpgme\_sig\_notation\_add): Return error properly.

\* Revert the "close\_notify\_handler" returns int stuff. Always close in the \_gpgme\_io\_close implementations.

\* engine-gpgsm.c (status\_handler): Try to terminate the connection in case of error.

\* w32-io.c (\_gpgme\_io\_read): Return C->error\_code in ERRNO.  
(\_gpgme\_io\_write): Likewise.

\* priv-io.h (\_gpgme\_io\_set\_close\_notify): Change type of HANDLER to \_gpgme\_close\_notify\_handler.  
(\_gpgme\_close\_notify\_handler): New type.  
(\_gpgme\_io\_dup): Remove prototype.

\* posix-io.c (notify\_table, \_gpgme\_io\_set\_close\_notify): Change type of HANDLER to \_gpgme\_close\_notify\_handler\_t.  
(\_gpgme\_io\_close): Do not close the FD if handler returns 0.  
(\_gpgme\_io\_dup): Remove function.

\* w32-io.c (notify\_table, \_gpgme\_io\_set\_close\_notify, \_gpgme\_io\_close): Change type of HANDLER to \_gpgme\_close\_notify\_handler\_t.  
(\_gpgme\_io\_close): Do not close the FD if handler returns 0.  
(\_gpgme\_io\_dup): Remove function.

\* w32-glib-io.c  
(\_gpgme\_io\_dup): Remove function.  
(\_gpgme\_io\_set\_close\_notify, notify\_table): Change type of HANDLER to \_gpgme\_close\_notify\_handler\_t.  
(\_gpgme\_io\_close): Do not close the FD if handler returns 0.

\* runpg.c (close\_notify\_handler): Change return type to int, return 1.

\* engine-gpgsm.c (close\_notify\_handler): Change return type to int, return 0 for status FD and 1 for all other FDs.  
(start): Do not duplicate the status FD.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am: Replace implicit rule by suffix rule. Add SUFFIXES for that.

2007-07-12 Werner Koch <wk@g10code.com>

\* version.c (do\_subsystem\_inits) [W32]: Make sure that the socket system has been started.

2007-07-10 Marcus Brinkmann <marcus@g10code.de>

- \* priv-io.h (\_gpgme\_io\_dup): New prototype.
- \* posix-io.c (\_gpgme\_io\_dup): New function.
- \* w32-io.c (\_gpgme\_io\_dup): Likewise.
- \* w32-glib-io.c (\_gpgme\_io\_dup): Likewise.
- \* engine-gpgsm.c (start): Use \_gpgme\_dup() instead of dup().

2007-07-08

Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c [HAVE\_W32\_SYSTEM]: Enable the bunch of the file.
- \* funopen.c (funopen): Rename to \_gpgme\_funopen.

2007-04-30 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c (gpgsm\_new): Fix error handling for ttyname\_r.
  - \* runpgg.c (gpg\_new): Likewise.
- Submitted by Stephen Tether.

2007-02-26 Werner Koch <wk@g10code.com>

- \* verify.c (op\_data\_t): New element PLAINTEXT\_SEEN.
- (\_gpgme\_verify\_status\_handler): Return an error if more than one plaintext has been seen.
- (parse\_error): New arg SET\_STATUS. Also detect it based on an ERROR status (gpg > 1.4.6).

2007-01-26 Werner Koch <wk@g10code.com>

- \* w32-io.c (build\_commandline): Fixed stupid quoting bug.
  - \* w32-glib-io.c (build\_commandline): Ditto.
- \* runpgg.c (gpg\_set\_locale): Avoid dangling pointer after free.
- \* gpgme-config.in: New options --get-gpg and --get-gpgsm.

2007-01-18 Marcus Brinkmann <marcus@g10code.de>

- \* data.h (\_gpgme\_data\_get\_fd): Add prototype.
- (gpgme\_data\_get\_fd\_cb):  
New type.
- (struct \_gpgme\_data\_cbs): New member get\_fd.
- \* data.c (\_gpgme\_data\_get\_fd): New function.
  - \* data-fd.c (fd\_get\_fd): New function.
- (fd\_cbs): Add fd\_get\_fd.
- \* data-stream.c (stream\_get\_fd): New function.
- (stream\_cbs): Add stream\_get\_fd.
- \* data-mem.c (mem\_cbs): Add NULL for get\_fd callback.

\* data-user.c (user\_cbs): Likewise.  
\* engine-gpgsm.c (gpgsm\_set\_fd) [USE\_DESCRIPTOR\_PASSING]: Try to short-cut by passing the data descriptor directly.

2007-01-17 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (build\_commandline): Quote all command line arguments.  
\* w32-glib-io.c (build\_commandline): Likewise.

2007-01-10 Werner Koch <wk@g10code.com>

\* ttyname\_r.c (ttyname\_r) [W32]: Return a dummy name.

2007-01-08 Werner Koch <wk@g10code.com>

\* version.c (do\_subsystem\_inits): Do assuan init only if building with Assuan.  
\* setenv.c: Include assuan-def.h only if building with Assuan support.

\* op-support.c (\_gpgme\_op\_reset): Set LC\_MESSAGES only if defined.

\* engine-gpgsm.c (gpgsm\_set\_locale): Ditto.

\* runpgg.c (gpg\_set\_locale): Ditto.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_set\_protocol): Shut down the engine when switching protocols.

(gpgme\_ctx\_set\_engine\_info): Likewise for engine info.

\* engine.h (\_gpgme\_engine\_reset): New function prototype.

\* engine.c (\_gpgme\_engine\_reset): New function.

\* engine-backend.h (struct engine\_ops): New member RESET.

\* runpgg.c (\_gpgme\_engine\_ops\_gpg): Add NULL for reset function.

\* engine-gpgsm.c (\_gpgme\_engine\_ops\_gpgsm)

[USE\_DESCRIPTOR\_PASSING]: Add gpgsm\_reset for reset.

(\_gpgme\_engine\_ops\_gpgsm) [!USE\_DESCRIPTOR\_PASSING]: Add NULL for reset function.

(gpgsm\_reset) [USE\_DESCRIPTOR\_PASSING]: New function.

\* op-support.c (\_gpgme\_op\_reset): Try to use the engine's reset function if available.

\* engine-gpgsm.c (gpgsm\_new): Move code to dup status\_fd to ... (start): ... here.

\* posix-io.c (\_gpgme\_io\_recvmsg, \_gpgme\_io\_sendmsg): New functions.

\*

engine.h (`_gpgme_engine_new`): Remove arguments `lc_ctype` and `lc_messages` from prototype.  
(`_gpgme_engine_set_locale`): New prototype.  
\* engine.c (`_gpgme_engine_set_locale`): New function.  
\* op-support.c (`_gpgme_op_reset`): Call `_gpgme_engine_set_locale`.  
\* engine-backend.h (struct `engine_ops`): Add new member `SET_LOCALE`.  
Remove arguments `lc_messages` and `lc_ctype` from member `NEW`.  
\* engine-gpgsm.c (struct `engine_gpgsm`): New members `lc_ctype_set` and `lc_messages_set`.  
(`gpgsm_new`): Remove `lc_messages` and `lc_ctype` arguments.  
(`gpgsm_set_locale`): New function.  
(`_gpgme_engine_ops_gpgsm`): Add `gpgsm_set_locale`.  
\* `runpgg.c` (struct `engine_gpg`): Add new members `lc_messages` and `lc_ctype`.  
(`gpg_release`): Release `lc_messages` and `lc_ctype` if set.  
(`gpg_new`): Remove `lc_messages` and `lc_ctype` arguments.  
(`gpg_set_locale`): New function.  
(`_gpgme_engine_ops_gpg`): Add `gpg_set_locale`.  
(`add_arg`): Implement in terms of:  
(`add_arg_ext`): New function.  
(`start`): Set `lc-messages` and `lc-ctype` arguments here.

2006-12-03

Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (struct `engine_gpgsm`): Move members `input_fd_server`, `output_fd_server`, `message_fd_server` to ...  
(`iocb_data`): ... here (as `server_fd`).  
(`close_notify_handler`): Reset tags as well.  
(`gpgsm_new`): Implement support for descriptor passing.  
(`fd_type_t`): New type.  
(`gpgsm_clear_fd`): New function. Use it instead of `_gpgsm_io_close` for unused communication channels.  
(`gpgsm_set_fd`): Rewritten to support descriptor passing. All relevant callers adjusted as well (previously of `_gpgme_io_close`).

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

\* version.c: Include "assuan.h".  
(`do_subsystem_inits`): Call `assuan_set_assuan_err_source`.

2006-12-01 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (`libgpgme_real_la_SOURCES`): Rename to `main_sources`.  
(`libgpgme_la_SOURCES`, `libgpgme_pthread_la_SOURCES`,  
`libgpgme_glib_la_SOURCES`, `libgpgme_pth_la_SOURCES`): Add

\$(main\_sources).  
(libgpgme\_la\_DEPENDENCIES, libgpgme\_la\_LIBADD,  
libgpgme\_pthread\_la\_DEPENDENCIES,  
libgpgme\_pthread\_la\_LIBADD,  
libgpgme\_pth\_la\_DEPENDENCIES, libgpgme\_pth\_la\_LIBADD,  
libgpgme\_glib\_la\_DEPENDENCIES, libgpgme\_glib\_la\_LIBADD): Remove  
libgpgme-real.la.  
(noinst\_LTLIBRARIES): Removed.  
(libgpgme\_glib\_la\_CFLAGS, libgpgme\_pth\_la\_CFLAGS): Removed.  
(AM\_CFLAGS): New variable.

2006-11-30 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Replace AssuanError with gpg\_error\_t and  
ASSUAN\_CONTEXT with assuan\_context\_t.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Check return value of  
assuan\_pipe\_connect.

\* runpgg.c: Include <unistd.h>.

(gpg\_new): Support --display, --ttyname, --ttytype, --lc-ctype and  
--lc-messages. Fixes issue 734.

2006-10-24 Marcus Brinkmann <marcus@g10code.de>

\* trustlist.c (gpgme\_op\_trustlist\_next): Return error if OPD is  
NULL.

2006-10-23 Marcus Brinkmann <marcus@g10code.de>

\* wait-global.c (gpgme\_wait): Unlock CTX\_LIST\_LOCK while calling  
\_gpgme\_engine\_io\_event().

\*

keylist.c (gpgme\_op\_keylist\_next): Return error if OPD is NULL.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

\* data-mem.c (gpgme\_data\_release\_and\_get\_mem): Release the data  
object properly.

2006-09-22 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (keylist\_colon\_handler): Move debug output after  
initialising KEY.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme-config.in (Options): Add NETLIBS.
- \* Makefile.am (libgpgme\_la\_LIBADD, libgpgme\_pthread\_la\_LIBADD, libgpgme\_pth\_la\_LIBADD, libgpgme\_glib\_la\_LIBADD): Add NETLIBS.
- \* runpg.c (read\_status): Fix comparison disguising as an assignment.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_set\_locale): Remove conditional on HAVE\_W32\_SYSTEM, and just check for LC\_MESSAGES.

2006-07-16 Marcus Brinkmann <marcus@g10code.de>

- \* runpg.c (read\_status): Strip potential carriage return.
- \* genkey.c (get\_key\_parameter): Skip potential carriage return.
- \* version.c (\_gpgme\_get\_program\_version): Strip potential carriage return.
- \* data.c (gpgme\_data\_set\_file\_name): Allow to clear the file name by passing NULL.

2006-06-22 Marcus Brinkmann <marcus@g10code.de>

- \* keylist.c (gpgme\_get\_key): Also clone the engine info.

2006-03-06 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme-config.in (cflags\_pth): Revert accidental removal of pthread support with last change.

2006-02-28 Marcus Brinkmann <marcus@g10code.de>

- \* w32-glib-io.c (O\_BINARY) [!O\_BINARY]: New macro. (\_gpgme\_io\_pipe): Open pipes in binary mode.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

- \* engine.c (gpgme\_engine\_check\_version): Reimplemented to allow checking the version correctly even after changing the engine information. Bug reported by Stphane Corthsy.
- \* runpg.c (read\_colon\_line): Invoke colon preprocess handler if it is set. (colon\_preprocessor\_t): New type.



(struct engine\_gpg): New member colon.preprocess\_fnc.

(gpg\_keylist\_preprocess): New function.

\* keylist.c

(keylist\_colon\_handler): Allow short key IDs.

2006-02-15 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (create\_writer): Make C->have\_data a manually reset event.

(writer): Move code from end of if block to beginning, so it is also run the first time.

(\_gpgme\_io\_write): Move assert check after error check. Reset the is\_empty event, and also do it eagerly.

(\_gpgme\_io\_select): Unconditionally wait for the is\_empty event.

2006-01-26 Werner Koch <wk@g10code.com>

\* w32-util.c (\_gpgme\_get\_conf\_int): New.

\* posix-util.c (\_gpgme\_get\_conf\_int): New.

\* w32-io.c (get\_desired\_thread\_priority): New.

(create\_reader, create\_writer): Use it here.

2006-01-04 Werner Koch <wk@g10code.com>

\* debug.h (\_gpgme\_debug\_srcname): New. Use it with the debug macros.

\* w32-glib-io.c (\_gpgme\_io\_set\_nonblocking): Add debug statements. Disable error return for failed nonblocking call.

2006-01-03 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (\_gpgme\_io\_close): Only close fd if there is no channel for it.

2005-12-31 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (find\_channel): Set channel to unbuffered.

(\_gpgme\_io\_select): Fix debug output.

2005-12-23 Werner Koch <wk@g10code.com>

\* gpgme.h (struct \_gpgme\_signature): Append field PKA\_ADDRESS.

\* verify.c (release\_op\_data, \_gpgme\_verify\_status\_handler): Set this field.

2005-12-20 Werner Koch <wk@g10code.com>

\* gpgme.h (gpgme\_status\_code\_t): Added GPGME\_STATUS\_PKA\_TRUST\_BAD and GPGME\_STATUS\_PKA\_TRUST\_GOOD.  
(struct \_gpgme\_signature): New field pka\_trust.  
\* verify.c (\_gpgme\_verify\_status\_handler): Set pka\_trust.

2005-12-06 Werner Koch <wk@g10code.com>

\* keylist.c (keylist\_colon\_handler): Store fingerprints of the subkeys. Reset the secret flag of subkeys for stub secret keys.  
(NR\_FIELDS): Bumped up to 16

2005-11-27 Marcus Brinkmann <marcus@g10code.de>

\* engine.c (\_gpgme\_set\_engine\_info): Use new\_file\_name in engine\_get\_version invocation. Reported by Stphane Corthsy.

2005-11-24

Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (\_gpgme\_io\_fd2str): Remove debug printf.

2005-11-18 Werner Koch <wk@g10code.com>

\* w32-glib-io.c: Include glib.h before windows to avoid a symbol shadowing warning.  
(find\_channel): Better use g\_io\_channel\_win32\_new\_fd instead of the autodetection function g\_io\_channel\_unix\_new.  
(\_gpgme\_io\_select): Rewritten. It is now a fully working select implementation.

2005-11-18 Marcus Brinkmann <marcus@g10code.de>

\* priv-io.h (\_gpgme\_io\_fd2str): New prototype.  
\* posix-io.c (\_gpgme\_io\_fd2str): New function.  
\* w32-io.c (\_gpgme\_io\_fd2str): New function.  
\* runpg.c: Use this new function.  
\* w32-glib-io.c (\_gpgme\_io\_fd2str): Rewrote the file handle code again. Two's company, three's the musketeers.

\* w32-glib-io.c: Rewrote the file handle code. We don't create system fds for every handle (doesn't work for inherited handles), but we create pseudo fds in a private namespace that designate a handle and potentially a giochannel.

2005-11-18 Werner Koch <wk@g10code.com>

\* versioninfo.rc.in: Set file version to LT-version + Svn-revision.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

- \* w32-glib-io.c: New file.
- \* gpgme.def (gpgme\_get\_giochannel): Add symbol.
- \* Makefile.am (system\_components) [HAVE\_DOSISH\_SYSTEM]: Remove w32-io.c.
- (ltlib\_gpgme\_extra): New variable.
- (lib\_LTLIBRARIES): Add \$(ltlib\_gpgme\_extra).
- (system\_components\_not\_extra): New variable.
- (libgpgme\_la\_SOURCES, libgpgme\_pthread\_la\_SOURCES, libgpgme\_pth\_la\_SOURCES): Add \$(system\_components\_not\_extra).
- (libgpgme\_glib\_la\_LDFLAGS, libgpgme\_glib\_la\_DEPENDENCIES, libgpgme\_glib\_la\_LIBADD, libgpgme\_glib\_la\_CFLAGS) [BUILD\_W32\_GLIB]: New variables.
- \* gpgme-config.in (glib): New option.
- \* gpgme.m4 (AM\_PATH\_GPGME\_GLIB): New macro.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

- \* priv-io.h (\_gpgme\_io\_waitpid, \_gpgme\_io\_kill): Removed.
- \* w32-io.c (\_gpgme\_io\_waitpid, \_gpgme\_io\_kill): Removed.
- \* posix-io.c (\_gpgme\_io\_kill): Removed.
- (\_gpgme\_io\_waitpid): Declare static.

2005-10-24 Marcus Brinkmann <marcus@g10code.de>

- \* w32-io.c (\_gpgme\_io\_spawn): Don't minimize window, hide it.

2005-10-21 Werner Koch <wk@g10code.com>

- \* Makefile.am: Fixed cut+paste problem

2005-10-20 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am: Build versioninfo.lo, not versioninfo.o. Also, fix the whole mess.

2005-10-16 Marcus Brinkmann <marcus@g10code.de>

- \* runpgg.c (gpg\_edit): Don't add a key argument if in card edit mode.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (gpgme.dll gpgme.dll.a): Use \$(srcdir) for gpgme.def.

- \* gpgme.h (gpgme\_free): New prototype.
- \* data-mem.c (gpgme\_free): New function.
- \* libgpgme.vers (GPGME\_1.1): Add gpgme\_free.
- \* gpgme.def: Add gpgme\_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

- \* util.h (\_gpgme\_decode\_percent\_string): Add new argument BINARY to prototype.
- \* verify.c (parse\_notation): Likewise for invocation.
- \* conversion.c (\_gpgme\_decode\_percent\_string):  
Likewise to  
declaration. If set, do not replace '\0' characters with a  
printable string.
- \* gpgme.h (struct \_gpgme\_key\_sig): New field notations.
- \* ops.h (\_gpgme\_parse\_notation): New prototype.
- \* sig-notation.c (\_gpgme\_parse\_notation): New function.
- \* key.c (gpgme\_key\_unref): Free all signature notations.
- \* keylist.c (op\_data\_t): New member tmp\_keysig.  
(finish\_key): Clear OPD->tmp\_keysig.
- \* gpgme.c (gpgme\_set\_keylist\_mode): Remove check.
- \* runpgg.c (gpg\_keylist): Support listing signature notations.  
(gpg\_keylist\_ext): Likewise.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

- \* engine.h (\_gpgme\_set\_engine\_info): Add prototype.
- \* engine-backend.h (struct engine\_ops): Change return type of  
get\_file\_name() to const char \* to silence gcc warning.
- \* engine.c (engine\_get\_file\_name): Change return type to const  
char \* to silence gcc warning.  
(gpgme\_get\_engine\_info): Use transitional variable to go from  
const char \* to char \* to silence gcc warning.  
(\_gpgme\_set\_engine\_info):  
Likewise.
- \* engine-gpgsm.c (struct engine\_gpgsm): Change type of LINE to  
char \* to silence gcc warning.  
(gpgsm\_new): Make ARGV a pointer to const char.  
(status\_handler): Change type of SRC, END, DST, ALINE and NEWLINE  
to char \* to silence gcc warning.
- \* gpgme.def: Add gpgme\_data\_set\_file\_name,  
gpgme\_data\_get\_file\_name, gpgme\_sig\_notation\_clear,  
gpgme\_sig\_notation\_add and gpgme\_sig\_notation\_get.
- \* libgpgme.vers: Add gpgme\_sig\_notation\_clear,  
gpgme\_sig\_notation\_add and gpgme\_sig\_notation\_get.
- \* Makefile.am (libgpgme\_real\_la\_SOURCES): Add sig-notation.c.

\* context.h (struct gpgme\_context): New field sig\_notations.  
\* gpgme.h (struct \_gpgme\_sig\_notation): New member value\_len and critical.  
(GPGME\_SIG\_NOTATION\_CRITICAL): New symbol.  
(gpgme\_sig\_notation\_flags\_t): New type.  
(gpgme\_sig\_notation\_add, gpgme\_sig\_notation\_clear, gpgme\_sig\_notation\_get): New prototypes.  
\* ops.h (\_gpgme\_sig\_notation\_create, \_gpgme\_sig\_notation\_free): New prototypes.  
\*  
sig-notation.c (\_gpgme\_sig\_notation\_free): New file.  
\* verify.c (parse\_notation): Use support functions.  
(release\_op\_data): Likewise.  
\* runpg.c (append\_args\_from\_sig\_notations): New function.  
(gpg\_encrypt\_sign, gpg\_sign): Call it.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

\* data.h (struct gpgme\_data): New member file\_name.  
\* data.c (gpgme\_data\_set\_filename): New function.  
(\_gpgme\_data\_release): Free DH->filename if necessary.  
(gpgme\_data\_get\_filename): New function.  
\* runpg.c (gpg\_encrypt): Set filename option.  
(gpg\_encrypt\_sign): Likewise.  
(gpg\_sign): Likewise.  
\* libgpgme.vers (GPGME\_1.1): Add gpgme\_data\_set\_file\_name and gpgme\_data\_get\_file\_name.  
  
\* decrypt.c, verify.c, gpgme.h: Replace plaintext\_filename with file\_name.

2005-09-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_key): Add field is\_qualified.  
(struct \_gpgme\_subkey): Likewise.  
\* keylist.c (set\_subkey\_capability, set\_mainkey\_capability): Set field is\_qualified.

2005-09-23

Werner Koch <wk@g10code.com>

\* w32-io.c (\_gpgme\_io\_pipe): Removed use of environment variable again.  
(create\_reader, create\_writer): Set thread priority higher.

2005-09-19 Werner Koch <wk@g10code.com>

\* w32-io.c (\_gpgme\_io\_pipe): New environment variable to change

the size of the pipe buffer.

2005-09-13 Werner Koch <wk@g10code.com>

\* ath.c: Changes to make it work under W32.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libpgme\_la\_SOURCES): Set to ath.h and ath.c.  
(ath\_pth\_src, ath\_pthread\_src): Removed.  
(w32\_o\_files): Replace ath-compat.o with ath.o.  
(libpgme\_pth\_la\_CFLAGS): New variable.  
\* ath-compat.c, ath-pthread-compat.c, ath-pth-compat.c: Removed.  
\* ath.h (ath\_pthread\_available, ath\_pth\_available): Removed.  
(ath\_init) [!\_ATH\_EXT\_SYM\_PREFIX]: Do not define macro.  
(struct ath\_ops, ath\_init) [\_ATH\_COMPAT]: Removed.  
(\_ATH\_COMPAT): Macro removed.  
\* posix-sema.c (\_gpgme\_sema\_subsystem\_init): Do not call  
\_gpgme\_ath\_init.

2005-09-12

Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (release\_op\_data): Do not free opd->tmp\_uid.

2005-09-07 Werner Koch <wk@g10code.com>

\* w32-io.c (build\_commandline): Quote argv[0].

2005-08-26 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (command\_handler): Use \_gpgme\_io\_write instead of write.  
  
\* edit.c (command\_handler): Do not depend on PROCESSED being available.  
  
\* engine.h (engine\_command\_handler\_t): Add new argument processed.  
\* ops.h (\_gpgme\_passphrase\_command\_handler\_internal): Rename prototype to ...  
(\_gpgme\_passphrase\_command\_handler): ... this one.  
\* passphrase.c (\_gpgme\_passphrase\_command\_handler\_internal):  
Rename to ...  
(\_gpgme\_passphrase\_command\_handler): ... this one.  
\* edit.c (command\_handler): Add new argument processed. Remove local variable with the same name. Always return processed as true.  
\* runpg.c (command\_handler): Send a newline character if the handler did not.

2005-08-26 Werner Koch <wk@g10code.com>

\* w32-util.c (read\_w32\_registry\_string):

Updated from code used by

GnuPG. This allows for expanding strings and features the implicit fallback key.

(w32\_shgetfolderpath, find\_program\_at\_standard\_place): New.

(\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path): With no registry entry, locate the programs at the standard place.

(dlopen, dlsym, dlclose): New, so that we can keep on using what we are accustomed to.

\* debug.c (debug\_init): Use PATHSEP\_C so that under W32 a semicolon is used which allows us to create files with drive letters.

\* w32-io.c (\_gpgme\_io\_read, \_gpgme\_io\_write): Print content in debug mode too.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_status\_code\_t): Add GPGME\_STATUS\_PLAINTEXT.

(struct \_gpgme\_op\_decrypt\_result): New member plaintext\_filename.

(struct \_gpgme\_op\_verify\_result): Likewise.

\* ops.h (\_gpgme\_parse\_plaintext): Add prototype.

\* op-support.c (\_gpgme\_parse\_plaintext): New function.

\* decrypt.c (release\_op\_data): Release

OPD->result.plaintext\_filename.

(\_gpgme\_decrypt\_status\_handler):

Handle GPGME\_STATUS\_PLAINTEXT.

\* verify.c (release\_op\_data): Release

OPD->result.plaintext\_filename.

(\_gpgme\_verify\_status\_handler): Handle GPGME\_STATUS\_PLAINTEXT.

2005-08-08 Werner Koch <wk@g10code.com>

\* util.h (stpcpy): Renamed to ..

(\_gpgme\_stpcpy): .. this and made inline. This avoids duplicate definitions when linking statically.

\* stpcpy.c: Removed.

2005-08-19 Werner Koch <wk@g10code.com>

\* gpgme.def: New.

\* versioninfo.rc.in: New.

\* Makefile.am: Adds support for building a W32 DLL.

- \* `ttyname_r.c` (`ttyname_r`) [W32]: Return error.
- \* `ath-compat.c` [W32]: `select` and `co` are not yet supported; return error.
- \* `data-stream.c` (`stream_seek`): Use `ftell` if `ftello` is not available.

2005-07-26 Marcus Brinkmann <marcus@g10code.de>

- \* `keylist.c` (`gpgme_get_key`): Allow key IDs.

2005-06-20 Marcus Brinkmann <marcus@g10code.de>

- \* `gpgme.m4`: Only call `GPGME_CONFIG` if found.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

- \*  
`gpgme.h` (`struct _gpgme_signature`): New members `pubkey_algo` and `hash_algo`.
- \* `verify.c` (`parse_valid_sig`): Parse `pubkey` and `hash algo` numbers.  
(`parse_new_sig`): Parse `pubkey`, `hash algo` and `timestamp` for `ERRSIG`.

(`_gpgme_decrypt_status_handler`): Fix last change.

- \* `gpgme.h` (`struct _gpgme_recipient`): New structure.  
(`gpgme_recipient_t`): New type.  
(`struct _gpgme_op_decrypt_result`): Add member `recipients`.
- \* `decrypt.c` (`op_data_t`): New member `last_recipient_p`.  
(`_gpgme_op_decrypt_init_result`): Initialize `last_recipient_p`.  
(`parse_enc_to`): New function.  
(`_gpgme_decrypt_status_handler`): Handle status `ENC_TO` and `NO_SECKEY`.

- \* `wait-global.c` (`gpgme_wait`): Break out of the `fd` processing loop after an error.

Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-06-02 Marcus Brinkmann <marcus@g10code.de>

- \* `wait.h` (`_gpgme_run_io_cb`): New prototype.
- \* `wait.c` (`_gpgme_run_io_cb`): New function.
- \* `wait-global.c` (`gpgme_wait`): Call it.
- \* `wait-user.c` (`_gpgme_user_io_cb_handler`): Likewise.
- \*  
`wait-private.c` (`_gpgme_wait_on_condition`): Likewise.

2005-06-02 Werner Koch <wk@g10code.com>

- \* `passphrase.c` (`_gpgme_passphrase_status_handler`): Take care of



GPGME\_STATUS\_NEED\_PASSPHRASE\_PIN.

(\_gpgme\_passphrase\_command\_handler\_internal): Also act on the key "passphrase.pin.ask".

\* gpgme.h: Added status codes GPGME\_STATUS\_SIG\_SUBPACKET, GPGME\_STATUS\_NEED\_PASSPHRASE\_PIN, GPGME\_STATUS\_SC\_OP\_FAILURE, GPGME\_STATUS\_SC\_OP\_SUCCESS, GPGME\_STATUS\_CARDCTRL, GPGME\_STATUS\_BACKUP\_KEY\_CREATED.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

\* data-user.c: Include <errno.h>.

2005-05-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_new): Set the CTX->include\_certs default to the default.

2005-05-11 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (\_gpgme\_io\_select): Fix loop increment.

2005-05-05 Marcus Brinkmann <marcus@g10code.de>

\* data-user.c (user\_release): Only call user hook if provided.  
(user\_seek): Return EBADF if no user hook is provided.  
(user\_read):  
Likewise.  
(user\_write): Likewise.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (GPGME\_INCLUDE\_CERTS\_DEFAULT): New macro.  
\* engine-gpgsm.c (gpgsm\_sign): Send the include-certs option after the reset, just for cleanliness, and do not sent it at all if the default is requested.  
\* gpgme.c (gpgme\_set\_include\_certs): Allow to use GPGME\_INCLUDE\_CERTS\_DEFAULT.

2005-04-21 Werner Koch <wk@g10code.com>

\* verify.c (calc\_sig\_summary): Set the key revoked bit.

2005-04-14 Marcus Brinkmann <marcus@g10code.de>

\* wait-global.c (gpgme\_wait): Use LI->ctx when checking a context in the list, not the user-provided CTX.  
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

\* wait-global.c (gpgme\_wait): If no context is found, and we should not hang, set \*status to 0 and return NULL.  
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

\* data.h (EOPNOTSUPP) [\_WIN32]: Remove definition.  
\* data.c (EOPNOTSUPP) [HAVE\_W32\_SYSTEM]:  
Remove definition.  
(gpgme\_data\_read, gpgme\_data\_write, gpgme\_data\_seek): Return ENOSYS instead EOPNOTSUPP.  
\* data-compat.c (EOPNOTSUPP) [HAVE\_W32\_SYSTEM]: Remove definition.  
(gpgme\_error\_to\_errno): Map GPG\_ERR\_NOT\_SUPPORTED to ENOSYS.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

\* io.h: Rename to ...  
\* priv-io.h: ... this.  
\* Makefile.am (libgpgme\_real\_la\_SOURCES): Change io.h to priv-io.h.  
\* data.c, engine-gpgsm.c, posix-io.c, runpgg.c, version.c, w32-io.c, wait-private.c, wait-global.c, wait-user.c, wait.c:  
Change all includes of "io.h" to "priv-io.h"

2005-03-09 Werner Koch <wk@g10code.com>

\* w32-util.c (\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path): Do not cast away type checks.  
  
\* io.h [W32]: Do not include stdio.h. If it is needed do it at the right place.  
  
\* data.h [W32]: Removed kludge for EOPNOTSUP.  
\* data.c, data-compat.c [W32]: Explicitly test for it here.

Replaced use of \_WIN32 by HAVE\_W32\_SYSTEM except for public header files.

2005-03-07

Timo Schulz <twoaday@g10code.de>

\* gpgme.h: [\_WIN32] Removed ssize\_t typedef.  
\* ath.h: [\_WIN32] Added some (dummy) types.  
\* io.h: [\_WIN32] include stdio.h.  
\* data.h: [\_WIN32] Define EOPNOTSUPP.  
\* w32-io.c [\_WIN32] (\_gpgme\_io\_subsystem\_init): New.  
\* gpgme.c [\_WIN32] (gpgme\_set\_locale): Disabled.

2004-12-12 Marcus Brinkmann <marcus@g10code.de>

\* engine.c (\_gpgme\_set\_engine\_info): Fix assertion.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

\* util.h [HAVE\_CONFIG\_H && HAVE\_TTYNAME\_R] (ttyname\_r): Define prototype.

\* ttyname\_r.c: New file.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

\* putc\_unlocked.c, funopen.c: I just claim copyright on these files and change their license to LGPL, because they are totally trivial wrapper functions.

\* isascii.c: Change copyright notice to the one from ctype/ctype.h in the GNU C Library (CVS Head 2004-10-10), where isascii is defined as a macro doing exactly the same as the function in this file.

\* memchr.c: Update from the GNU C Library (CVS Head 2001-07-06).

\* stpcpy.c: Update from the GNU C Library (CVS Head 2004-10-10).

\* ath.c, ath-compat.c, ath.h, ath-pth.c, ath-pth-compat.c, ath-pthread.c, ath-pthread-compat.c, context.h, conversion.c, data.c, data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c, data-user.c, debug.c, debug.h, decrypt.c, decrypt-verify.c, delete.c, edit.c, encrypt.c, encrypt-sign.c, engine-backend.h, engine.c, engine-gpgsm.c, engine.h, error.c, export.c, genkey.c, get-env.c, gpgme.c, gpgme.h, import.c, io.h, key.c, keylist.c, mkstatus, Makefile.am, ops.h, op-support.c, passphrase.c, posix-io.c, posix-sema.c, posix-util.c, progress.c, runpgp.c, sema.h, sign.c, signers.c, trust-item.c, trustlist.c, util.h, verify.c, version.c, w32-io.c, w32-sema.c, w32-util.c, wait.c, wait-global.c, wait.h, wait-private.c, wait-user.c: Change license to LGPL.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

\* libgpgme.vers

(GPGME\_1.1): New version.

\* engine-backend.h (struct engine\_ops): Add argument FILE\_NAME to member get\_version(). Add arguments FILE\_NAME and HOME\_DIR to member new(). Change return type of get\_file\_name and get\_version to char \*.

\* engine-gpgsm.c (gpgsm\_get\_version): Change return type to char pointer. Do not cache result.

(gpgsm\_new): Add file\_name and home\_dir argument, and use them

instead of the defaults, if set.

- \* `engine_gpg.c` (struct `engine_gpg`): New member `file_name`.
- (`gpg_get_version`): Change return type to char pointer, and do not cache result.
- (`gpg_release`): Free `gpg->file_name`.
- (`gpg_new`): Take new arguments `file_name` and `home_dir`. Set the `--homedir` argument if `HOME_DIR` is not NULL. Set `gpg->file_name`.
- (`start`): Use `gpg->file_name` instead `_gpgme_get_gpg_path`, if set.
- \* `engine.h` (`_gpgme_engine_info_copy`, `_gpgme_engine_info_release`): New prototypes.
- (`_gpgme_engine_new`): Change first argument to `gpgme_engine_info_t info`.
- \* `engine.c`: Include `<assert.h>`.
- (`gpgme_get_engine_info`): Set `*INFO` within the lock. Move `ENGINE_INFO` and `ENGINE_INFO_LOCK` to ....
- (`engine_info`, `engine_info_lock`): ... here. New static variables.
- (`engine_get_version`): Add `file_name` argument to `get_version` invocation. Change return type to char pointer.
- (`gpgme_engine_check_version`): Rewritten to `free()` the return value of `engine_get_version` after using it.
- (`_gpgme_engine_info_release`): New function.
- (`gpgme_get_engine_info`): Rewritten.
- (`_gpgme_engine_info_copy`): New function.
- (`_gpgme_set_engine_info`): New function.
- (`gpgme_set_engine_info`): New function.
- (`_gpgme_engine_new`): Change first argument to `gpgme_engine_info_t info`, and use that.
- \* `gpgme.h` (struct `_gpgme_engine_info`): Change type of `file_name` and `version` to `char *` (remove the `const`). New member `home_dir`.
- (`gpgme_set_engine_info`, `gpgme_ctx_get_engine_info`, `gpgme_ctx_set_engine_info`): New prototypes.
- \* `context.h` (struct `gpgme_context`): New member `engine_info`.
- \* `gpgme.c` (`gpgme_new`): Allocate `CTX->engine_info`.
- (`gpgme_release`): Deallocate `CTX->engine_info`.
- (`gpgme_ctx_get_engine_info`, `gpgme_ctx_set_engine_info`): New functions.
- \* `op-support.c` (`_gpgme_op_reset`): Look for correct engine info and pass it to `_gpgme_engine_new`.
- \* `version.c` (`gpgme_check_version`): Adjust to `_gpgme_compare_versions` returning an `int`.
- (`_gpgme_compare_versions`): Return an `int` value, not a `const char` pointer.
- \* `ops.h` (`_gpgme_compare_versions`): Same for prototype.

2004-10-03 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (parse\_trust): If no reason is provided, set SIG->validity\_reason to 0.  
(calc\_sig\_summary): Set GPGME\_SIGSUM\_CRL\_TOO\_OLD if appropriate.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (map\_assuan\_error): Return 0 if ERR is 0.  
(start): Call map\_assuan\_error on return value of assuan\_write\_line.

2004-10-05 Marcus Brinkmann <marcus@g10code.de>

\* op-support.c (\_gpgme\_op\_data\_lookup): Use char pointer for pointer arithmetic.

2004-09-30 Marcus Brinkmann  
<marcus@g10code.de>

\* gpgme.m4: Implement the --api-version check.

\* runpg.c (read\_status): Move the polling of the output data pipe to just before removing the command fd, from just before adding it. This avoids buffering problems.

\* data.c (\_gpgme\_data\_inbound\_handler): Use \_gpgme\_io\_read, not read, to improve debug output.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (GPGME\_IMPORT\_NEW, GPGME\_IMPORT\_UID, GPGME\_IMPORT\_SIG, GPGME\_IMPORT\_SUBKEY, GPGME\_IMPORT\_SECRET, (GPGME\_KEYLIST\_MODE\_LOCAL, GPGME\_KEYLIST\_MODERN\_EXTERN, GPGME\_KEYLIST\_MODE\_SIGS, GPGME\_KEYLIST\_MODE\_VALIDATE): Change from enum to macros.

(gpgme\_keylist\_mode\_t): Define as unsigned int.

(gpgme\_key\_t): Change type of keylist\_mode to gpgme\_keylist\_mode\_t.

2004-09-23 Marcus Brinkmann <marcus@g10code.de>

\* data.c (\_gpgme\_data\_outbound\_handler): Close the file descriptor if we get an EPIPE.

\* data-stream.c (stream\_seek): Call ftello and return the current offset.

\* data.h (struct

gpgme\_data): Change type of data.mem.offset to off\_t.

\* data.c (gpgme\_data\_seek): Check dh->cbs->seek callback, not read callback. If SEEK\_CUR, adjust the offset by the pending buffer size. Clear pending buffer on success.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.m4: Add copyright notice.

2004-08-18 Marcus Brinkmann <marcus@g10code.de>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Always run the status handler.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

\* runpgp.c (build\_argv): Use --no-sk-comment, not --no-comment.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_append\_name): Make sure tail points to the byte following the uid.  
(\_gpgme\_key\_add\_sig): Likewise. Don't use calloc, but malloc and memset.

2004-06-02 Marcus Brinkmann <marcus@g10code.de>

\* libgpgme.vers: Remove C-style comment, which is not supported by older binutils.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in (Options):  
Support --api-version.

\* libgpgme.vers: List all gpgme symbols under version GPGME\_1.0.

\* decrypt.c (\_gpgme\_decrypt\_status\_handler): Fix last change.

\* verify.c (parse\_error): Likewise.

\* verify.c (parse\_error): Do not skip location of where token.

\* gpgme.h (gpgme\_status\_code\_t): Add GPGME\_STATUS\_REVKEYSIG.

\* verify.c (\_gpgme\_verify\_status\_handler): Add handling of GPGME\_STATUS\_REVKEYSIG.  
(parse\_trust): Likewise.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_decrypt\_result): New fields  
wrong\_key\_usage and \_unused.

\* decrypt.c (\_gpgme\_decrypt\_status\_handler): Don't skip over  
character after a matched string, as in a protocol error this  
could skip over the trailing binary zero.

Handle decrypt.keyusage error notifications.

\* gpgme.h (struct \_gpgme\_key): New member keylist\_mode.

\* keylist.c (keylist\_colon\_handler): Set the keylist\_mode of KEY.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_signature):

Change member WRONG\_KEY\_USAGE

to unsigned int. Same for member \_unused.

\* keylist.c (set\_mainkey\_trust\_info): Rewritten.

(set\_subkey\_capability): Handle 'd' (disabled).

(set\_mainkey\_capability): Rewritten.

2004-04-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.m4: Quote first argument to AC\_DEFUN.

2004-04-21 Werner Koch <wk@gnupg.org>

\* key.c (gpgme\_key\_unref): Allow passing NULL like free does.

The rule of least surprise.

2004-04-15 Werner Koch <wk@gnupg.org>

\* verify.c (prepare\_new\_sig, \_gpgme\_verify\_status\_handler): Remove  
unused result.signatures items.

\* keylist.c (gpgme\_get\_key): Return an error if FPR is NULL.

2004-04-08 Werner Koch <wk@gnupg.org>

\* verify.c (\_gpgme\_verify\_status\_handler): Ignore the error status  
if we can't process it.

\* decrypt-verify.c (decrypt\_verify\_status\_handler): Backed out  
yesterday's hack. It is not any longer required.

2004-04-07 Werner Koch <wk@gnupg.org>

\* decrypt-verify.c (decrypt\_verify\_status\_handler):

Hack to cope  
with meaningless error codes from the verify status function.

2004-04-05 Werner Koch <wk@gnupg.org>

\* gpgme.h: Add GPGME\_STATUS\_NEWSIG.

\* verify.c (parse\_error): Compare only the last part of the where  
token.

(prepare\_new\_sig): New.

(parse\_new\_sig): Use prepare\_new\_sig when required.

(\_gpgme\_verify\_status\_handler): Handle STATUS\_NEWSIG.

\* engine-gpgsm.c (gpgsm\_keylist\_ext): Send with-validation  
option. Fixed pattern construction.

(status\_handler): Add debugging output.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Protect \_only\_ tty related code with  
isatty(). Submitted by Bernhard Herzog.

2004-03-11 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Protect all tty related code with  
isatty().

\* runpg.c (gpg\_cancel): Set GPG->fd\_data\_map to NULL after  
releasing it.

\* engine-gpgsm.c (gpgsm\_cancel): Only call assuan\_disconnect if  
GPGSM->assuan\_ctx is not NULL. Set it to NULL afterwards.

2004-03-07

Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in: Do not emit include and lib directory for  
prefix "/usr" or "".

2004-03-03 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (gpgsm\_export\_ext): Properly insert a space  
between patterns.

2004-02-18 Werner Koch <wk@gnupg.org>

\* gpgme-config.in: Ignore setting of --prefix.

2004-02-25 Marcus Brinkmann <marcus@g10code.de>



\* `rungpg.c` (`gpg_cancel`): New function.  
(`gpg_release`): Call it here.  
(`_gpgme_engine_ops_gpg`): Add it here.  
\* `engine-gpgsm.c` (`gpgsm_cancel`): Fix last change.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.c` (`gpgme_cancel`): New function.  
\* `engine-backend.h` (`struct engine_ops`): New member `cancel`.  
\* `engine.h` (`_gpgme_engine_cancel`): New prototype.  
\* `engine.c` (`_gpgme_engine_cancel`): New function.  
\* `engine-gpgsm.c` (`_gpgme_engine_ops_gpgsm`): Add new member `cancel`.  
(`gpgsm_cancel`): New function.  
(`gpgsm_release`): Use it.  
\* `rungpg.c` (`_gpgme_engine_ops_gpg`): Add new member `cancel`.

2004-02-17

Werner Koch <wk@gnupg.org>

\* `gpgme.h`: Add `GPGME_KEYLIST_MODE_VALIDATE`.  
\* `engine-gpgsm.c` (`gpgsm_keylist`): Send this to `gpgsm`.

2004-02-15 Werner Koch <wk@gnupg.org>

\* `memrchr.c` (`memrchr`): Fixed implementation. Problem pointed out by Adriaan de Groot.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

\* `rungpg.c` (`build_argv`): Use `--no-comment`, not `--comment ""`.  
\* `data-compat.c` (`gpgme_data_new_from_filepart`): Call `fseeko` if available.  
\* `data-stream.c` (`stream_seek`): Likewise.

2004-01-16 Werner Koch <wk@gnupg.org>

\* `conversion.c` (`_gpgme_map_gnupg_error`): Handle numerical codes as used by GnuPG 1.9.x

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.h` (`struct _gpgme_key_sig`): Fix comment on `REVOKED`.

2004-01-12 Werner Koch <wk@gnupg.org>

\* `sign.c`: Include `util.h` for prototype of `_gpgme_parse_timestamp`.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (\_GPGME\_D\_CLASS): Revert this change.
- (struct \_gpgme\_key\_sig): For C++ compilers, rename class member to \_obsolete\_class. Add new member sig\_class.
- (struct \_gpgme\_new\_signature): Same here.
- \* key.c (gpgme\_key\_sig\_get\_ulong\_attr): Use CERTSIG->sig\_class, not CERTSIG->class.
- \* keylist.c (keylist\_colon\_handler): Likewise for KEYSIG, but keep setting KEYSIG->class, too. Rename variable CLASS to SIG\_CLASS.
- \* sign.c (parse\_sig\_created): Set SIG->sig\_class.

2003-12-22 Werner Koch <wk@gnupg.org>

- \* gpgme.h (\_GPGME\_D\_CLASS): Kludge for C++ compatibility without changing the C API.

2003-11-19 Werner Koch <wk@gnupg.org>

- \* conversion.c (\_gpgme\_parse\_timestamp): New.
- (atoi\_1, atoi\_2, atoi\_4): New.
- \* keylist.c (parse\_timestamp): Removed. Changed all callers to use the new function.
- \* verify.c (parse\_valid\_sig): Ditto. Repalced the errno check.
- \* sign.c (parse\_sig\_created): Ditto.

2003-10-31 Werner Koch <wk@gnupg.org>

- \* keylist.c (parse\_timestamp): Detect ISO 8601 timestamps and try to convert them.

2003-10-10 Marcus Brinkmann <marcus@g10code.de>

- \* genkey.c (get\_key\_parameter): Make a copy of the key parameters. Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

- \* data-compat.c: Include <sys/time.h> before <sys/stat.h> for broken systems.
- \* engine-gpgsm.c (map\_assuan\_error): If ERR is -1, return sensible error.
- \* io.h (\_gpgme\_io\_subsystem\_init): New prototype.

- \* posix-io.c (\_gpgme\_io\_subsystem\_init): Add function.
- (\_gpgme\_io\_spawn): Do not fixup signal handler here.
- \* version.c (do\_subsystem\_inits): Call \_gpgme\_io\_subsystem\_init.
  
- \* debug.c (debug\_init): Drop const qualifier from E.
  
- \* ath.h (struct ath\_ops): Make ADDR argument of CONNECT prototype const.
- (ath\_connect): Make ADDR argument const.
- \* ath-pthread.c (ath\_connect): Likewise.
- \* ath-pth.c (ath\_connect): Likewise.
- \* ath-compatible.c (ath\_connect): Likewise.
- \* ath.c (ath\_connect): Likewise.
  
- \* ath.h [HAVE\_SYS\_SELECT\_H]: Include <sys/select.h> for fd\_set.
- [!HAVE\_SYS\_SELECT\_H]: Include <sys/time.h>.
  
- \*
- conversion.c (\_gpgme\_hextobyte): Drop "unsigned" from type of SRC argument.
- \* util.h (\_gpgme\_hextobyte): Likewise for prototype.
  
- \* gpgme.h: Remove trailing comma in enum.
  
- \* runpgg.c: Do not include <time.h>, <sys/time.h>, <sys/types.h>, <signal.h>, <fcntl.h>, or "unistd.h".

2003-10-02 Marcus Brinkmann <marcus@g10code.de>

- \* engine-backend.h (struct engine\_ops): Add argument TYPE.
- \* engine.c (\_gpgme\_engine\_op\_edit): Likewise.
- \* engine.h: Likewise.
- \* runpgg.c (gpg\_edit): Likewise. Use it.
- \* edit.c (edit\_start): Likewise. Pass it on.
- (gpgme\_op\_edit\_start, gpgme\_op\_edit): Likewise.
- (gpgme\_op\_card\_edit\_start, gpgme\_op\_card\_edit): New functions.

2003-09-30 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (gpg\_strerror\_r): Change prototype to match gpg\_strerror\_r change.
- \* error.c (gpg\_strerror\_r): Likewise, also update implementation.
  
- \* gpgme.c (gpgme\_hash\_algo\_name): Change name of RMD160 to RIPEMD160, name of TIGER to TIGER192, name of CRC32-RFC1510 to CRC32RFC1510, and name of CRC24-RFC2440 to CRC24RFC2440.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h: Add prototype for gpgme\_set\_locale.
- \* gpgme.h: Define macro \_GPGME\_INLINE depending on the compiler characteristics and use that instead \_\_inline\_\_.
- \* context.h (struct gpgme\_context): New members lc\_ctype and lc\_messages.
- \* gpgme.c: Include <locale.h>.
- (def\_lc\_lock, def\_lc\_ctype, def\_lc\_messages): New static variables.
- (gpgme\_set\_locale): New function.
- \* engine.c (\_gpgme\_engine\_new): Add arguments lc\_ctype and lc\_messages.
- \* engine.h (\_gpgme\_engine\_new): Likewise.
- \* engine-gpgsm.c (gpgsm\_new): Likewise.
- \* runpgg.c (gpg\_new): Likewise.
- \* engine-backend.h (struct engine\_ops): Likewise to NEW.
- \* op-support.c (\_gpgme\_op\_reset): Likewise to invocation of \_gpgme\_engine\_new.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (gpgme\_strerror\_r): New prototype.
- \* error.c (gpgme\_strerror\_r): New function.
- \* get-env.c: New file.
- \* util.h (\_gpgme\_getenv):  
Add prototype.
- \* Makefile.am (libgpgme\_real\_la\_SOURCES): Add get-env.c.
- \* runpgg.c (build\_argv): Use \_gpgme\_getenv.
- \* debug.c (debug\_init): Likewise.
- \* engine-gpgsm.c (gpgsm\_new): Likewise.  
(gpgsm\_new): Use ttyname\_r.
- \* w32-io.c (\_gpgme\_io\_spawn): Disable debugging for now.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme-config.in: Use \$libdir, not @libdir@, for the echo command.
- \* gpgme-config.in: Rewritten.
- \* gpgme.m4: Rewritten.

2003-08-19 Marcus Brinkmann <marcus@g10code.de>

The ath files (ath.h, ath.c, ath-pth.c, ath-pthread.c,

ath-compat.c, ath-pth-compat.c and ath-pthread-compat.c) have been updated to have better thread support, and the Makefile.am was changed to reflect that.

- \* util.h [!HAVE\_FOPENCOOKIE]: Remove fopencookie declaration.
- \* engine-gpgsm.c (gpgsm\_assuan\_simple\_command): Set ERR to return value of status\_fnc.
- \* runpg.c (start): Return SAVED\_ERRNO, not errno.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

- \* runpg.c (start):  
Use saved\_errno instead errno.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

- \* funopen.c, putc\_unlocked.c, isascii.c, memchr.c: New files.
- \* fopencookie.c: File removed.

2003-08-15 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme-config.in: Put gpg-error related flags after gpgme's.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (struct \_gpgme\_new\_signature): Rename member CLASS to \_OBSOLETE\_CLASS, add member CLASS with type unsigned int.
- \* sign.c (parse\_sig\_created): Also set SIG->\_unused\_class for backward compatibility.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

- \* verify.c (parse\_new\_sig): Fix status parsing case.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (struct \_gpgme\_subkey): Add flag CAN\_AUTHENTICATE. Lower \_UNUSED to 23 bits.
- (struct \_gpgme\_key): Likewise.
- \* keylist.c (set\_mainkey\_capability): Support 'a' and 'A'.
- (set\_subkey\_capability): Support 'a'.
  
- \* keylist.c (gpgme\_get\_key): Check if there is more than one key listed, and return GPG\_ERR\_AMBIGUOUS\_NAME in that case.
  
- \* util.h (\_gpgme\_decode\_c\_string): Change type of LEN argument to size\_t.

(\_gpgme\_decode\_percent\_string): Likewise.  
\* conversion.c (\_gpgme\_decode\_c\_string): Likewise.  
(\_gpgme\_decode\_percent\_string): Likewise.  
(\_gpgme\_map\_gnupg\_error): Change type of I to unsigned int.  
\* signers.c (gpgme\_signers\_clear): Likewise.  
(gpgme\_signers\_enum): New unsigned variable SEQNO, set to SEQ.  
Use SEQNO instead SEQ.  
\* wait.c (fd\_table\_put): Change type of I and J to unsigned int.  
\* wait-global.c (\_gpgme\_wait\_global\_event\_cb): Change type of IDX  
to unsigned int.  
(gpgme\_wait): Change type of I and IDX to unsigned int.  
\* wait-private.c (\_gpgme\_wait\_on\_condition): Change type of IDX  
and I to unsigned int.  
\* posix-io.c (\_gpgme\_io\_close): Cast return value of macro DIM to  
int to suppress gcc warning.  
(\_gpgme\_io\_set\_close\_notify): Likewise.  
(\_gpgme\_io\_select): Change type of I to unsigned int.  
\* engine.c (gpgme\_get\_engine\_info):  
Change type of PROTO to  
unsigned int.  
\* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Change type of IDX and  
I to unsigned int.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

\* decrypt-verify.c (decrypt\_verify\_status\_handler): Expand silly  
and wrong expression.  
\* encrypt-sign.c (encrypt\_sign\_status\_handler): Likewise.  
\* encrypt.c (encrypt\_sym\_status\_handler): Likewise.  
\* sign.c (sign\_status\_handler): Likewise.  
\* verify.c (verify\_status\_handler): Likewise.  
\* decrypt.c (decrypt\_status\_handler): Likewise.

\* engine.c (gpgme\_get\_engine\_info): Initialize NULL.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in (gpg\_error\_libs): Quote GPG\_ERROR\_CFLAGS and  
GPG\_ERROR\_LIBS when setting the corresponding variables.  
Reported by Stphane Corthsy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (set\_recipients): Move declaration of NEWLEN to  
the beginning of the block.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

\* data-mem.c (mem\_write):  
Copy original buffer content.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_user\_ids\_release, gpgme\_user\_ids\_append): Remove prototypes.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (AM\_CPPFLAGS): Add @GPG\_ERROR\_CFLAGS@.  
\* gpgme-config.in (gpg\_error\_libs, gpg\_error\_cflags): New variables.  
Print them.

\* op-support.c (\_gpgme\_parse\_inv\_userid): Rename to  
\_gpgme\_parse\_inv\_recp and change to new datatype.  
\* ops.h (\_gpgme\_parse\_inv\_key): Fix prototype.  
\* gpgme.h (struct \_gpgme\_invalid\_user\_id): Rename to  
\_gpgme\_invalid\_key. Rename field ID to KEY.  
(gpgme\_invalid\_user\_id\_t): Rename to gpgme\_invalid\_key\_t.  
(struct \_gpgme\_op\_encrypt\_result): Here, too.  
(struct \_gpgme\_op\_sign\_result): Likewise.  
\* encrypt.c (struct op\_data): Likewise.  
(release\_op\_data): Likewise.  
\* sign.c (struct op\_data): Likewise.  
(release\_op\_data): Likewise.

\* posix-io.c (\_gpgme\_io\_read): Save errno across debug calls.  
(\_gpgme\_io\_write): Likewise.  
(\_gpgme\_io\_pipe):  
Likewise.  
(\_gpgme\_io\_select): Likewise.

\* runpgg.c (struct engine\_gpg): Remove arg\_error.  
(add\_arg): Don't set arg\_error.  
(add\_data): Likewise.  
(start): Don't check arg\_error.  
(gpg\_new): Check return value of add\_arg.  
\* verify.c (parse\_notation): Free allocated memory at error.

2003-06-05 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libpgg-error error codes.

\* Makefile.am (EXTRA\_DIST): Remove mkerrors.  
(BUILT\_SOURCES): Remove errors.c.  
(MOSTLYCLEANFILES): Likewise.  
(libpggme\_la\_SOURCES): Likewise. Add error.c.

(errors.c): Remove target.

\* mkerrors: File removed.

\* error.c: New file.

\* gpgme.h (gpgme\_error\_t): Change to type gpg\_error\_t.

(gpgme\_err\_code\_t, gpgme\_err\_source\_t): New types.

(gpgme\_err\_code, gpgme\_err\_source, gpgme\_error, gpgme\_err\_make):  
New static inline functions.

(gpgme\_strsource, gpgme\_err\_code\_from\_errno,  
gpgme\_err\_code\_to\_errno, gpgme\_err\_make\_from\_errno,  
gpgme\_error\_from\_errno): New prototypes.

2003-05-29 Marcus

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\* gpgme.h (gpgme\_op\_export\_start): Change second arg to const char \*.

(gpgme\_op\_export): Likewise.

(gpgme\_op\_export\_ext\_start): New prototype.

(gpgme\_op\_export\_ext): Likewise.

\* engine.h: Likewise for \_gpgme\_engine\_op\_export and  
\_gpgme\_engine\_op\_export\_ext.

\* engine-backend.h (struct engine\_ops): Change second argument of  
prototype of export to const char \*, and add reserved int as  
third argument. Add prototype for export\_ext.

\* engine.c (\_gpgme\_engine\_op\_export\_ext): New function.

(\_gpgme\_engine\_op\_export): Change second argument of prototype of  
export to const char \*, and add reserved int as third argument.

\* runpg.c (gpg\_export): Change second argument of prototype of  
export to const char \*, and add reserved int as third argument.

(gpg\_export\_ext): New function.

(gpg\_keylist\_ext): Break loop at error.

(\_gpgme\_engine\_ops\_gpg): Add gpg\_export\_ext.

\* engine-gpgsm.c (gpgsm\_export): Change second argument of  
prototype of export to const  
char \*, and add reserved int as  
third argument.

(gpgsm\_export\_ext): New function.

(\_gpgme\_engine\_ops\_gpgsm): Add gpgsm\_export\_ext.

\* export.c (export\_start): Change second argument of prototype of  
export to const char \*, and add reserved int as third argument.

(gpgme\_op\_export\_start): Likewise.

(export\_ext\_start): New function.

(gpgme\_op\_export\_ext\_start): Likewise.

(gpgme\_op\_export\_ext): Likewise.

\* gpgme.h (gpgme\_keylist\_mode\_t): New type for anonymous enum.

(gpgme\_sigsum\_t): New type for anonymous enum.



- \* encrypt-sign.c (encrypt\_sign\_start): Check for errors earlier, and return an error if RECP is not set.
- \* Makefile.am (libpggme\_la\_SOURCES): Remove user-id.c.
- \* user-id.c: Remove file.
- \* ops.h: Remove prototype for \_gpgme\_user\_ids\_all\_valid.
- \* gpgme.h (gpgme\_encrypt\_flags\_t): New type.
- (gpgme\_op\_encrypt\_start): Change second parameter to type gpgme\_key\_t[], and add third parameter.
- (gpgme\_op\_encrypt): Likewise.
- (gpgme\_op\_encrypt\_sign\_start): Likewise.
- (gpgme\_op\_encrypt\_sign): Likewise.
- \* encrypt.c (encrypt\_start): Likewise.
- (gpgme\_op\_encrypt\_start): Likewise.
- (gpgme\_op\_encrypt): Likewise. Pass flags to engine.
- \* encrypt-sign.c (encrypt\_sign\_start): Likewise.
- (gpgme\_op\_encrypt\_sign\_start): Likewise.
- (gpgme\_op\_encrypt\_sign): Likewise.
- \* engine-backend.h (struct engine\_ops): Likewise for prototypes of encrypt and encrypt\_sign.
- \* engine.h: Likewise for prototypes of \_gpgme\_engine\_op\_encrypt and \_gpgme\_engine\_op\_encrypt\_sign.
- \* engine.c (\_gpgme\_engine\_op\_encrypt): Likewise.
- (\_gpgme\_engine\_op\_encrypt\_sign): Likewise.
- \* runpgg.c (gpg\_encrypt): Likewise.
- (gpg\_encrypt\_sign): Likewise.
- \* runpgg.c (gpg\_encrypt): Check flags for always trust option.
- \* engine-gpgsm.c (gpgsm\_encrypt): Likewise.
- (set\_recipients): Rewritten to use keys instead user IDs.
- \* runpgg.c (append\_args\_from\_recipients): Rewritten to use keys instead user IDs.
- \* encrypt.c (\_gpgme\_encrypt\_status\_handler): Change errors returned to GPGME\_Invalid\_Key and GPGME\_General\_Error.

2003-05-28

Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c: Rename GpgsmObject to engine\_gpgsm\_t.
- (struct gpgsm\_object\_s): Rename to struct engine\_gpgsm.
- \* runpgg.c: Rename GpgObject to engine\_gpg\_t.
- (struct gpg\_object\_s): Rename to struct engine\_gpg.
- \* context.h (struct gpgme\_context): Change EngineObject to engine\_object\_t.
- (enum ctx\_op\_data\_type): Rename to ctx\_op\_data\_id\_t.
- (ctx\_op\_data\_t): New type.
- (struct gpgme\_context): Use it.

- \* ops.h (\_gpgme\_op\_data\_lookup): Use new type name.
- \* op-support.c (\_gpgme\_op\_data\_lookup): Likewise.
- \* engine.c: Rename EngineObject to engine\_t in the file. Also EngineStatusHandler to engine\_status\_handler\_t, EngineCommandHandler to engine\_command\_handler\_t and EngineColonLineHandler to engine\_colon\_line\_handler.
- \* runpgg.c (start): Likewise.
- \* engine-gpgsm.c: Likewise.
- \* engine-backend.h (struct engine\_ops): Likewise
- \* engine.h (struct engine\_object\_s): Rename to struct engine. (EngineObject): Rename to engine\_t. Also everywhere else in the file.
- (EngineStatusHandler): Rename to engine\_status\_handler\_t.
- (EngineColonLineHandler): Rename to engine\_colon\_line\_handler\_t.
- (EngineCommandHandler): Rename to engine\_command\_handler\_t.
  
- \* engine-gpgsm.c (gpgsm\_export): Fix bug in last change.
  
- \* Makefile.am (libgpgme\_la\_SOURCES): Remove recipient.c, add user-id.c.
- \* gpgme.h (gpgme\_recipients\_t): Removed.
- (gpgme\_recipients\_new, gpgme\_recipients\_release, gpgme\_recipients\_add\_name, gpgme\_recipients\_add\_name\_with\_validity, gpgme\_recipients\_count, gpgme\_recipients\_enum\_open, gpgme\_recipients\_enum\_read, gpgme\_recipients\_enum\_close): Removed.
- (gpgme\_op\_encrypt, gpgme\_op\_encrypt\_start, gpgme\_op\_encrypt\_sign, gpgme\_op\_encrypt\_sign\_start, gpgme\_op\_export\_start, gpgme\_op\_export): Change second argument to gpgme\_user\_id\_t.
- (gpgme\_user\_ids\_release): New prototype.
- (gpgme\_user\_ids\_append): Likewise.
- \* ops.h (\_gpgme\_recipients\_all\_valid): Remove.
- (\_gpgme\_user\_ids\_all\_valid): Add.
- \* context.h
- (struct gpgme\_recipients): Removed.
- \* user-id.c: New file.
- \* recipient.c: Removed file.
- \* runpgg.c (append\_args\_from\_recipients): Change last arg to gpgme\_user\_id\_t. Reimplement.
- (gpg\_encrypt): Change second arg to gpgme\_user\_id\_t.
- (gpg\_encrypt\_sign): Likewise.
- (gpg\_export): Likewise. Rewrite user ID list code.
- \* engine.c (\_gpgme\_engine\_op\_encrypt): Change second arg to gpgme\_user\_id\_t.
- (\_gpgme\_engine\_op\_encrypt\_sign): Likewise.
- (\_gpgme\_engine\_op\_export): Likewise.
- \* engine.h (\_gpgme\_engine\_op\_encrypt, \_gpgme\_engine\_op\_encrypt\_sign,

\_gpgme\_engine\_op\_export): Likewise.  
\* engine-gpgsm.c (set\_recipients): Likewise. Rewrite loop code.  
(gpgsm\_encrypt): Likewise.  
(gpgsm\_export): Likewise.  
\* engine-backend.h (struct engine\_ops): Likewise for members ENCRYPT, ENCRYPT\_SIGN and EXPORT.  
\* export.c (export\_start, gpgme\_op\_export\_start, gpgme\_op\_export): Likewise.  
\* encrypt.c (encrypt\_start): Likewise. Don't check for count of recipients.  
(gpgme\_op\_encrypt\_start): Likewise.  
(gpgme\_op\_encrypt): Likewise.  
\* encrypt-sign.c (encrypt\_sign\_start): Likewise.  
(gpgme\_op\_encrypt\_sign): Likewise.  
(gpgme\_op\_encrypt\_sign\_start): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_op\_import\_result): Add skipped\_new\_keys.  
\* import.c (parse\_import\_res): Add skipped\_new\_keys parser.  
  
\* op-support.c (\_gpgme\_parse\_inv\_userid): Add missing break statements.  
\* encrypt.c (gpgme\_op\_encrypt): Use gpgme\_error\_t instead of int.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

\* encrypt.c (gpgme\_op\_encrypt\_result): Use intermediate variable HOOK to avoid compiler warning. Don't ask, you don't want to know.  
(\_gpgme\_encrypt\_status\_handler): Likewise.  
(\_gpgme\_op\_encrypt\_init\_result): Likewise.  
\* decrypt.c (gpgme\_op\_decrypt\_result): Likewise.  
(\_gpgme\_decrypt\_status\_handler): Likewise.  
(\_gpgme\_op\_decrypt\_init\_result): Likewise.  
\* verify.c (gpgme\_op\_verify\_result): Likewise.  
(\_gpgme\_verify\_status\_handler): Likewise.  
(\_gpgme\_op\_verify\_init\_result): Likewise.  
\* edit.c (edit\_status\_handler): Likewise.  
(command\_handler): Likewise.  
(edit\_start): Likewise.  
\* genkey.c (gpgme\_op\_genkey\_result): Likewise.  
(genkey\_status\_handler): Likewise.  
(genkey\_start): Likewise.  
\* import.c (gpgme\_op\_import\_result): Likewise.  
(import\_status\_handler): Likewise.  
(\_gpgme\_op\_import\_start): Likewise.

\* trustlist.c (gpgme\_op\_trustlist\_next): Likewise.  
 (\_gpgme\_op\_trustlist\_event\_cb): Likewise.  
 (gpgme\_op\_trustlist\_start): Likewise.  
 \* keylist.c (gpgme\_op\_keylist\_result): Likewise.  
 (keylist\_colon\_handler): Likewise.  
 (keylist\_status\_handler): Likewise.  
 (\_gpgme\_op\_keylist\_event\_cb): Likewise.  
 (gpgme\_op\_keylist\_start): Likewise.  
 (gpgme\_op\_keylist\_ext\_start): Likewise.  
 (gpgme\_op\_keylist\_next): Likewise.  
 \* passphrase.c (\_gpgme\_passphrase\_status\_handler): Likewise.  
 (\_gpgme\_passphrase\_command\_handler\_internal): Likewise.  
 \* sign.c (gpgme\_op\_sign\_result): Likewise.  
 (\_gpgme\_sign\_status\_handler): Likewise.  
 (\_gpgme\_op\_sign\_init\_result):  
 Likewise.

\* passphrase.c (\_gpgme\_passphrase\_command\_handler\_internal): Fix  
 access to pointer type.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

\* engine.h (EngineCommandHandler): Change last argument to int fd.  
 \* gpgme.h (gpgme\_passphrase\_cb\_t): Rewritten to take parts of the  
 description and fd.  
 (gpgme\_edit\_cb\_t): Change last argument to int fd.  
 \* ops.h (\_gpgme\_passphrase\_command\_handler\_internal): New prototype.  
 \* passphrase.c: Include <assert.h>.  
 (op\_data\_t): Rename userid\_hint to uid\_hint, remove last\_pw\_handle.  
 (release\_op\_data): Check values before calling free.  
 (\_gpgme\_passphrase\_status\_handler): Likewise.  
 (\_gpgme\_passphrase\_command\_handler\_internal): New function.  
 (\_gpgme\_passphrase\_command\_handler): Rewritten.  
 \* edit.c (edit\_status\_handler): Pass -1 as fd argument.  
 (command\_handler): Update prototype. New variable processed. Use  
 it to store return value of  
 \_gpgme\_passphrase\_command\_handler\_internal which is now used  
 instead \_gpgme\_passphrase\_command\_handler.  
 Use it also to check  
 if we should call the user's edit function. Pass fd to user's  
 edit function.  
 \* runpg.c (struct gpg\_object\_s): Change type of cmd.cb\_data to  
 void \*.  
 (gpg\_release): Check value before calling free. Do not release  
 cmd.cb\_data.  
 (command\_cb): Function removed.  
 (command\_handler): New function. Thus we don't use a data object  
 for command handler stuff anymore, but handle it directly. This

allows proper error reporting (cancel of passphrase requests, for example). Also all callbacks work via direct writes to the file descriptor (so that passphrases are not kept in insecure memory).  
(gpg\_set\_command\_handler): Rewritten to use even more ugly hacks.  
(read\_status): Check cmd.keyword before calling free. Install command\_handler as the I/O callback handler with GPG as private data.

\* `runpgg.c` (`gpg_new`): Add `--enable-progress-filter` to `gpg` invocation.  
\* `decrypt-verify.c` (`_gpgme_op_decrypt_verify_start`): Rename to `decrypt_verify_start`.  
(`gpgme_op_decrypt_verify_start`):  
Call `decrypt_verify_start`.  
(`gpgme_op_decrypt_verify`): Likewise.  
\* `verify.c` (`verify_status_handler`): New function that also calls progress status handler.  
(`_gpgme_op_verify_start`): Set status handler to `verify_status_handler`.  
Rename to (`verify_start`).  
(`gpgme_op_verify_start`): Call `verify_start`.  
(`gpgme_op_verify`): Likewise.  
\* `encrypt.c` (`encrypt_status_handler`): New function.  
(`_gpgme_encrypt_sym_status_handler`): Call progress status handler.  
Make static. Rename to `encrypt_sym_status_handler`.  
(`encrypt_start`): Set status handler to `encrypt_sym_status_handler` or `encrypt_status_handler`.  
\* `sign.c` (`sign_status_handler`): New function.  
(`sign_start`): Set status handler to `sign_status_handler`.  
\* `decrypt.c` (`decrypt_status_handler`): New function that also calls progress status handler.  
(`decrypt_start`): Set status handler to `decrypt_status_handler`.  
\* `encrypt-sign.c` (`encrypt_sign_status_handler`): Likewise.  
\* `decrypt-verify.c` (`decrypt_verify_status_handler`):  
Call  
`_gpgme_progress_status_handler`.  
  
\* `conversion.c` (`_gpgme_decode_c_string`): Add missing break statement.  
  
\* `recipient.c` (`gpgme_recipients_add_name_with_validity`): Add one to buffer to allocate.

2003-05-19 Marcus Brinkmann <marcus@g10code.de>

\* `verify.c` (`parse_new_sig`): Fix ERRSIG case.  
Submitted by Benjamin Lee <benjaminlee@users.sf.net>.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: The following types are renamed. The old name is kept as a deprecated typedef.

(GpgmeCtx): Rename to gpgme\_ctx\_t.

(GpgmeData): Rename to gpgme\_data\_t.

(GpgmeRecipients): Rename to gpgme\_recipients\_t.

(GpgmeError): Rename to gpgme\_error\_t.

(GpgmeDataEncoding): Rename to gpgme\_data\_encoding\_t.

(GpgmePubKeyAlgo): Rename to gpgme\_pubkey\_algo\_t.

(GpgmeHashAlgo): Rename to gpgme\_hash\_algo\_t.

(GpgmeSigStat): Rename to gpgme\_sig\_stat\_t.

(GpgmeSigMode): Rename to gpgme\_sig\_mode\_t.

(GpgmeAttr): Rename to gpgme\_attr\_t.

(GpgmeValidity): Rename to gpgme\_validity\_t.

(GpgmeProtocol):

Rename to gpgme\_protocol\_t.

(GpgmeStatusCode): Rename to gpgme\_status\_code\_t.

(GpgmeEngineInfo): Rename to gpgme\_engine\_info\_t.

(GpgmeSubkey): Rename to gpgme\_subkey\_t.

(GpgmeKeySig): Rename to gpgme\_keysig\_t.

(GpgmeUserID): Rename to gpgme\_user\_id\_t.

(GpgmePassphraseCb): Rename to gpgme\_passphrase\_cb\_t.

(GpgmeProgressCb): Rename to gpgme\_progress\_cb\_t.

(GpgmeEditCb): Rename to gpgme\_edit\_cb\_t.

(GpgmeIOCb): Rename to gpgme\_io\_cb\_t.

(GpgmeRegisterIOCb): Rename to gpgme\_register\_io\_cb\_t.

(GpgmeRemoveIOCb): Rename to gpgme\_remove\_io\_cb\_t.

(GpgmeEventIO): Rename to gpgme\_event\_io\_t.

(GpgmeEventIOCb): Rename to gpgme\_event\_io\_cb\_t.

(GpgmeIOCs): Rename to gpgme\_io\_cs.

(gpgme\_io\_cs\_t): New type.

(GpgmeDataReadCb): Rename to gpgme\_data\_read\_cb\_t.

(GpgmeDataWriteCb): Rename to gpgme\_data\_write\_cb\_t.

(GpgmeDataSeekCb): Rename to gpgme\_data\_seek\_cb\_t.

(GpgmeDataReleaseCb): Rename to gpgme\_data\_release\_cb\_t.

(GpgmeDataCs): Rename to gpgme\_data\_cs.

(gpgme\_data\_cs\_t):

New type.

(GpgmeInvalidUserID): Rename to gpgme\_invalid\_user\_id\_t.

(GpgmeEncryptResult): Rename to gpgme\_encrypt\_result\_t.

(GpgmeDecryptResult): Rename to gpgme\_decrypt\_result\_t.

(GpgmeNewSignature): Rename to gpgme\_new\_signature\_t.

(GpgmeSignResult): Rename to gpgme\_sign\_result\_t.

(GpgmeSigNotation): Rename to gpgme\_sig\_notation\_t.

(GpgmeSignature): Rename to gpgme\_signature\_t.

(GpgmeVerifyResult): Rename to gpgme\_verify\_result\_t.

(GpgmeImportStatus): Rename to gpgme\_import\_status\_t.

(GpgmeImportResult): Rename to gpgme\_import\_result\_t.

(GpgmeGenKeyResult): Rename to gpgme\_genkey\_result\_t.  
(GpgmeKeyListResult): Rename to gpgme\_keylist\_result\_t.  
(GpgmeTrustItem): Rename to gpgme\_trust\_item\_t.  
\* gpgme.h (gpgme\_deprecated\_error\_t): New type, swallowing macros  
GPGME\_No\_Recipients, GPGME\_Invalid\_Recipient and  
GPGME\_No\_Passphrase.  
\* data.h (struct gpgme\_data\_s): Rename to struct gpgme\_data.  
\* context.h (struct gpgme\_context\_s): Rename to struct  
gpgme\_context.  
(struct  
gpgme\_recipients\_s): Rename to gpgme\_recipients.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (finish\_key): Clear OPD->tmp\_uid.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (\_gpgme\_verify\_status\_handler): Return GPGME\_No\_Data  
for NODATA status without signatures.

2003-05-05 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_append\_name): Use decoded string to parse user id.  
(\_gpgme\_key\_add\_sig): Likewise.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

\* context.h (struct gpgme\_context\_s): Remove member op\_info.

\* key.c (\_gpgme\_key\_add\_sig): Initialize SIG->uid.

\* gpgme.h (GpgmeError): Add deprecated values for  
GPGME\_Invalid\_Type and GPGME\_Invalid\_Mode.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_get\_op\_info): Remove prototype.  
\* ops.h (\_gpgme\_set\_op\_info,  
\_gpgme\_data\_release\_and\_return\_string, \_gpgme\_data\_get\_as\_string,  
\_gpgme\_data\_append, \_gpgme\_data\_append\_string,  
\_gpgme\_data\_append\_string\_for\_xml,  
\_gpgme\_data\_append\_for\_xml,  
\_gpgme\_data\_append\_percentstring\_for\_xml): Likewise.  
(\_gpgme\_progress\_status\_handler): Change first arg to void \*.  
\* progress.c (\_gpgme\_progress\_status\_handler): Likewise.  
\* conversion.c: Do not include <string.h>, <errno.h>, <ctype.h>,  
and <sys/types.h>, but <string.h>.

(\_gpgme\_data\_append): Remove function.  
 (\_gpgme\_data\_append\_string): Likewise.  
 (\_gpgme\_data\_append\_for\_xml): Likewise.  
 (\_gpgme\_data\_append\_string\_for\_xml): Likewise.  
 (\_gpgme\_data\_append\_percentstring\_for\_xml): Likewise.  
 \* data-mem.c (\_gpgme\_data\_get\_as\_string): Likewise.  
 (\_gpgme\_data\_release\_and\_return\_string): Likewise.  
 \* gpgme.c (gpgme\_get\_op\_info): Likewise.  
 (\_gpgme\_set\_op\_info): Likewise.

\* gpgme.h (struct \_gpgme\_key): New structure.  
 (GpgmeKey): Define using \_gpgme\_key.  
 (struct \_gpgme\_subkey): New structure.  
 (GpgmeSubKey): New type.  
 (struct \_gpgme\_key\_sig): New structure.  
 (GpgmeKeySig): New type.  
 (struct \_gpgme\_user\_id): New structure.  
 (GpgmeUserID):  
 New type.  
 (struct \_gpgme\_op\_keylist\_result): New structure.  
 (GpgmeKeyListResult): New type.  
 (gpgme\_op\_keylist\_result): New function.  
 (gpgme\_key\_get\_as\_xml): Remove prototype.  
 \* context.h (struct gpgme\_context\_s): Remove members tmp\_key,  
 tmp\_uid, key\_cond and key\_queue.  
 (struct key\_queue\_item\_s): Remove structure.  
 (struct user\_id\_s): Remove structure.  
 (struct gpgme\_recipients\_s): Replace with simple  
 GpgmeUserID list.  
 \* gpgme.c (gpgme\_release): Do not release CTX->tmp\_key.  
 \* ops.h (\_gpgme\_key\_add\_subkey, \_gpgme\_key\_append\_name,  
 \_gpgme\_key\_add\_sig, \_gpgme\_trust\_item\_new): New prototypes.  
 \* runpg.c (command\_cb): Return GpgmeError instead int.  
 New variable ERR. Use it to hold return value of cmd handler.  
 (gpg\_delete): Access fingerprint of key directly.  
 (append\_args\_from\_signers): Likewise.  
 (gpg\_edit): Likewise.  
 (append\_args\_from\_recipients): Use GpgmeUserID for recipient list.  
 \* engine-gpgsm.c: Do not include "key.h".  
 (gpgsm\_delete): Access fingerprint of key  
 directly.  
 (gpgsm\_sign): Likewise.  
 (set\_recipients): Use GpgmeUserID for recipients. Invert invalid  
 user ID flag.  
 \* key.h: File removed.  
 \* key.c: Completely reworked to use exposed GpgmeKey data types.  
 \* keylist.c: Likewise.  
 \* recipient.c: Completely reworked to use GpgmeUserID.



2003-04-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (gpgme\_get\_key): Remove force\_update argument.
- \* key-cache.c: File removed.
- \* Makefile.am (libgpgme\_la\_SOURCES): Remove key-cache.c.
- \* ops.h (\_gpgme\_key\_cache\_add, \_gpgme\_key\_cache\_get): Remove prototypes.
- \* keylist.c (\_gpgme\_op\_keylist\_event\_cb): Don't call \_gpgme\_key\_cache\_add.
- (gpgme\_get\_key): New function.
- \* verify.c (gpgme\_get\_sig\_key): Remove last argument to gpgme\_get\_key invocation.
  
- \* gpgme.h (struct \_gpgme\_trust\_item): New structure.
- (GpgmeTrustItem): New type.
- (gpgme\_trust\_item\_ref, gpgme\_trust\_item\_unref): New prototypes.
- \* context.h (struct trust\_queue\_item\_s): Remove structure.
- (struct gpgme\_context\_s): Remove trust\_queue member.
- \* Makefile.am (libgpgme\_la\_SOURCES): Add trust-item.c.
- \* trust-item.c: New file.
- \* trustlist.c: Do not include <stdio.h> or <time.h>, but "gpgme.h".
- (struct trust\_queue\_item\_s): Change to new type op\_data\_t.
- (trust\_status\_handler): Change first argument to void \*.
- (trust\_colon\_handler): Likewise.
- (\_gpgme\_op\_trustlist\_event\_cb): Use op\_data\_t type.
- (gpgme\_op\_trustlist\_start): Use op\_data\_t and rework error handling.
- (gpgme\_op\_trustlist\_next): Use op\_data\_t.
- (gpgme\_trust\_item\_release): Remove function.
- (gpgme\_trust\_item\_get\_string\_attr): Likewise.
- (gpgme\_trust\_item\_get\_int\_attr): Likewise.
  
- \* verify.c (calc\_sig\_summary): Do not set GPGME\_SIGSUM\_SYS\_ERROR for bad signatures.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

- \* context.h: Remove OPDATA\_VERIFY\_COLLECTING.
- (struct gpgme\_context\_s): Remove member notation.
- \* gpgme.h: Make enum for GPGME\_KEYLIST\_MODE\_\* values.
  
- \* gpgme.h (struct \_gpgme\_sig\_notation): New structure.
- (GpgmeSigNotation): New type.
- (struct \_gpgme\_signature): New structure.

(GpgmeSignature): New type.  
 (struct \_gpgme\_op\_verify\_result): New structure.  
 (GpgmeVerifyResult): New type.  
 (gpgme\_op\_verify\_result): New prototype.  
 (gpgme\_get\_notation): Remove prototype.  
 \* ops.h (\_gpgme\_op\_verify\_init\_result): New prototype.  
 (\_gpgme\_verify\_status\_handler): Change first argument to void \*.  
 \* util.h (\_gpgme\_decode\_percent\_string, \_gpgme\_map\_gnupg\_error):  
 New prototypes.  
 \* conversion.c (\_gpgme\_decode\_percent\_string): New function.  
 (gnupg\_errors): New static global.  
 (\_gpgme\_map\_gnupg\_error): New function.  
 \* gpgme.c (gpgme\_release): Don't release CTX->notation.  
 (gpgme\_get\_notation): Remove function.  
 \* decrypt-verify.c (\_gpgme\_op\_decrypt\_verify\_start): Call  
 \_gpgme\_op\_verify\_init\_result.  
 \* verify.c: Do not include <stdio.h>, <assert.h> and "key.h", but  
 do include "gpgme.h".  
 (struct verify\_result): Replace with ...  
 (op\_data\_t): ... this type.  
 (release\_verify\_result): Remove function.  
 (release\_op\_data):  
 New function.  
 (is\_token): Remove function.  
 (skip\_token): Remove function.  
 (copy\_token): Remove function.  
 (gpgme\_op\_verify\_result): New function.  
 (calc\_sig\_summary): Rewritten.  
 (finish\_sig): Remove function.  
 (parse\_new\_sig): New function.  
 (parse\_valid\_sig): New function.  
 (parse\_notation): New function.  
 (parse\_trust): New function.  
 (parse\_error): New function.  
 (\_gpgme\_verify\_status\_handler): Rewritten. Change first argument  
 to void \*.  
 (\_gpgme\_op\_verify\_start): Rework error handling. Call  
 \_gpgme\_op\_verify\_init\_result.  
 (gpgme\_op\_verify): Do not release or clear CTX->notation.  
 (gpgme\_get\_sig\_status): Rewritten.  
 (gpgme\_get\_sig\_string\_attr): Likewise.  
 (gpgme\_get\_sig\_ulong\_attr): Likewise.  
 (gpgme\_get\_sig\_key): Likewise.

\* gpgme.h (struct \_gpgme\_op\_decrypt\_result): New structure.  
 (GpgmeDecryptResult): New type.  
 (gpgme\_op\_decrypt\_result): New prototype.  
 \* ops.h (\_gpgme\_op\_decrypt\_init\_result): New prototype.

(\_gpgme\_decrypt\_status\_handler): Fix prototype.  
(\_gpgme\_decrypt\_start):  
Remove prototype.  
\* decrypt-verify.c: Do not include <stdio.h>, <stdlib.h>, <string.h> and <assert.h>, "util.h" and "context.h", but "gpgme.h".  
(decrypt\_verify\_status\_handler): Change first argument to void \*, and rework error handling.  
(\_gpgme\_op\_decrypt\_verify\_start): New function.  
(gpgme\_op\_decrypt\_verify\_start): Rewrite using \_gpgme\_op\_decrypt\_verify\_start.  
(gpgme\_op\_decrypt\_verify): Likewise.  
\* decrypt.c: Include <string.h>, "gpgme.h" and "util.h".  
(struct decrypt\_result): Change to typedef op\_data\_t, rewritten.  
(is\_token): Remove function.  
(release\_op\_data): New function.  
(skip\_token): Remove function.  
(gpgme\_op\_decrypt\_result): New function.  
(\_gpgme\_decrypt\_status\_handler): Change first argument to void \*. Rework error handling.  
(\_gpgme\_decrypt\_start): Rename to ...  
(decrypt\_start): ... this. Call \_gpgme\_op\_decrypt\_init\_result.  
(\_gpgme\_op\_decrypt\_init\_result): New function.  
(gpgme\_op\_decrypt\_start): Use decrypt\_start.  
(gpgme\_op\_decrypt): Likewise.

2003-04-27

Marcus Brinkmann <marcus@g10code.de>

\* encrypt-sign.c: Do not include <stddef.h>, <stdio.h>, <stdlib.h>, <string.h>, <assert.h> and "util.h", but "gpgme.h".  
(\_gpgme\_op\_encrypt\_sign\_start): Rename to ...  
(encrypt\_sign\_start): ... this.  
(gpgme\_op\_encrypt\_sign\_start): Use encrypt\_sign\_start, not \_gpgme\_op\_encrypt\_sign\_start.  
(gpgme\_op\_encrypt\_sign): Likewise.

\* gpgme.h (GpgmeEncryptResult): New data type.  
(gpgme\_op\_encrypt\_result): New prototype.  
\* ops.h (\_gpgme\_op\_encrypt\_init\_result): New prototype.  
(\_gpgme\_op\_encrypt\_status\_handler): Fix prototype.  
\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Call \_gpgme\_op\_encrypt\_init\_result.  
\* encrypt.c: Do not include <stdio.h>, <assert.h>, "util.h" and "wait.h". Include <errno.h> and "gpgme.h".  
(SKIP\_TOKEN\_OR\_RETURN): Remove macro.  
(struct encrypt\_result): Rename to ...  
(op\_data\_t): ... new data type. Rewrite for user result data.

(append\_xml\_encinfo): Remove function.

(release\_op\_data): New function.

(gpgme\_op\_encrypt\_result):  
New function.

(\_gpgme\_op\_encrypt\_status\_handler): Change first argument to void \*.  
Rewrite result parsing.

(\_gpgme\_op\_encrypt\_sym\_status\_handler): Change first argument to  
void \*.

(\_gpgme\_op\_encrypt\_init\_result): New function.

(\_gpgme\_op\_encrypt\_start): Rename to ...

(encrypt\_start): ... this.

(gpgme\_op\_encrypt\_start): Use encrypt\_start, not  
gpgme\_op\_encrypt\_start.

(gpgme\_op\_encrypt): Likewise.

\* gpgme.h (GpgmePubKeyAlgo, GpgmeHashAlgo, GpgmeInvalidUserID,  
GpgmeNewSignature, GpgmeSignResult): New data types.

(gpgme\_op\_sign\_result, gpgme\_pubkey\_algo\_name,  
gpgme\_hash\_algo\_name): New prototypes.

\* gpgme.c (gpgme\_pubkey\_algo\_name): New function.

(gpgme\_hash\_algo\_name): Likewise.

\* ops.h (\_gpgme\_parse\_inv\_userid, \_gpgme\_op\_sign\_init\_result): New  
prototype.

(\_gpgme\_op\_sign\_status\_handler): Fix prototype.

\* op-support.c: Include <errno.h> and <string.h>.

(\_gpgme\_parse\_inv\_userid): New function.

\* sign.c: Include <errno.h> and "gpgme.h", but  
not <stdio.h>,  
<assert.h> and "util.h".

(SKIP\_TOKEN\_OR\_RETURN): Remove macro.

(struct sign\_result): Change to op\_data\_t type and rework it.

(release\_sign\_result): Rename to ...

(release\_op\_data): ... this and rewrite it.

(append\_xml\_info): Remove function.

(gpgme\_op\_sign\_result): New function.

(parse\_sig\_created): New function.

(\_gpgme\_sign\_status\_handler): Change first argument to void \*.  
Rewrite the function to use the new result structure and functions.

(\_gpgme\_op\_sign\_init\_result): New function.

(\_gpgme\_op\_sign\_start): Rename to ...

(sign\_start): ... this. Call \_gpgme\_op\_sign\_init\_result.

(gpgme\_op\_sign\_start): Use sign\_start instead \_gpgme\_op\_sign\_start.

(gpgme\_op\_sign): Likewise.

\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Call  
\_gpgme\_op\_sign\_init\_result.

\* delete.c: Include <errno.h> and "gpgme.h", but not "util.h" or  
"key.h".

(enum delete\_problem): Move into function delete\_status\_handler.  
(delete\_status\_handler): Change first argument to void \*. Parse delete problem with strtol instead atoi. Return better error values.  
(\_gpgme\_op\_delete\_start): Rename to ...  
(delete\_start): ... this. Rework error handling.  
(gpgme\_op\_delete\_start): Use delete\_start instead \_gpgme\_op\_delete\_start.  
(gpgme\_op\_delete): Likewise.  
\* gpgme.h (GpgmeDataType): Removed.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Change GPGME\_IMPORT\_PRIVATE to GPGME\_IMPORT\_SECRET.  
\* import.c (parse\_import\_res): Parse unchanged field.

\* gpgme.h: New enum for GPGME\_IMPORT\_NEW, GPGME\_IMPORT\_UID, GPGME\_IMPORT\_SIG, GPGME\_IMPORT\_SUBKEY, GPGME\_IMPORT\_PRIVATE.  
(GpgmeError): GPGME\_Unknown\_Reason, GPGME\_Not\_Found, GPGME\_Ambiguous\_Specification, GPGME\_Wrong\_Key\_Usage, GPGME\_Key\_Revoked, GPGME\_Key\_Expired, GPGME\_No\_CRL\_Known, GPGME\_CRL\_Too\_Old, GPGME\_Policy\_Mismatch, GPGME\_No\_Secret\_Key, GPGME\_Key\_Not\_Trusted, GPGME\_Issuer\_Missing, GPGME\_Chain\_Too\_Long, GPGME\_Unsupported\_Algorithm, GPGME\_Sig\_Expired, GPGME\_Bad\_Signature, GPGME\_No\_Public\_Key added as new error codes.  
(struct \_gpgme\_import\_status): New structure.  
(GpgmeImportStatus): New type.  
(struct \_gpgme\_op\_import\_result): New structure.  
(GpgmeImportResult): New type.  
(gpgme\_op\_import\_result): New function.  
\* import.c: Include <errno.h> and "gpgme.h", but not "util.h".  
(struct import\_result): Change to type op\_data\_t.  
(release\_import\_result): Rename to ...  
(release\_op\_data): ... this.  
(append\_xml\_impinfo): Function removed.  
(gpgme\_op\_import\_result): New function.  
(parse\_import): New function.  
(parse\_import\_res): Likewise.  
(import\_status\_handler): Change first argument to void \*. Rewrite to use new functions.  
(\_gpgme\_op\_import\_start): Rework error handling.

\* edit.c: Do not include <assert.h>, "util.h", but "gpgme.h".  
(edit\_resut): Change to typedef for op\_data\_t.  
(edit\_status\_handler): Change first argument to void \*.  
Rework error handling.

(command\_handler): Rework error handling.

(\_gpgme\_op\_edit\_start): Rename to ...

(edit\_start): ... this. Rework error handling.

(gpgme\_op\_edit\_start): Rewrite using edit\_start.

(gpgme\_op\_edit): Likewise.

\* ops.h (\_gpgme\_passphrase\_start): Remove prototype.

\* passphrase.c: Do not include <assert.h>, "util.h" or "debug.h", but "gpgme.h".

(struct passphrase\_result): Change to typedef for op\_data\_t.

(release\_passphrase\_result): Rename to release\_op\_data.

(\_gpgme\_passphrase\_status\_handler): Change first argument to void \*. Use new op\_data\_t type.

(\_gpgme\_passphrase\_command\_handler): Use new op\_data\_t type.

(\_gpgme\_passphrase\_start): Remove function.

\* decrypt.c (\_gpgme\_decrypt\_start): Rewrite error handling. Do not call \_gpgme\_passphrase\_start, but install command handler.

\* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.

\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.

\* sign.c (\_gpgme\_op\_sign\_start): Likewise.

\* context.h (struct gpgme\_context\_s): Remove member initialized, use\_cms and help\_data\_1. Add member protocol. Make use\_armor and use\_textmode bit flags.

Make keylist\_mode, include\_certs, signers\_len and signers\_size unsigned.

\* gpgme.c (gpgme\_new): Initialize CTX->protocol.

(gpgme\_set\_protocol): Do not check CTX. Use CTX->protocol.

(gpgme\_get\_protocol): Likewise.

(gpgme\_release): Do not release CTX->help\_data\_1.

\* op-support.c (\_gpgme\_op\_reset): Use CTX->protocol.

\* wait-private.c (\_gpgme\_wait\_private\_event\_cb): Remove variable CTX.

\* data.c: Do not include <assert.h>, but "gpgme.h".

(\_gpgme\_data\_inbound\_handler): Expand \_gpgme\_data\_append, because it will go. Do not assert DH.

(\_gpgme\_data\_outbound\_handler): Do not assert DH.

\* export.c: Do not include <stdlib.h>, "debug.h" and "util.h", but "gpgme.h".

(export\_status\_handler): Change type of first argument to void \*.

(\_gpgme\_op\_export\_start): Rename to ...

(export\_start): ... this. Rework error handling.

(gpgme\_op\_export\_start): Rewritten to use export\_start instead \_gpgme\_op\_export\_start.

(gpgme\_op\_export): Likewise.

\* gpgme.h (GpgmeError): Add GPGME\_Busy,  
GPGME\_No\_Request.  
(GPGME\_No\_Recipients, GPGME\_Invalid\_Recipient,  
GPGME\_No\_Passphrase): New macros.

\* key.c (gpgme\_key\_get\_string\_attr): Fix validity attribute.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_op\_genkey\_result): New structure.  
(GpgmeGenKeyResult): New type.  
(gpgme\_op\_genkey): Drop last argument.  
(gpgme\_op\_genkey\_result): New function.  
\* genkey.c: Do not include "util.h", but "gpgme.h".  
(struct genkey\_result): Replace with ...  
(op\_data\_t): ... this new type.  
(release\_genkey\_result): Replace with ...  
(release\_op\_data): ... this new function.  
(gpgme\_op\_genkey\_result): New function.  
(genkey\_status\_handler): Rewritten using new op\_data\_t type.  
(get\_key\_parameter): New function.  
(\_gpgme\_op\_genkey\_start): Renamed to  
(genkey\_start): ... this and rewritten.  
(gpgme\_op\_genkey\_start): Use genkey\_start instead  
\_gpgme\_op\_genkey\_start.  
(gpgme\_op\_genkey): Rewritten. Remove FPR argument.

\* context.h (struct gpgme\_context\_s): Remove member  
verbosity.  
\* gpgme.c (gpgme\_new): Do not set member verbosity.  
\* engine.h (\_gpgme\_engine\_set\_verbosity): Remove prototype.  
\* engine.c (\_gpgme\_engine\_set\_verbosity): Remove function.  
\* engine-backend.h (struct engine\_ops): Remove set\_verbosity.  
\* engine-gpgsm.c (\_gpgme\_engine\_ops\_gpgsm): Remove set\_verbosity member.  
\* runpg.c (\_gpgme\_engine\_ops\_gpg): Likewise.  
(gpg\_set\_verbosity): Remove function.  
\* decrypt.c (\_gpgme\_decrypt\_start): Don't call  
\_gpgme\_engine\_set\_verbosity.  
\* delete.c (\_gpgme\_op\_delete\_start): Likewise.  
\* edit.c (\_gpgme\_op\_edit\_start): Likewise.  
\* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.  
\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.  
\* export.c (\_gpgme\_op\_export\_start): Likewise.  
\* genkey.c (\_gpgme\_op\_genkey\_start): Likewise.  
\* import.c (\_gpgme\_op\_import\_start): Likewise.  
\* keylist.c (gpgme\_op\_keylist\_start): Likewise.  
(gpgme\_op\_keylist\_ext\_start): Likewise.

- \* sign.c (\_gpgme\_op\_sign\_start): Likewise.
- \* verify.c (\_gpgme\_op\_verify\_start):  
Likewise.
  
- \* Makefile.am (libgpgme\_la\_SOURCES): Add key-cache.c.
- \* key.c (key\_cache\_initialized, key\_cache\_size,  
key\_cache\_max\_chain\_length, ): Removed.  
(struct key\_cache\_item\_s, key\_cache\_lock, key\_cache,  
key\_cache\_unused\_items, hash\_key, \_gpgme\_key\_cache\_add,  
\_gpgme\_key\_cache\_get, gpgme\_get\_key): Moved to ...
- \* key-cache.c: ... here. New file.
- \* key.h (\_gpgme\_key\_cache\_init): Remove prototypes.  
(\_gpgme\_key\_cache\_add, \_gpgme\_key\_cache\_get): Move to ...
- \* ops.h: ... here.
- \* version.c: Do not include "key.h".  
(do\_subsystem\_inits): Do not call \_gpgme\_key\_cache\_init.
  
- \* mkstatus: Strip trailing comma.
- \* gpgme.h (GpgmeStatus): Pretty print.
  
- \* gpgme.h (GpgmeError): Rename GPGME\_No\_Passphrase to  
GPGME\_Bad\_Passphrase.
- \* passphrase.c (\_gpgme\_passphrase\_status\_handler): Use  
GPGME\_Bad\_Passphrase instead GPGME\_No\_Passphrase.
  
- \* gpgme.h (GpgmeError): Rename GPGME\_No\_Recipients to  
GPGME\_No\_UserID and GPGME\_Invalid\_Recipient to  
GPGME\_Invalid\_UserID.
- \* encrypt.c (\_gpgme\_encrypt\_status\_handler):  
Use GPGME\_No\_UserID  
instead GPGME\_No\_Recipients and GPGME\_Invalid\_UserID instead  
GPGME\_Invalid\_Recipient.  
(\_gpgme\_op\_encrypt\_start): Likewise.
  
- \* gpgme.h (GpgmeError): Remove GPGME\_Busy and GPGME\_No\_Request.
- \* wait-user.c (\_gpgme\_wait\_user\_event\_cb): Don't clear CTX->pending.
- \* wait-private.c (\_gpgme\_wait\_private\_event\_cb): Likewise.
- \* wait-global.c (gpgme\_wait): Likewise.
- \* verify.c (\_gpgme\_op\_verify\_start): Likewise.  
(gpgme\_get\_sig\_status): Don't check pending flag.  
(gpgme\_get\_sig\_string\_attr): Likewise.  
(gpgme\_get\_sig\_ulong\_attr): Likewise.  
(gpgme\_get\_sig\_key): Likewise.
- \* op-support.c (\_gpgme\_op\_reset): Likewise.
- \* trustlist.c (gpgme\_op\_trustlist\_start): Don't clear pending flag.  
(gpgme\_op\_trustlist\_next): Don't check or clear pending flag.  
(gpgme\_op\_trustlist\_end): Likewise.
- \* sign.c (\_gpgme\_op\_sign\_start): Likewise.



- \* context.h (struct gpgme\_context\_s): Remove member PENDING.
- \* decrypt.c (\_gpgme\_decrypt\_start): Likewise.
- \* delete.c (\_gpgme\_op\_delete\_start):  
Likewise.
- \* edit.c (\_gpgme\_op\_edit\_start): Likewise.
- \* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.
- \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* export.c (\_gpgme\_op\_export\_start): Likewise.
- \* genkey.c (\_gpgme\_op\_genkey\_start): Likewise.
- \* import.c (\_gpgme\_op\_import\_start): Likewise.
- \* key.c (gpgme\_get\_key): Likewise.
- \* keylist.c (gpgme\_op\_keylist\_start): Likewise.  
(gpgme\_op\_keylist\_ext\_start): Likewise.  
(gpgme\_op\_keylist\_next): Likewise.  
(gpgme\_op\_keylist\_end): Likewise.
- \* data-compat.c (gpgme\_error\_to\_errno): Don't convert EBUSY.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (GpgmePassphraseCb): Change type to return GpgmeError,  
and add argument for returning the result string.  
(gpgme\_cancel): Remove prototype.
- \* gpgme.c (gpgme\_cancel): Remove function.
- \* context.h (struct gpgme\_context\_s): Remove member cancel.
- \* passphrase.c (\_gpgme\_passphrase\_command\_handler): Call the  
passphrase callback in the new way.

2003-01-30

Marcus Brinkmann <marcus@g10code.de>

- \* edit.c (\_gpgme\_edit\_status\_handler): Call the progress status  
handler.

2003-02-05 Marcus Brinkmann <marcus@g10code.de>

- \* wait-user.c (\_gpgme\_wait\_user\_remove\_io\_cb): Move check for no  
I/O handlers left to ...  
(\_gpgme\_user\_io\_cb\_handler): ... here.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

- \* trustlist.c (trustlist\_colon\_handler): Release ITEM if name  
could not be allocated.  
(gpgme\_trust\_item\_release): Only release name if it is allocated.  
Reported by Marc Mutz <Marc.Mutz@uni-bielefeld.de>.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

\* `rungpg.c` (`read_status`): If the status handler returns an error, return it.

(`status_handler`): If `read_status` fails, just return the error.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`start`): Handle all errors, not only most of them.

(`xtoi_1`, `xtoi_2`): Remove macro.

(`status_handler`): Replace use of `xtoi_2` with `_gpgme_hextobyte`.

2003-02-01 Marcus

Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`map_assuan_error`): Replace `ASSUAN_Bad_Certificate_Path` with `ASSUAN_Bad_Certificate_Chain`.

(`gpgsm_new`): Use `assuan_pipe_connect` instead `assuan_pipe_connect2`.

\* `util.h` (`DIMof`): Remove macro.

\* `ops.h` (`_gpgme_op_event_cb`, `_gpgme_op_event_cb_user`, `_gpgme_data_unread`): Prototypes removed.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

\* `types.h`: File removed.

\* `Makefile.am` (`libgpgme_la_SOURCES`): Remove `types.h`.

\* `io.h` (`struct spawn_fd_item_s`): Do not include "types.h".

\* `key.h`: Likewise.

\* `context.h`: Likewise.

\* `engine-gpgsm.h`: Likewise.

\* `engine.h`: Include "gpgme.h" instead "types.h". Add prototypes for `EngineStatusHandler`, `EngineColonLineHandler` and `EngineCommandHandler`.

(`_gpgme_engine_set_status_handler`): Change parameter type from `GpgmeStatusHandler` to `EngineStatusHandler`.

(`_gpgme_engine_set_command_handler`): Change parameter type from `GpgmeCommandHandler` to `EngineCommandHandler`.

(`_gpgme_engine_set_colon_line_handler`):

Change parameter type from

`GpgmeColonLineHandler` to `EngineColonLineHandler`.

\* `engine-backend.h`: Include "engine.h" instead "types.h".

(`struct engine_ops`): Change `Gpgme*Handler` parameters in members `set_command_handler`, `set_colon_line_handler` and `set_status_handler` to `Engine*Handler`.

\* `engine.c` (`_gpgme_engine_set_status_handler`): Change parameter type from `GpgmeStatusHandler` to `EngineStatusHandler`.

(`_gpgme_engine_set_command_handler`): Change parameter type from

GpgmeCommandHandler to EngineCommandHandler.

(\_gpgme\_engine\_set\_colon\_line\_handler): Change parameter type from GpgmeColonLineHandler to EngineColonLineHandler.

\* runpgg.c (struct gpg\_object\_s): Change type of member status.fnc from GpgmeStatusHandler to EngineStatusHandler. Change type of member colon.fnc from GpgmeColonLineHandler to EngineColonLineHandler. Change type of member cmd.fnc from GpgmeCommandHandler to EngineCommandHandler.

\* engine-gpgsm.c (struct gpgsm\_object\_s): Likewise.

\* runpgg.c

(gpg\_set\_status\_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.

\* engine-gpgsm.c (gpgsm\_set\_status\_handler): Likewise.

(assuan\_simple\_command): Likewise.

\* runpgg.c (gpg\_set\_colon\_line\_handler): Change parameter type from GpgmeColonLineHandler to EngineColonLineHandler.

\* engine-gpgsm.c (gpgsm\_set\_colon\_line\_handler): Likewise.

\* runpgg.c (gpg\_set\_command\_handler): Change parameter type from GpgmeCommandHandler to EngineCommandHandler.

\* engine-gpgsm.c (status\_handler): Do not close status fd at end of function.

\* ops.h (\_gpgme\_op\_data\_lookup): Add prototype.

\* op-support.c: Include <stdlib.h>.

(\_gpgme\_op\_data\_lookup): New function.

\* decrypt.c (\_gpgme\_release\_decrypt\_result): Function removed.

(struct decrypt\_result\_s): Rename to ...

(struct decrypt\_result): ... this.

(DecryptResult): New type.

(\_gpgme\_decrypt\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to retrieve result data object.

\* sign.c

(\_gpgme\_release\_sign\_result): Function removed.

(release\_sign\_result): New function.

(struct sign\_result\_s): Rename to ...

(struct sign\_result): ... this.

(SignResult): New type.

(\_gpgme\_sign\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to retrieve result data object.

\* encrypt.c (struct encrypt\_result\_s): Rename to ...

(struct encrypt\_result): ... this.

(\_gpgme\_release\_encrypt\_result): Function removed.

(release\_encrypt\_result): New function.

(\_gpgme\_encrypt\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to

retrieve result data object.

- \* verify.c (struct verify\_result\_s): Rename to ...  
(struct verify\_result): ... this. Remove member next.  
(VerifyResult): New type.  
(\_gpgme\_release\_verify\_result): Function removed.  
(release\_verify\_result): New function.  
(finish\_sig): Change first argument to type VerifyResult. Diddle the type of the op\_data structure.  
(add\_notation): Change first argument to type VerifyResult.  
(\_gpgme\_verify\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to retrieve result data object.
- \* passphrase.c (struct passphrase\_result\_s): Rename to ...  
(struct passphrase\_result): ... this. Remove member next.  
(PassphraseResult): New type.  
(\_gpgme\_release\_passphrase\_result): Function removed.  
(release\_passphrase\_result): New function.  
(\_gpgme\_passphrase\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to retrieve result data object.  
(\_gpgme\_passphrase\_command\_handler): Likewise.
- \* keylist.c (struct keylist\_result\_s): Rename to ...  
(struct keylist\_result): ... this. Remove member next.  
(KeylistResult): New type.  
(\_gpgme\_release\_keylist\_result): Function removed.  
(release\_keylist\_result): New function.  
(keylist\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to retrieve result data object.
- \* edit.c (struct edit\_result\_s): Rename to ...  
(struct edit\_result): ... this. Remove member next.  
(EditResult): New type.  
(\_gpgme\_release\_edit\_result): Function removed.  
(release\_edit\_result): New function.  
(edit\_status\_handler): Don't use test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to retrieve result data object.  
(command\_handler): Likewise.
- \* types.h (DecryptResult, SignResult, EncryptResult, PassphraseResult, ImportResult, DeleteResult, GenKeyResult, KeylistResult, EditResult): Types removed.
- \* ops.h: Don't include "types.h", but "gpgme.h" and "context.h".  
(test\_and\_allocate\_result): Remove macro.  
(\_gpgme\_release\_decrypt\_result): Remove prototype.  
(\_gpgme\_decrypt\_result): Remove prototype.  
(\_gpgme\_release\_sign\_result): Remove prototype.

(\_gpgme\_release\_encrypt\_result): Remove prototype.  
(\_gpgme\_release\_passphrase\_result): Remove prototype.  
(\_gpgme\_release\_import\_result): Remove prototype.  
(\_gpgme\_release\_delete\_result): Remove prototype.  
(\_gpgme\_release\_genkey\_result): Remove prototype.  
(\_gpgme\_release\_keylist\_result):  
Remove prototype.  
(\_gpgme\_release\_edit\_result): Remove prototype.  
(\_gpgme\_release\_verify\_result): Remove prototype.  
\* gpgme.c (\_gpgme\_release\_result): Rewritten.  
\* context.h (enum ctx\_op\_data\_type): New enum.  
(struct ctx\_op\_data): New structure.  
(struct gpgme\_context\_s): Replace the member result with a member  
op\_data.  
(fail\_on\_pending\_request): Remove macro.  
\* op-support.c (\_gpgme\_op\_reset): Expand macro  
fail\_on\_pending\_request.  
\* util.h: Don't include "types.h" or "debug.h", but include "gpgme.h".

2003-01-19 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (\_gpgme\_engine\_ops\_gpg): Remove gpg\_start.  
(gpg\_start): Rename to ...  
(start): ... this function. Change arguments to GpgObject.  
(gpg\_decrypt): Call start.  
(gpg\_edit): Likewise.  
(gpg\_encrypt): Likewise.  
(gpg\_encrypt\_sign): Likewise.  
(gpg\_export): Likewise.  
(gpg\_import): Likewise.  
(gpg\_keylist): Likewise.  
(gpg\_keylist\_ext): Likewise.  
(gpg\_trustlist): Likewise.  
(gpg\_verify): Likewise.  
  
\*  
engine-gpgsm.c (\_gpgme\_engine\_ops\_encrypt): Remove gpgsm\_start.  
(gpgsm\_start): Rename to ...  
(struct gpgsm\_object\_s): Remove member command.  
(gpgsm\_release): Don't free command.  
(start): ... this function. Change arguments to GpgsmObject and  
const char \*.  
(gpgsm\_decrypt): Call start.  
(gpgsm\_delete): Likewise.  
(gpgsm\_encrypt): Likewise.  
(gpgsm\_export): Likewise.  
(gpgsm\_genkey): Likewise.  
(gpgsm\_import): Likewise.

(gpgsm\_keylist): Likewise.

(gpgsm\_keylist\_ext): Likewise.

(gpgsm\_verify): Likewise.

\* decrypt.c (\_gpgme\_decrypt\_start): Don't call  
\_gpgme\_engine\_start.

\* delete.c (\_gpgme\_op\_delete\_start): Likewise.

\* edit.c (\_gpgme\_op\_edit\_start): Likewise.

\* encrypt.c (\_gpgme\_op\_encrypt\_start):

\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start):

\* export.c (\_gpgme\_op\_export\_start): Likewise.

\* genkey.c (\_gpgme\_op\_genkey\_start): Likewise.

\* import.c (\_gpgme\_op\_import\_start): Likewise.

\* keylist.c (gpgme\_op\_keylist\_ext\_start): Likewise.

(gpgme\_op\_keylist\_start):

Likewise.

\* sign.c (\_gpgme\_op\_sign\_start): Likewise.

\* trustlist.c (gpgme\_op\_trustlist\_start): Likewise.

\* verify.c (\_gpgme\_op\_verify\_start): Likewise.

\* engine-backend.h (struct engine\_ops): Remove member start.

\* engine.h (\_gpgme\_engine\_start): Remove prototype.

\* engine.c (\_gpgme\_engine\_start): Remove function.

2003-01-19 Miguel Coca <mcoca@gnu.org>

\* w32-io.c (\_gpgme\_io\_select): Add missing argument in calls to  
DEBUG\_BEGIN.

\* w32-util.c: Include "sema.h".

(find\_program\_in\_registry): Change DEBUG1 to DEBUG2, fixes compilation  
error.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

\* types.h: Remove byte and ulong types.

\* util.h (\_gpgme\_hextobyte): Change prototype to unsigned char  
instead byte.

\* conversion.c (\_gpgme\_hextobyte): Change argument to unsigned  
char instead byte.

(\_gpgme\_decode\_c\_string): Likewise, and beautify. Also support a  
few more escaped characters. Be more strict about buffer size.

(\_gpgme\_data\_append\_percentstring\_for\_xml): Change  
type of SRC,

BUF and DST to unsigned char instead byte.

\* progress.c (\_gpgme\_progress\_status\_handler): Use unsigned char  
instead byte.

\* debug.c (trim\_spaces): Likewise.

- \* util.h (mk\_error): Remove macro.
- \* conversion.c, data.c, data-compat.c, decrypt.c, delete.c, edit.c, encrypt.c, encrypt-sign.c, engine.c, engine-gpgsm.c, export.c, genkey.c, gpgme.c, import.c, key.c, keylist.c, passphrase.c, progress.c, recipient.c, runpgg.c, sign.c, signers.c, trustlist.c, verify.c, wait.c, wait-global.c, wait-private (literally everywhere): Expand the mk\_error macro.
  
- \* context.h (wait\_on\_request\_or\_fail): Remove macro.
  
- \* context.h (gpgme\_context\_s): Remove member ERROR.
- \* types.h (GpgmeStatusHandler): Change return type to GpgmeError. (GpgmeCommandHandler): Change return type to GpgmeError and add new argument RESULT.
- \* gpgme.h (GpgmeIOCb): Change return type to GpgmeError. (GpgmeEventIO): New event GPGME\_EVENT\_START. (GpgmeIdleFunc): Remove type. (gpgme\_register\_idle): Remove prototype.
- \* data.c: Include <assert.h>. (\_gpgme\_data\_inbound\_handler): Change return type to GpgmeError. Return any error instead ignoring it, don't close file descriptor on error. (\_gpgme\_data\_outbound\_handler): Likewise.
- \* decrypt.c: Do not include <stdio.h>, <string.h> and <assert.h>. (\_gpgme\_decrypt\_status\_handler): Change return type to GpgmeError. Return error instead setting ctx->error. Return success at end of function. (gpgme\_op\_decrypt): Don't work around the old kludge anymore.
- \* decrypt-verify.c (decrypt\_verify\_status\_handler): Change return type to GpgmeError. Return possible errors.
- \* delete.c: Do not include <stdio.h>, <string.h>, <time.h> and <assert.h>. (delete\_status\_handler): Change return type to GpgmeError. Return error instead setting ctx->error. Return success at end of function.
- \* edit.c: Do not include <stdio.h> and <string.h>. (\_gpgme\_edit\_status\_handler): Change type to GpgmeError, make static and rename to ... (edit\_status\_handler): ... this. Return error directly. (command\_handler): Change return type to GpgmeError, add result argument. Return error directly.
- \* encrypt.c (status\_handler\_finish): Remove function. (\_gpgme\_encrypt\_status\_handler): Change return type to GpgmeError. Return error directly. (\_gpgme\_encrypt\_sym\_status\_handler): Likewise.

\* encrypt-sign.c (encrypt\_sign\_status\_handler): Likewise.

\* engine-gpgsm.c (close\_notify\_handler): Do not signal done event anymore.

(status\_handler): Change return type to GpgmeError. Diddle things around a bit to return errors directly.

(start): Send start event.

\* export.c: Do not include <stdio.h>, <string.h> and <assert.h>.

(export\_status\_handler): Change return type to GpgmeError. Don't check ctx->error.

\* genkey.c: Do not include <stdio.h> and <assert.h>.

(genkey\_status\_handler): Change return type to GpgmeError. Don't check ctx->error. Return errors directly.

\* gpgme.c (\_gpgme\_release\_result): Do not initialize ctx->error.

(\_gpgme\_op\_event\_cb):  
Function removed.

(\_gpgme\_op\_event\_cb\_user): Likewise.

\* import.c: Do not include <stdio.h>, <string.h> and <assert.h>.

(import\_status\_handler): Change return type to GpgmeError. Don't check ctx->error.

\* keylist.c (keylist\_colon\_handler, keylist\_status\_handler, finish\_key):  
Change return type to GpgmeError, return error directly.

\* Makefile (libgpgme\_la\_SOURCES): Add wait-global.c, wait-private.c and wait-user.c

\* ops.h (test\_and\_allocate\_result): Return error instead setting ctx->error.

(\_gpgme\_data\_inbound\_handler, \_gpgme\_data\_outbound\_handler, \_gpgme\_verify\_status\_handler, \_gpgme\_decrypt\_status\_handler, \_gpgme\_sign\_status\_handler, \_gpgme\_encrypt\_status\_handler, \_gpgme\_passphrase\_status\_handler, \_gpgme\_progress\_status\_handler):  
Change return type to GpgmeError.

(\_gpgme\_passphrase\_command\_handler): Change return type to GpgmeError and add new argument RESULT.

\* op-support.c: Use new callback functions, and change private data to ctx everywhere.

\* passphrase.c  
(\_gpgme\_passphrase\_status\_handler): Change return type to GpgmeError, return error directly.

(\_gpgme\_passphrase\_command\_handler): Change return type to GpgmeError, add result argument. Return results accordingly.

\* progress.c (\_gpgme\_progress\_status\_handler): Change return type to GpgmeError, return errors directly.

\* runpg.c (status\_handler): Change return type to GpgmeError. Return error directly.

(close\_notify\_handler): Don't send done event.

(colon\_line\_handler): Change return type to GpgmeError, return errors directly.

\* runpg.c (start): Send start event.

\* sign.c (\_gpgme\_sign\_status\_handler): Change return type to



GpgmeError, return errors directly.

- \* trustlist.c (trustlist\_status\_handler): Change return type to GpgmeError. Return 0.
- (trustlist\_colon\_handler): Change return type GpgmeError. Return errors directly.
- \* verify.c (add\_notation): Change return type to GpgmeError, return errors directly.
- (\_gpgme\_verify\_status\_handler): Likewise.
- \* wait.h
- (struct fd\_table): Remove lock member.
- (struct wait\_item\_s): Moved here from wait.c.
- (struct tag): New structure.
- (\_gpgme\_wait\_event\_cb): Remove prototype.
- (\_gpgme\_wait\_private\_event\_cb, \_gpgme\_wait\_global\_event\_cb, \_gpgme\_wait\_user\_add\_io\_cb, \_gpgme\_wait\_user\_remove\_io\_cb, \_gpgme\_wait\_user\_event\_io\_cb): New prototypes.
- \* wait.c: Don't include <stdio.h>.
- (ftd\_global, ctx\_done\_list, ctx\_done\_list\_size, ctx\_done\_list\_length, ctx\_done\_list\_lock, idle\_function): Remove global variable.
- (gpgme\_register\_idle, do\_select, \_gpgme\_wait\_event\_cb): Remove function.
- (gpgme\_wait): Move to file wait-global.c.
- (\_gpgme\_add\_io\_cb): Take ctx as private argument, initialize ctx member in wait item and tag.
- (\_gpgme\_remove\_io\_cb): Take ctx from tag. Don't use FDT lock.
- (\_gpgme\_wait\_one, \_gpgme\_wait\_on\_condition): Move to wait-private.c.
- (gpgme\_fd\_table\_init): Don't initialize FDT->lock.
- (gpgme\_fd\_table\_deinit): Don't destroy FDT->lock.
- (\_gpgme\_fd\_table\_put): Make static and rename to ...
- (fd\_table\_put): ... this function. Don't use FDT->lock.
- (struct wait\_item\_s): Move to wait.h.
- \* wait-global.c: New file.
- \* wait-private.c: New file.
- \* wait-user.c: New file.

\* key.c (gpgme\_key\_sig\_get\_string\_attr): Use validity\_to\_string instead otrust\_to\_string to calculate validity.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

- \* types.h (EngineObject): Move typedef to ...
- \* engine.h: ... here.
- \* types.h (GpgObject): Move typedef to ...
- \* runpgg.c: ... here.
- \* types.h (GpgsmObject): Move typedef to ...

\* engine-gpgsm.c: ... here.

\* util.h (return\_if\_fail, return\_null\_if\_fail, return\_val\_if\_fail): Remove macro.

\* gpgme.c (gpgme\_cancel): Don't use return\_if\_fail.

\* key.c (gpgme\_key\_ref): Likewise.

\* signers.c (gpgme\_signers\_enum): Likewise.  
(gpgme\_signers\_clear): Likewise.

\* engine-backend.h (struct engine\_ops): Rename get\_path to get\_file\_name.

\* gpgme.h (struct \_gpgme\_engine\_info): Rename member path to file\_name.

\* version.c: Do not include <stdio.h>, <stdlib.h>, context.h and util.h. Other clean ups.  
(parse\_version\_number): Protect more seriously against overflow.  
(gpgme\_get\_engine\_info): Move to ...

\* engine.c (gpgme\_get\_engine\_info): ... here.  
(\_gpgme\_engine\_get\_info): Function removed.  
(\_gpgme\_engine\_get\_path): Make static and rename to ...  
(engine\_get\_file\_name): .. this.  
(\_gpgme\_engine\_get\_version): Make static and rename to ...  
(engine\_get\_version): ... this.  
(\_gpgme\_engine\_get\_req\_version): Make static and rename to ...  
(engine\_get\_req\_version): ... this.

\* engine.h (\_gpgme\_engine\_get\_path, \_gpgme\_engine\_get\_version, \_gpgme\_engine\_req\_version, \_gpgme\_engine\_get\_info.): Remove prototypes.

\* gpgme.h (enum GpgmeProtocol): Remove GPGME\_PROTOCOL\_AUTO.

\* gpgme.c (gpgme\_set\_protocol): Don't handle GPGME\_PROTOCOL\_AUTO.  
(gpgme\_get\_protocol\_name): New function.

\* engine-backend.h (struct engine\_ops): New member get\_req\_version, remove member check\_version.

\* engine.h (\_gpgme\_Engine\_get\_version): New prototype.  
\*

rungpg.c (gpg\_get\_req\_version): New function.  
(gpg\_check\_version): Function removed.  
(\_gpgme\_engine\_ops\_gpg): Add gpg\_get\_req\_version, remove gpg\_check\_version.

\* engine-gpgsm.c (gpgsm\_get\_req\_version): New function.  
(gpgsm\_check\_version): Function removed.  
(\_gpgme\_engine\_ops\_gpgsm): Add gpgsm\_get\_req\_version, remove gpgsm\_check\_version.

\* engine.c: Include ops.h.

(\_gpgme\_engine\_get\_req\_version): New function.  
(gpgme\_engine\_check\_version): Rewritten.  
\* version.c (gpgme\_get\_engine\_info): Rewritten.  
\* gpgme.h (gpgme\_engine\_info): New structure.  
(GpgmeEngineInfo): New type.

2003-01-06 Werner Koch <wk@gnupg.org>

\* keylist.c (set\_mainkey\_capability): Handle 'd' and 'D' used since gpg 1.3 to denote disabled keys.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

\* data-mem.c: Include <string.h>.  
\* engine.c: Likewise.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_la\_DEPENDENCIES): Correct bug in last change.

2002-12-24 Marcus  
Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_op\_verify, gpgme\_op\_decrypt\_verify): Drop R\_STAT argument.  
\* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Drop R\_STAT argument.  
\* verify.c (gpgme\_op\_verify): Drop R\_STAT argument.  
(\_gpgme\_intersect\_stati): Function removed.  
\* ops.h (\_gpgme\_intersect\_stati): Remove prototype.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

\* libgpgme.vers: New file.  
\* Makefile.am (EXTRA\_DIST): Add libgpgme.vers.  
(libgpgme\_version\_script\_cmd): New variable.  
(libgpgme\_la\_LDFLAGS): Add libgpgme\_version\_script\_cmd here.  
(libgpgme\_la\_DEPENDENCIES): New variable.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* key.c (gpgme\_key\_get\_string\_attr): Don't accept GPGME\_ATTR\_IS\_SECRET.  
(otrust\_to\_string): New function.  
(gpgme\_key\_get\_as\_xml): Use it.  
(validity\_to\_string): New function.  
(gpgme\_key\_get\_string\_attr): Beautify using above functions.  
(gpgme\_key\_get\_ulong\_attr): Likewise.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

- \* data-mem.c  
(mem\_release): Fix gcc warning.
- \* data-user.c (user\_release): Likewise.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

- \* data.h (gpgme\_data\_release\_cb): Change return type to void.  
(gpgme\_data\_read\_cb): Change return type to ssize\_t.
- \* data.c (gpgme\_data\_read): Likewise.
- \* data-stream.c (stream\_read): Likewise.
- \* data-fd.c (fd\_read): Likewise.
- \* data-mem.c (mem\_read): Likewise.  
(mem\_release): Change return type to void.
- \* data-user.c (user\_read): Change return type to ssize\_t.  
(user\_release): Change return type to void.
- \* data-compat.c (old\_user\_read): Change return type to ssize\_t.
- \* gpgme.h (GpgmeDataReadCb): Likewise.  
(gpgme\_data\_read): Likewise.  
(GpgmeDataSeekCb): Change return type to off\_t.

2002-12-04 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h: Add prototype for gpgme\_get\_key.
- \* key.c (gpgme\_get\_key): New function.
- \* verify.c (gpgme\_get\_sig\_key): Rewrite using gpgme\_get\_key.
  
- \* gpgme.h: Add prototypes for new interfaces  
gpgme\_key\_sig\_get\_string\_attr  
and gpgme\_key\_get\_ulong\_attr.  
(enum GpgmeAttr): New attribute GPGME\_ATTR\_SIG\_CLASS.
- \* gpgme.c (gpgme\_set\_keylist\_mode): Allow GPGME\_KEYLIST\_MODE\_SIGS.
- \* key.h (struct certsig\_s): New members ALGO, NAME\_PART,  
EMAIL\_PART, COMMENT\_PART, NAME, SIG\_STAT and SIG\_CLASS.
  
- \* conversion.c (\_gpgme\_decode\_c\_string): Add new parameter LEN.  
Use that to determine if allocation is desired or not.
- \* util.h: Adjust prototype of \_gpgme\_decode\_c\_string.
- \* keylist.c (keylist\_colon\_handler): Adjust caller of  
\_gpgme\_decode\_c\_string.
  
- \* key.h (struct gpgme\_key\_s): New member last\_uid.
- \* key.c (\_gpgme\_key\_append\_name): Rewritten using  
\_gpgme\_decode\_c\_string and the last\_uid pointer.  
(my\_isdigit): Macro removed.  
(ALLOC\_CHUNK): Likewise.
- \* keylist.c (set\_userid\_flags): Use last\_uid member of KEY.

\* context.h (struct user\_id\_s): New member last\_certsig.  
\* key.h: Add prototype for \_gpgme\_key\_add\_certsig.  
\* key.c (\_gpgme\_key\_add\_certsig): New function.  
(set\_user\_id\_part): Move function  
before \_gpgme\_key\_add\_certsig.  
(parse\_user\_id): Change first argument to SRC, add new arguments  
NAME, EMAIL and COMMENT. Change code to use these arguments  
instead going through UID. Move function before  
\_gpgme\_add\_certsig.  
(parse\_x509\_user\_id): Likewise.  
(\_gpgme\_key\_append\_name): Adjust arguments to parse\_x509\_user\_id  
and parse\_user\_id invocation.  
(one\_certsig\_as\_xml): New function.  
(one\_uid\_as\_xml): Print signatures.  
\* context.h (struct gpgme\_context\_s): New member TMP\_UID.  
\* keylist.c (keylist\_colon\_handler): Rewritten, implement "sig"  
record entries.

\* key.c (get\_certsig): New function.  
(gpgme\_key\_sig\_get\_string\_attr): Likewise.  
(gpgme\_key\_sig\_get\_ulong\_attr): Likewise.

\* keylist.c: Include <ctype.h>.  
(my\_isdigit): Macro removed.  
(set\_mainkey\_trust\_info): Use isdigit, not my\_isdigit.  
(set\_userid\_flags): Likewise.  
(set\_subkey\_trust\_info): Likewise.  
(set\_ownertrust): Likewise.  
(finish\_key): Move function up a bit and remove prototype.

\* runpg.c (gpg\_keylist\_ext):  
Correct precedence of signature  
listing mode.  
(gpg\_keylist\_ext): Implement signature listing mode.

2002-11-25 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (\_gpgme\_gpg\_spawn): Do not set parent fds to -1.  
\* posix-io.c (\_gpgme\_io\_spawn): Call \_gpgme\_io\_close instead close  
for parent fds.  
\* w32-io.c (\_gpgme\_io\_spawn): Call \_gpgme\_io\_close instead  
CloseHandle for parent fds.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h [\_MSC\_VER]: Define ssize\_t as long.

2002-11-22 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Save the result of a first setlocale before doing another setlocale.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

\* decrypt.c: Some beautyfication.

\* verify.c (\_gpgme\_verify\_status\_handler): Treat GPGME\_STATUS\_UNEXPECTED like GPGME\_STATUS\_NODATA. Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* genkey.c: Only include <config.h> if [HAVE\_CONFIG\_H].  
(struct genkey\_result\_s): Add new member FPR.  
(\_gpgme\_release\_genkey\_result): Free RESULT->fpr if set.  
(genkey\_status\_handler): Extract the fingerprint from the status line.  
(gpgme\_op\_genkey): Add new argument FPR and return the fingerprint in it.  
\* gpgme.h: Adjust prototype of gpgme\_op\_genkey.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* rungpg.c (gpg\_keylist): Add --with-fingerprint to gpg invocation twice, to get fingerprints on subkeys. Suggested by Timo Schulz <twoaday@freakmail.de>.  
(gpg\_keylist\_ext): Likewise.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

\* import.c (append\_xml\_impinfo): Use \_gpgme\_data\_append\_string\_for\_xml rather than \_gpgme\_data\_append\_string for the field content. Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

\* rungpg.h, engine-gpgsm.h: File removed.  
\* engine-backend.h: New file.  
\* Makefile.am (gpgsm\_components): New variable, set depending on automake conditional HAVE\_GPGSM.  
(libgpgme\_la\_SOURCES):  
Add engine-backend.h, remove rungpg.h and engine-gpgsm.h. Replace engine-gpgsm.c with \${gpgsm\_components}.

(status-table.h): Depend on gpgme.h, not runpgg.h.  
\* conversion.c: Include <stdlib.h>.  
\* engine-gpgsm.c: Do not set ENABLE\_GPGSM here. Include "engine-backend.h" instead "engine-gpgsm.h". Reorder some functions and remove all function prototypes.  
(\_gpgme\_gpgsm\_get\_version): Make static and rename to ...  
(gpgsm\_get\_version): ... this.  
(\_gpgme\_gpgsm\_check\_version): Make static and rename to ...  
(gpgsm\_check\_version): ... this.  
(\_gpgme\_gpgsm\_new): Make static. Change argument type from GpgsmObject \* to void \*\*. Call gpgsm\_release instead \_gpgme\_gpgsm\_release.  
(\_gpgme\_gpgsm\_op\_decrypt): Make static and rename to ...  
(gpgsm\_check\_decrypt): ... this.  
(\_gpgme\_gpgsm\_op\_delete): Make static and rename to ...  
(gpgsm\_check\_delete): ... this.  
(\_gpgme\_gpgsm\_set\_recipients): Make static and rename to ...  
(gpgsm\_check\_set\_recipients): ... this.  
(\_gpgme\_gpgsm\_op\_encrypt):  
Make static and rename to ...  
(gpgsm\_encrypt): ... this.  
(\_gpgme\_gpgsm\_op\_export): Make static and rename to ...  
(gpgsm\_export): ... this.  
(\_gpgme\_gpgsm\_op\_genkey): Make static and rename to ...  
(gpgsm\_genkey): ... this.  
(\_gpgme\_gpgsm\_op\_import): Make static and rename to ...  
(gpgsm\_import): ... this.  
(\_gpgme\_gpgsm\_op\_keylist): Make static and rename to ...  
(gpgsm\_keylist): ... this.  
(\_gpgme\_gpgsm\_op\_keylist\_ext): Make static and rename to ...  
(gpgsm\_keylist\_ext): ... this.  
(\_gpgme\_gpgsm\_op\_sign): Make static and rename to ...  
(gpgsm\_sign): ... this.  
(\_gpgme\_gpgsm\_op\_trustlist): Make static and rename to ...  
(gpgsm\_trustlist): ... this.  
(\_gpgme\_gpgsm\_op\_verify): Make static and rename to ...  
(gpgsm\_verify): ... this.  
(gpgsm\_status\_handler): Rename to ...  
(status\_handler): ... this.  
(\_gpgme\_gpgsm\_set\_status\_handler): Make static and rename to ...  
(gpgsm\_set\_status\_handler): ... this.  
(\_gpgme\_gpgsm\_set\_colon\_line\_handler): Make static and rename to ...  
(gpgsm\_set\_colon\_line\_handler): ... this.  
(\_gpgme\_gpgsm\_add\_io\_cb): Rename to ...  
(add\_io\_cb): ... this.  
(\_gpgme\_gpgsm\_start): Make static and rename to ...  
(gpgsm\_start): ... this.

(\_gpgme\_gpgsm\_set\_io\_cb): Make static and rename to ...  
 (gpgsm\_set\_io\_cb): ... this.  
 (\_gpgme\_gpgsm\_io\_event): Make static and rename to ...  
 (gpgsm\_io\_event): ... this.  
 (struct \_gpgme\_engine\_ops\_gpgsm): New variable.  
 [!ENABLE\_GPGSM]: Removed.  
 \* engine.c: Do not include <time.h>, <sys/types.h>, <string.h>, <assert.h>, "io.h", "runggpg.h" and "engine-gpgsm.h". Include <stdlib.h> and "engine-backend.h".  
 (struct engine\_object\_s): Rewritten.  
 (engine\_ops): New variable.  
 \* engine.c (\_gpgme\_engine\_get\_path, \_gpgme\_engine\_get\_version, \_gpgme\_engine\_check\_version, \_gpgme\_engine\_new, \_gpgme\_engine\_release, \_gpgme\_engine\_set\_verbosity, \_gpgme\_engine\_set\_status\_handler, \_gpgme\_engine\_set\_command\_handler, \_gpgme\_engine\_set\_colon\_line\_handler, \_gpgme\_engine\_op\_decrypt, \_gpgme\_engine\_op\_delete, \_gpgme\_engine\_op\_edit, \_gpgme\_engine\_op\_encrypt, \_gpgme\_engine\_op\_encrypt\_sign, \_gpgme\_engine\_op\_export, \_gpgme\_engine\_op\_genkey, \_gpgme\_engine\_op\_import, \_gpgme\_engine\_op\_keylist, \_gpgme\_engine\_op\_keylist\_ext, \_gpgme\_engine\_op\_sign, \_gpgme\_engine\_op\_trustlist, \_gpgme\_engine\_op\_verify, \_gpgme\_engine\_start, \_gpgme\_engine\_set\_io\_cbs, \_gpgme\_engine\_io\_event): Reimplement.  
 \* engine.h: Fix a few comments and a variable name in a prototype.  
 \* ops.h: Do not include "runggpg.h".  
 \* passphrase.c: Include config.h only if [HAVE\_CONFIG\_H]. Do not include "runggpg.h".  
 \* recipient.c: Likewise.  
 \* signers.c: Likewise.  
 \* version.c: Likewise.  
 \* runngpg.c: Likewise. Include "engine-backend.h". Reorder functions and remove prototypes.  
 (\_gpgme\_gpg\_get\_version): Make static and rename to ...  
 (gpg\_get\_version): ... this.  
 (\_gpgme\_gpg\_check\_version): Make static and rename to ...  
 (gpg\_check\_version): ... this.  
 (\_gpgme\_gpg\_new): Make static. Change argument type from GpgObject  
 \* to void \*\*. Call gpg\_release instead  
 \_gpgme\_gpg\_release.  
 (\_gpgme\_gpg\_op\_decrypt): Make static and rename to ...  
 (gpg\_check\_decrypt): ... this.  
 (\_gpgme\_gpg\_op\_delete): Make static and rename to ...  
 (gpg\_check\_delete): ... this.  
 (\_gpgme\_gpg\_set\_recipients): Make static and rename to ...



(gpg\_check\_set\_recipients): ... this.  
(\_gpgme\_gpg\_op\_encrypt): Make static and rename to ...  
(gpg\_encrypt): ... this.  
(\_gpgme\_gpg\_op\_export): Make static and rename to ...  
(gpg\_export): ... this.  
(\_gpgme\_gpg\_op\_genkey): Make static and rename to ...  
(gpg\_genkey): ... this.  
(\_gpgme\_gpg\_op\_import): Make static and rename to ...  
(gpg\_import): ... this.  
(\_gpgme\_gpg\_op\_keylist): Make static and rename to ...  
(gpg\_keylist): ... this.  
(\_gpgme\_gpg\_op\_keylist\_ext): Make static and rename to ...  
(gpg\_keylist\_ext): ... this.  
(\_gpgme\_gpg\_op\_sign): Make static and rename to ...  
(gpg\_sign): ... this.  
(\_gpgme\_gpg\_op\_trustlist): Make static and rename to ...  
(gpg\_trustlist): ... this.  
(\_gpgme\_gpg\_op\_verify):  
Make static and rename to ...  
(gpg\_verify): ... this.  
(gpg\_status\_handler): Rename to ...  
(status\_handler): ... this.  
(\_gpgme\_gpg\_set\_status\_handler): Make static and rename to ...  
(gpg\_set\_status\_handler): ... this.  
(\_gpgme\_gpg\_set\_colon\_line\_handler): Make static and rename to ...  
(gpg\_set\_colon\_line\_handler): ... this.  
(gpgme\_gpg\_add\_io\_cb): Rename to ...  
(add\_io\_cb): ... this.  
(\_gpgme\_gpg\_start): Make static and rename to ...  
(gpg\_start): ... this.  
(\_gpgme\_gpg\_set\_io\_cb): Make static and rename to ...  
(gpg\_set\_io\_cb): ... this.  
(\_gpgme\_gpg\_io\_event): Make static and rename to ...  
(gpg\_io\_event): ... this.  
(struct\_gpgme\_engine\_ops\_gpg): New variable.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify) [!ENABLE\_GPGSM]: Add missing argument.

2002-10-09 Marcus Brinkmann <marcus@g10code.de>

\* data.h, data-user.c, data-stream.c, data-mem.c, data-fd.c, data-compat.c: New file. Really check them in this time, completes

2002-10-08 change.

\* `runpgg.h` (`GpgStatusHandler`): Rename type to `GpgmeStatusHandler` and move to ...

\* `types.h` (`GpgmeStatusHandler`): ... here.

\* `runpgg.h` (`GpgColonLineHandler`): Rename type to `GpgmeColonLineHandler`. and move to ...

\* `types.h` (`GpgmeColonLineHandler`): ... here.

\* `runpgg.h` (`GpgCommandHandler`): Rename type to `GpgmeCommandHandler`. and move to ...

\* `types.h` (`GpgmeCommandHandler`): ... here.

\* `engine.h`: Don't include "runpgg.h".

(`_gpgme_engine_set_status_handler`): Change type of argument from `GpgStatusHandler` to `GpgmeStatusHandler`.

(`_gpgme_engine_set_colon_line_handler`): Change type of argument from `GpgColonLineHandler` to `GpgmeColonLineHandler`.

(`_gpgme_engine_set_command_handler`): Change type of argument from `GpgCommandHandler` to `GpgmeCommandHandler`.

\* `engine-gpgsm.h`: Don't include "runpgg.h".

(`_gpgme_gpgsm_set_status_handler`): Change type of argument from `GpgStatusHandler` to `GpgmeStatusHandler`.

(`_gpgme_gpgsm_set_colon_line_handler`): Change type of argument from `GpgColonLineHandler` to `GpgmeColonLineHandler`.

\* `engine-gpgsm.c`: Do not include "runpgg.h".

(`struct gpgsm_object_s`): Change type of `status.fnc` to `GpgmeStatusHandler`. Change type of `colon.fnc` to `GpgmeColonLineHandler`.

(`gpgsm_assuan_simple_command`): Change type of argument from `GpgStatusHandler` to `GpgmeStatusHandler`.

(`_gpgme_gpgsm_set_status_handler`): Likewise.

(`_gpgme_gpgsm_set_colon_line_handler`): Change type of argument from `GpgColonLineHandler` to `GpgmeColonLineHandler`.

\* `runpgg.h` (`_gpgme_gpg_set_status_handler`): Change type of argument from `GpgStatusHandler` to `GpgmeStatusHandler`.

(`_gpgme_gpg_set_colon_line_handler`): Change type of argument from `GpgColonLineHandler` to `GpgmeColonLineHandler`.

(`_gpgme_gpg_set_command_handler`): Change type of argument from `GpgCommandHandler` to `GpgmeCommandHandler`.

\* `runpgg.c` (`struct gpg_object_s`): Change type of `status.fnc` to `GpgmeStatusHandler`. Change type of `colon.fnc` to `GpgmeColonLineHandler`. Change type of `cmd.fnc` to `GpgmeCommandLineHandler`.

(`_gpgme_gpg_set_status_handler`): Change type of argument FNC to `GpgmeStatusHandler`.

(`_gpgme_gpg_set_colon_line_handler`): Change type of argument FNC to `GpgmeColonLineHandler`.

(`_gpgme_gpg_set_command_handler`): Change type of argument FNC to `GpgmeCommandHandler`.

\* engine.c (`_gpgme_engine_set_status_handler`): Change type of argument FNC to `GpgmeStatusHandler`.

(`_gpgme_engine_set_colon_line_handler`): Change type of argument FNC to `GpgmeColonLineHandler`.

(`_gpgme_engine_set_command_handler`): Change type of argument FNC to `GpgmeCommandHandler`.

\* `rungpg.h` (`_gpgme_gpg_enable_pipemode`): Remove prototype.

\* `rungpg.c` (`struct gpg_object_s`): Remove PM.

(`pipemode_cb`): Prototype removed.

(`add_pm_data`): Function removed.

(`_gpgme_gpg_enable_pipemode`): Likewise.

(`pipemode_copy`): Likewise.

(`pipemode_cb`): Likewise.

(`add_arg`): Don't check for pipemode.

(`add_data`): Likewise.

(`_gpgme_gpg_set_status_handler`): Likewise.

(`_gpgme_gpg_set_colon_line_handler`): Likewise.

(`_gpgme_gpg_set_command_handler`): Likewise.

(`_gpgme_gpg_spawn`): Likewise.

(`_gpgme_gpg_spawn`): Don't set PM.active.

(`_gpgme_gpg_op_verify`): Remove pipemode case.

\* `verify.c` (`_gpgme_op_verify_start`): Remove pipemode case.

\* `rungpg.h` (`_gpgme_gpg_add_arg`, `_gpgme_gpg_add_data`, `_gpgme_gpg_add_pm_data`, `_gpgme_gpg_housecleaning`, `_gpgme_gpg_set_simple_line_handler`): Prototype removed.

(`_gpgme_gpg_set_verbosity`): New prototype.

\* `rungpg.c` (`_gpgme_gpg_add_data`): Make static and rename to ...

(`add_data`): ... this.

(`_gpgme_gpg_add_pm_data`): Call `add_data`, not `_gpgme_gpg_add_data`.

(`_gpgme_gpg_set_command_handler`): Likewise.

(`_gpgme_gpg_op_decrypt`, `_gpgme_gpg_op_edit`, `_gpgme_gpg_op_encrypt`, `_gpgme_gpg_op_encrypt_sign`, `_gpgme_gpg_op_export`, `_gpgme_gpg_op_genkey`, `_gpgme_gpg_op_import`, `_gpgme_gpg_op_sign`, `_gpgme_gpg_op_verify`): Likewise.

(`_gpgme_gpg_add_pm_data`): Rename to ...

(`add_pm_data`): ... this.

(`_gpgme_gpg_op_verify`): Call `add_pm_data`, not `_gpgme_gpg_add_pm_data`.

(`_gpgme_gpg_add_arg`):

Make static and rename to ...

(`add_arg`): ... this.

(`_gpgme_gpg_set_command_handler`, `_gpgme_gpg_new`, `_gpgme_gpg_op_decrypt`, `_gpgme_gpg_op_delete`, `_gpgme_append_gpg_args_from_signers`, `_gpgme_gpg_op_edit`, `_gpgme_append_gpg_args_from_recipients`, `_gpgme_gpg_op_encrypt`,

`_gpgme_gpg_op_encrypt_sign`, `_gpgme_gpg_op_export`,  
`_gpgme_gpg_op_genkey`, `_gpgme_gpg_op_import`, `_gpgme_gpg_op_keylist`,  
`_gpgme_gpg_op_keylist_ext`, `_gpgme_gpg_op_trustlist`,  
`_gpgme_gpg_op_sign`, `_gpgme_gpg_op_verify`): Use `add_arg`, not  
`_gpgme_gpg_add_arg`.  
`(_gpgme_gpg_set_verbosity)`: New function.  
`(struct gpg_object_s)`: Remove member `simple` from colon.  
`(_gpgme_gpg_set_colon_line_handler)`: Don't initialize `simple`.  
`(_gpgme_gpg_set_simple_line_handler)`: Removed function.  
`(read_colon_line)`: Don't check the GPG->colon.`simple`.  
\* `engine.c` (`_gpgme_engine_set_verbosity`): Call  
`_gpgme_gpg_set_verbosity` instead `_gpgme_gpg_add_arg`.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

\* `util.h` (`_gpgme_malloc`,  
`_gpgme_realloc`, `_gpgme_calloc`,  
`_gpgme_strdup`, `_gpgme_free`): Remove prototypes.  
`(xtrymalloc, xtrycalloc, xtryrealloc, xtrystrdup, xfree)`: Remove  
macros.  
\* `util.c`: File removed.  
\* `Makefile.am` (`libgpgme_la_SOURCES`): Remove `util.h`.  
\* `conversion.c` (`_gpgme_decode_c_string`): Use `malloc` instead of  
`xtrymalloc`, `realloc` instead of `xtryrealloc`, `calloc` instead of  
`xtrycalloc`, `free` instead of `xfree`.  
`(_gpgme_data_append_percentstring_for_xml)`: Likewise.  
\* `data.c` (`_gpgme_data_new`, `_gpgme_data_release`): Likewise.  
\* `data-compat.c` (`gpgme_data_new_from_filepart`): Likewise.  
\* `data-mem.c` (`mem_write`, `mem_release`, `gpgme_data_new_from_mem`,  
`_gpgme_data_get_as_string`): Likewise.  
\* `debug.c` (`debug_init`): Likewise.  
\* `decrypt.c` (`_gpgme_release_decrypt_result`): Likewise.  
\* `delete.c` (`_gpgme_release_delete_result`): Likewise.  
\* `edit.c` (`_gpgme_release_edit_result`, `_gpgme_op_edit_start`):  
Likewise.  
\* `encrypt.c` (`_gpgme_release_encrypt_result`): Likewise.  
\* `engine.c` (`_gpgme_engine_get_info`, `_gpgme_engine_new`,  
`_gpgme_engine_release`):  
Likewise.  
\* `engine-gpgsm.c` (`_gpgme_gpgsm_new`, `_gpgme_gpgsm_release`,  
`_gpgme_gpgsm_op_decrypt`, `_gpgme_gpgsm_op_delete`,  
`gpgsm_set_recipients`, `_gpgme_gpgsm_op_encrypt`,  
`_gpgme_gpgsm_op_export`, `_gpgme_gpgsm_op_genkey`,  
`_gpgme_gpgsm_op_import`, `_gpgme_gpgsm_op_keylist`,  
`_gpgme_gpgsm_op_keylist_ext`, `_gpgme_gpgsm_op_sign`,  
`_gpgme_gpgsm_op_verify`, `gpgsm_status_handler`): Likewise.  
\* `genkey.c` (`_gpgme_release_genkey_result`): Likewise.  
\* `gpgme.c` (`gpgme_new`, `gpgme_release`): Likewise.

\* import.c (\_gpgme\_release\_import\_result): Likewise.

\* key.c (\_gpgme\_key\_cache\_init, \_gpgme\_key\_cache\_add, key\_new, add\_subkey, gpgme\_key\_release, \_gpgme\_key\_append\_name): Likewise.

\* keylist.c (\_gpgme\_release\_keylist\_result, keylist\_colon\_handler, \_gpgme\_op\_keylist\_event\_cb, gpgme\_op\_keylist\_next): Likewise.

\* ops.h (test\_and\_allocate\_result): Likewise.

\* passphrase.c (\_gpgme\_release\_passphrase\_result, \_gpgme\_passphrase\_status\_handler, \_gpgme\_passphrase\_command\_handler): Likewise.

\*

progress.c (\_gpgme\_progress\_status\_handler): Likewise.

\* recipient.c (gpgme\_recipients\_new, gpgme\_recipients\_release, gpgme\_recipients\_add\_name\_with\_validity): Likewise.

\* runpg.c (\_gpgme\_gpg\_new, \_gpgme\_gpg\_release, \_gpgme\_gpg\_add\_arg, \_gpgme\_gpg\_add\_data, \_gpgme\_gpg\_set\_colon\_line\_handler, free\_argv, free\_fd\_data\_map, build\_argv, \_gpgme\_gpg\_spawn, read\_status, read\_colon\_line): Likewise.

\* sign.c (\_gpgme\_release\_sign\_result): Likewise.

\* signers.c (\_gpgme\_signers\_add): Likewise.

\* trustlist.c (trust\_item\_new, trustlist\_colon\_handler, \_gpgme\_op\_trustlist\_event\_cb, gpgme\_op\_trustlist\_next, gpgme\_trustitem\_release): Likewise.

\* verify.c (\_gpgme\_release\_verify\_result, finish\_sig): Likewise.

\* version.c (gpgme\_get\_engine\_info, \_gpgme\_get\_program\_version): Likewise.

\* w32-io.c (create\_reader, create\_writer, destroy\_reader, destroy\_writer, build\_commandline, \_gpgme\_io\_spawn): Likewise.

\* w32-sema.c (critsect\_init, \_gpgme\_sema\_cs\_destroy): Likewise.

\* w32-util.c (read\_w32\_registry\_string): Likewise.

\* wait.c (\_gpgme\_fd\_table\_deinit, \_gpgme\_fd\_table\_put, \_gpgme\_wait\_event\_cb, \_gpgme\_add\_io\_cb, \_gpgme\_remove\_io\_cb)

\* data-compat.c: Include <stdlib.h>.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

New data object component:

\* gpgme.h (GpgmeDataReadCb, GpgmeDataWriteCb, GpgmeDataSeekCb, GpgmeDataReleaseCb): New types.  
 (struct GpgmeDataCbs): New structure.  
 (gpgme\_data\_read): Changed prototype to match that of read() closely.  
 (gpgme\_data\_write): Similar for write().  
 (gpgme\_data\_seek, gpgme\_data\_new\_from\_cbs, gpgme\_data\_new\_from\_fd, gpgme\_data\_new\_from\_stream): New prototypes.  
 (gpgme\_data\_get\_type, gpgme\_check\_engine): Prototype removed.

- \* Makefile.am (libpgpme\_la\_SOURCES): Add data.h, data-fd.c, data-stream.c, data-mem.c, data-user.c and data-compat.c.
- \* data.c: Reimplemented from scratch.
- \* (data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c, data-user.c): New file.
- \* context.h (struct gpgme\_data\_s): Removed.
- \* conversion.c:
  - Include <errno.h> and <sys/types.h>.
  - (\_gpgme\_data\_append): New function.
  - \* data.c (\_gpgme\_data\_append\_string): Move to ...
  - \* conversion.c (\_gpgme\_data\_append\_string): ... here.
  - \* data.c (\_gpgme\_data\_append\_for\_xml): Move to ...
  - \* conversion.c (\_gpgme\_data\_append\_for\_xml): ... here.
  - \* data.c (\_gpgme\_data\_append\_string\_for\_xml): Move to ...
  - \* conversion.c (\_gpgme\_data\_append\_string\_for\_xml): ... here.
  - \* data.c (\_gpgme\_data\_append\_percentstring\_for\_xml): Move to ...
  - \* conversion.c (\_gpgme\_data\_append\_percentstring\_for\_xml): ... here.
  
- \* ops.h (\_gpgme\_data\_get\_mode, \_gpgme\_data\_set\_mode): Prototype removed.
- \* types.h (GpgmeDataMode): Type removed.
  
- \* decrypt.c (\_gpgme\_decrypt\_start): Don't check data type or mode.
- \* edit.c (\_gpgme\_op\_edit\_start): Likewise.
- \* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.
- \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* export.c (\_gpgme\_op\_export\_start): Likewise.
- \*
- genkey.c (\_gpgme\_op\_genkey\_start): Likewise.
- \* import.c (\_gpgme\_op\_import\_start): Likewise.
- \* sign.c (\_gpgme\_op\_sign\_start): Likewise.
- \* verify.c (\_gpgme\_op\_verify\_start): Likewise.
  
- \* encrypt.c (gpgme\_op\_encrypt): Remove hack that returns invalid no recipient if no data was returned.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign): Remove hack that returns no recipient if no data was returned.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign): Remove hack that returns no recipient if no data was returned.
  
- \* engine.c (\_gpgme\_engine\_op\_verify): Add new argument to differentiate detached from normal signatures.
- \* engine.h (\_gpgme\_engine\_op\_verify): Likewise for prototype.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Likewise. Don't check mode of data argument.
- \* engine-gpgsm.h (\_gpgme\_gpgsm\_op\_verify): Likewise for prototype.
- \* gpgme.h (gpgme\_op\_verify\_start): Likewise for prototype.

(gpgme\_op\_verify): Likewise for prototype.  
\* runpgg.c (\_gpgme\_gpg\_op\_verify): Likewise.  
\* runpgg.h  
(\_gpgme\_gpg\_op\_verify): Likewise for prototype.  
\* verify.c (\_gpgme\_op\_verify\_start): Likewise.  
(gpgme\_op\_verify\_start): Likewise.  
(gpgme\_op\_verify): Likewise.

\* runpgg.c (struct arg\_and\_data\_s): New member INBOUND to hold direction of data object.  
(\_gpgme\_gpg\_add\_data): Add new argument INBOUND. Use it to determine direction of data object.  
(\_gpgme\_gpg\_add\_pm\_data, \_gpgme\_gpg\_set\_command\_handler, \_gpgme\_gpg\_op\_decrypt, \_gpgme\_gpg\_op\_edit, \_gpgme\_gpg\_op\_encrypt, \_gpgme\_gpg\_op\_encrypt\_sign, \_gpgme\_gpg\_op\_export, \_gpgme\_gpg\_op\_genkey, \_gpgme\_gpg\_op\_import, \_gpgme\_gpg\_op\_sign, \_gpgme\_gpg\_op\_verify): Add new argument to \_gpgme\_gpg\_add\_data invocation.  
(build\_argv): Use new member INBOUND to determine direction of file descriptor. Don't check the data type.  
\* runpgg.h (\_gpgme\_gpg\_add\_data): Add new argument to prototype.

\* gpgme.c (gpgme\_get\_op\_info): Don't call \_gpgme\_data\_get\_as\_string if CTX->op\_info is NULL.

\* version.c (gpgme\_check\_engine): Function removed.

2002-09-30

Werner Koch <wk@gnupg.org>

\* keylist.c (keylist\_colon\_handler): Take care when printing a NULL with the DEBUG.

\* engine-gpgsm.c (struct gpgsm\_object\_s): New member ANY.  
(gpgsm\_status\_handler): Run the colon function to indicate EOF.  
(\_gpgme\_gpgsm\_set\_colon\_line\_handler): Better reset ANY here.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c (\_gpgme\_hextobyte): Prevent superfluous multiplication with base. Reported by Stphane Corthsy.

\* keylist.c (gpgme\_op\_keylist\_ext\_start): Use private asynchronous operation type in invocation of \_gpgme\_op\_reset.

2002-09-20 Werner Koch <wk@gnupg.org>

\* ath.c: Include sys/time.h if sys/select.h is not available.

2002-09-13 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (keylist\_status\_handler): Do not call finish\_key() here.  
(gpgme\_op\_keylist\_ext\_start): Set CTX->tmp\_key to NULL.

2002-09-03 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (assuan\_libobj): Remove @LTLIBOBJ@ as we link them into gpgme unconditionally.  
(libgpgme\_la\_LIBADD): Change @LIBOBJ@ into @LTLIBOBJ@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (assuan\_libobj): Use @LTLIBOBJ@ instead @LIBOBJ@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* debug.c (\_gpgme\_debug\_add): Test \*LINE, not LINE.  
(\_gpgme\_debug\_end): Likewise.  
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* posix-io.c (\_gpgme\_io\_select): Don't use a non-constant struct initializer.  
\* version.c (\_gpgme\_get\_program\_version): Likewise.  
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c (\_gpgme\_decode\_c\_string): Set DESTP before modifying DEST.  
  
\* conversion.c (\_gpgme\_decode\_c\_string): Fix off by one error in last change.  
\* runpg.c (\_gpgme\_append\_gpg\_args\_from\_signers): Move before \_gpgme\_op\_edit so its prototype is known early on.  
  
\* conversion.c: New file.  
\* util.h: Add prototypes for \_gpgme\_decode\_c\_string and \_gpgme\_hextobyte.  
\* keylist.c (keylist\_colon\_handler): Call \_gpgme\_decode\_c\_string on issuer name.  
\* Makefile.am (libgpgme\_la\_SOURCES): Add conversion.c  
\* key.c (\_gpgme\_key\_append\_name): Replace calls to hextobyte by



calls to `_gpgme_hextobyte`.

(`hash_key`): Likewise.

2002-09-01 Marcus Brinkmann <marcus@g10code.de>

\* `op-support.c` (`_gpgme_op_reset`): Set `CTX->pending` after calling `_gpgme_engine_release`, as this will reset `pending` to zero in the event done callback on cancelled operations.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

\* `rungpg.c` (`_gpgme_gpg_op_edit`): Add args from signers.  
Suggested by Miguel Coca <e970095@zipi.fi.upm.es>.

\* `rungpg.c` (`_gpgme_gpg_op_edit`): Add bogus `ctx` argument.

\* `rungpg.h`: Also to prototype.

\* `engine.c` (`_gpgme_engine_op_edit`): Likewise.

\* `engine.h`: Likewise.

\* `edit.c` (`_gpgme_op_edit_start`): Likewise.

2002-08-29 Werner Koch <wk@gnupg.org>

\* `engine-gpgsm.c` (`_gpgme_gpgsm_op_sign`):

Implement signer

selection.

\* `vasprintf.c` (`va_copy`): Define macro if not yet defined.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

\* `passphrase.c` (`_gpgme_passphrase_status_handler`): Reset `CTX->result.passphrase->no_passphrase` if `passphrase` is given (good or bad). Submitted by Jean DIRAISON <jean.diraison@free.fr>.

2002-08-28 Marcus Brinkmann <marcus@g10code.de>

\* `posix-io.c` (`_gpgme_io_spawn`): Use a double-fork approach.

Return 0 on success, -1 on error.

\* `version.c` (`_gpgme_get_program_version`): Don't wait for the child.

\* `engine.c` (`_gpgme_engine_housecleaning`): Function removed.

(`do_reaping`): Likewise.

(`_gpgme_engine_add_child_to_reap_list`): Likewise.

(`struct reap_s`): Removed.

(`reap_list`): Likewise.

(`reap_list_lock`): Likewise.

\* `engine.h` (`_gpgme_engine_io_event`): Remove prototypes for

`_gpgme_engine_housecleaning` and

`_gpgme_engine_add_child_to_reap_list`.

\* `rungpg.c` (`_gpgme_gpg_release`): Don't add child to reap list.

(struct gpg\_object\_s): Remove  
PID member.  
(\_gpgme\_gpg\_new): Don't initialize GPG->pid.  
(\_gpgme\_gpg\_spawn): Don't set GPG->pid.  
\* wait.c (run\_idle): Removed.  
(gpgme\_wait): Run idle\_function directly.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* encrypt-sign.c (encrypt\_sign\_status\_handler): Remove dead  
variables encrypt\_info and encrypt\_info\_len.  
\* trustlist.c (gpgme\_op\_trustlist\_start): Set colon line handler.  
\* posix-sema.c (sema\_fatal): Remove function.  
All these reported by Stphane Corthsy.

2002-08-23 Werner Koch <wk@gnupg.org>

\* gpgme-config.in: Made --prefix work for --libs.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* ath.h: Update list of symbols that get a prefix: Rename the  
ath\_mutex\_\*\_available symbols to ath\_\*\_available.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* stpcpy.c: New file from gnulib.  
\* Makefile.am (assuan\_libobjs): Remove jnlib.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add prototype for gpgme\_op\_import\_ext.  
\* import.c  
(struct import\_result\_s): New member `nr\_considered'.  
Rename `any\_imported' to `nr\_imported'.  
(import\_status\_handler): Increment nr\_imported. Set nr\_considered  
if appropriate.  
(gpgme\_op\_import\_ext): New function.  
(gpgme\_op\_import): Implement in terms of gpgme\_op\_import\_ext.

2002-08-20 Werner Koch <wk@gnupg.org>

\* gpgme.m4: Replaced with a new and faster version. This does not  
anymore try to build test programs. If we really need test  
programs, we should add an option to gpgme-config to do so.

\* vasprintf.c (int\_vasprintf): Hack to handle NULL passed for %s.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (\_gpgme\_set\_op\_info): Append data on subsequent calls.
- \* encrypt-sign.c (encrypt\_sign\_status\_handler): Remove op\_info handling.

2002-08-19 Werner Koch <wk@gnupg.org>

- \* decrypt.c (is\_token, skip\_token): Duplicated from verify.c (gpgme\_op\_decrypt): Hack to properly return Decryption\_Failed.. (\_gpgme\_decrypt\_status\_handler): Create an operation info.

2002-08-14

Werner Koch <wk@gnupg.org>

- \* key.h (struct certsigs): New. Use it in gpgme\_key\_s.
- \* key.c (gpgme\_key\_release): Release it. We need to add more code of course.
- (\_gpgme\_key\_append\_name): Use memset to initialize the struct.
- \* gpgme.h (GPGME\_KEYLIST\_MODE\_SIGS): New.
- \* runpgp.c (\_gpgme\_gpg\_op\_keylist): Include sigs in listing depending non the list mode.
  
- \* key.c (gpgme\_key\_get\_string\_attr): Use GPGME\_ATTR\_TYPE to return information about the key type (PGP or X.509).
- (gpgme\_key\_get\_ulong\_attr): Likewise.
  
- \* keylist.c (keylist\_colon\_handler): Include 1 in the check for valid algorithms so that RSA is usable. Store the issuer name and serial number also for "crs" records. Parse the expire date for subkeys.
- (set\_userid\_flags): Put them onto the last appended key.

2002-07-29 Marcus Brinkmann <marcus@g10code.de>

- \* runpgp.c (\_gpgme\_gpg\_op\_edit): Use --with-colons.

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

- \* data.c (gpgme\_data\_read): For GPGME\_DATA\_TYPE\_NONE, return EOF instead an error.

The following changes make it possible to flush an inbound data pipe before invoking a command handler:

- \* posix-io.c (\_gpgme\_io\_select): Accept new argument NONBLOCK to \_gpgme\_io\_select. Set timeout of 0 if this is set.

- \* w32-io.c (`_gpgme_io_select`): Likewise.
- \* io.h: Add new argument `NONBLOCK` to `_gpgme_io_select` prototype.
- \* wait.c (`do_select`): Add new argument to `_gpgme_io_select` invocation.
- \* `rungpg.h` (`_gpgme_gpg_set_command_handler`): Add new argument `linked_data` to prototype.
- \* `engine.h` (`_gpgme_engine_set_command_handler`): Likewise.
- \* `engine.c` (`_gpgme_engine_set_command_handler`): Likewise.
- \* `passphrase.c` (`_gpgme_passphrase_start`): Pass `NULL` as `linked_data` argument to `_gpgme_engine_set_command_handler`.
- \* `rungpg.c` (`struct gpg_object_s`): New members `linked_data` and `linked_idx` in `CMD`.
- (`_gpgme_gpg_new`): Initialize those new members.
- (`_gpgme_gpg_set_command_handler`): Accept new argument `linked_data`.
- (`build_argv`): Handle `linked_data` in the same hack as `cb_data`.
- (`read_status`): If `linked_data` is in use, flush the pipe before activating the command handler.
- \* `gpgme.h`: Add prototypes for `gpgme_op_edit_start` and `gpgme_op_edit`.

The next changes export the status codes to the user:

- \* `decrypt.c` (`_gpgme_decrypt_status_handler`): Likewise, also prefix all `STATUS_` with `GPGME_`.
- \* `delete.c` (`delete_status_handler`): Likewise.
- \* `decrypt-verify.c` (`decrypt_verify_status_handler`): Likewise.
- \* `encrypt.c` (`_gpgme_encrypt_status_handler`): Likewise.
- (`_gpgme_encrypt_sym_status_handler`): Likewise.
- \* `encrypt-sign.c` (`encrypt_sign_status_handler`): Likewise.
- \* `engine-gpgsm.c` (`parse_status`): Likewise.
- (`gpgsm_status_handler`): Likewise.
- (`gpgsm_set_recipients`): Likewise.
- \* `export.c` (`export_status_handler`): Likewise.
- \* `genkey.c` (`genkey_status_handler`): Likewise.
- \* `import.c` (`append_xml_impinfo`): Likewise.
- (`import_status_handler`): Likewise.
- \* `keylist.c` (`keylist_status_handler`): Likewise.
- \* `passphrase.c` (`_gpgme_passphrase_status_handler`): Likewise.
- (`command_handler`): Likewise.
- \* `progress.c` (`_gpgme_progress_status_handler`): Likewise.
- \* `sign.c` (`_gpgme_sign_status_handler`): Likewise.
- \* `trustlist.c` (`trustlist_status_handler`): Likewise.
- \* `verify.c` (`_gpgme_verify_status_handler`): Likewise.
- \* `gpgme.h` (`GpgmeEditCb`): New type.
- \* `rungpg.h` (`GpgStatusCode`): Rename and move to ...
- \* `gpgme.h` (`GpgmeStatusCode`): ... this and here.

- \* Makefile.am (status-table.h): Run mkstatus on gpgme.h, not runpg.h.
- \* mkstatus: Prefix STATUS with GPGME\_.
- \* runpg.h (GpgStatusHandler, GpgCommandHandler): Change type accordingly.
- \* ops.h (\_gpgme\_verify\_status\_handler, \_gpgme\_decrypt\_status\_handler, \_gpgme\_sign\_status\_handler, \_gpgme\_encrypt\_status\_handler, \_gpgme\_passphrase\_status\_handler, \_gpgme\_progress\_status\_handler): Likewise.
- \* runpg.c (struct gpg\_object\_s): Likewise for CMD.code.

These changes add an edit operation to GPGME:

- \* context.h (struct gpgme\_context\_s): New member RESULT.edit. \*
- ops.h: Add prototype for \_gpgme\_release\_edit\_result and \_gpgme\_passphrase\_command\_handler.
- \* passphrase.c (command\_handler): Make non-static and rename to ... (\_gpgme\_passphrase\_command\_handler): ... this.
- (\_gpgme\_passphrase\_start): Use new name for command handler.
- \* types.h: Add EditResult type.
- \* gpgme.c (\_gpgme\_release\_result): Release EDIT result.
- \* edit.c: New file.
- \* Makefile.am (libgpgme\_la\_SOURCES): Add edit.c.
- (libgpgme\_la\_LDADD): Rename to libgpgme\_la\_LIBADD, and include assuan\_libobjs.
- (assuan\_libobjs): New variable, set this instead libgpgme\_la\_LIBADD.
- \* engine.h (\_gpgme\_engine\_op\_edit): New prototype.
- \* engine.c (\_gpgme\_engine\_op\_edit): New function.
- \* runpg.h (\_gpgme\_gpg\_op\_edit): New prototype.
- \* runpg.c (\_gpgme\_gpg\_op\_edit): New function.

2002-07-27 Marcus Brinkmann <marcus@g10code.de>

- \* delete.c (delete\_problem): New case ambiguous specification.
- (delete\_status\_handler): Handle new case (poorly).

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c
- (\_gpgme\_gpgsm\_op\_delete): Implement this.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (libgpgme\_la\_LDADD): Add @LIBOBJS@ for vasprintf and fopencookie.
- \* vasprintf.c: Update to more recent libiberty version.
- \* debug.h: Replace #elif with #elif.

Submitted by Stphane Corthsy:

\* util.h (vasprintf): Correct prototype.

\* encrypt-sign.c: Include <stddef.h>.

(encrypt\_sign\_status\_handler): Change type of ENCRYPT\_INFO\_LEN to size\_t.

\* ath-pthread.c: Include <stdlib.h>, not <malloc.h>.

\* ath-pth.c: Likewise.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (fdt\_global): Make static. Reported by Stphane Corthsy.

\* runpgg.c (\_gpgme\_gpg\_op\_keylist\_ext): Skip empty string patterns. Reported by Stphane Corthsy.

\* key.c (gpgme\_key\_get\_as\_xml): Add OTRUST attribute. Requested by Stphane Corthsy.

(gpgme\_key\_get\_string\_attr): Add GPGME\_ATTR\_SIG\_SUMMARY case to silence gcc warning.

\* runpgg.c (\_gpgme\_gpg\_new): Always set utf8 as charset.

2002-07-03

Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_set\_io\_cbs): Deal with CTX being NULL.

\* gpgme.c (\_gpgme\_op\_event\_cb\_user): New function.

\* op-support.c (\_gpgme\_op\_reset): Support a new mode of operation for private or user event loop. Use new user event callback wrapper.

\* trustlist.c (gpgme\_op\_trustlist\_start): Use this new mode.

\* keylist.c (gpgme\_op\_keylist\_start): Likewise.

\* runpgg.c (\_gpgme\_gpg\_io\_event): New function.

\* runpgg.h (\_gpgme\_gpg\_io\_event): New prototype.

\* engine-gpgsm.c (\_gpgme\_gpg\_io\_event): New function.

\* engine-gpgsm.h (\_gpgme\_gpgsm\_io\_event): New prototype.

\* engine.c (\_gpgme\_engine\_io\_event): New function.

\* engine.h (\_gpgme\_engine\_io\_event): New prototype.

\* keylist.c (finish\_key): Call \_gpgme\_engine\_io\_event, and move the real work for the default IO callback routines to ...

(\_gpgme\_op\_keylist\_event\_cb): ... here. New function.

\* trustlist.c (trustlist\_colon\_handler): Signal GPGME\_EVENT\_NEXT\_TRUSTITEM. Move queue

manipulation to ...

(\_gpgme\_op\_trustlist\_event\_cb): ... here. New function.

\* gpgme.c (\_gpgme\_op\_event\_cb): Call \_gpgme\_op\_keylist\_event\_cb and \_gpgme\_op\_trustlist\_event\_cb when appropriate.

\* ops.h (\_gpgme\_op\_keylist\_event\_cb): New prototype.

(\_gpgme\_op\_trustlist\_event\_cb): Likewise.

\* op-support.c (\_gpgme\_op\_reset): Add comment why we don't use the user provided event handler directly.

\* gpgme.h (GpgmeRegisterIOCb): Return GpgmeError value, and TAG in a pointer argument.

\* wait.c (\_gpgme\_add\_io\_cb): Likewise.

\* wait.h (\_gpgme\_add\_io\_cb): Likewise for prototype.

\* runpgp.c (\_gpgme\_gpg\_add\_io\_cb): Call IO\_CBS->add with new argument. Fix up error handling.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_add\_io\_cb): Call IO\_CBS->add with new argument, fix up error handling.

2002-07-03 Werner Koch <wk@gnupg.org>

\* encrypt.c (status\_handler\_finish): New.

(\_gpgme\_encrypt\_status\_handler): Moved some code out to the new function and call this function also in case we get into the status

handler with an error which might happen due to a kludge in engine-gpgsm.c

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (gpgme\_op\_keylist\_ext\_start): Always use our own FD table (eg use synchronous mode).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Fix documentation of key attribute retrieval functions.

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

\* ops.h (\_gpgme\_wait\_on\_condition): Remove HANG argument from prototype and change return type to GpgmeError.

(\_gpgme\_wait\_one): New prototype.

\* wait.c (gpgme\_wait): Replace with the meat from \_gpgme\_wait\_on\_condition here, and remove the support for conditions.

(\_gpgme\_wait\_on\_condition): Remove HANG argument from prototype and change return type to GpgmeError. Replace with meat from \_gpgme\_wait\_one and add support for conditions.

(\_gpgme\_wait\_one): Just call \_gpgme\_wait\_on\_condition without condition.

\* keylist.c (gpgme\_op\_keylist\_ext\_start): Always use our own FD table (eg use synchronous mode).  
(gpgme\_op\_keylist\_next): Remove HANG argument from \_gpgme\_wait\_on\_condition. Check its return value.  
\* trustlist.c (gpgme\_op\_trustlist\_start): Always use our own FD table (eg use synchronous mode).  
(gpgme\_op\_trustlist\_next): Remove HANG argument from \_gpgme\_wait\_on\_condition. Check its return value.

2002-06-26 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (map\_assuan\_error): Map No\_Data\_Available to EOF.  
  
\* import.c (append\_xml\_impinfo): Kludge to print fingerprint instead of keyid for use with gpgsm.  
(import\_status\_handler): Set a flag to know whether any import occurred.  
(gpgme\_op\_import): Return -1 if no certificate was imported.

2002-06-25 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_set\_io\_cbs) [ENABLE\_GPGSM]: Fixed function arguments.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_export): Only export the keys listed in RECP.  
\* export.c (gpgme\_op\_export): If no data was returned, return GPGME\_No\_Recipients.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_export): Implement.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_assuan\_simple\_command): Return ERR.  
(parse\_status): New function.  
(gpgsm\_status\_handler): Use parse\_status.  
(gpgsm\_assuan\_simple\_command): Accept new arguments STATUS\_FNC and STATUS\_FNC\_VALUE and process status messages.  
(gpgsm\_set\_recipients): Pass new arguments to gpgsm\_assuan\_simple\_command.  
(gpgsm\_set\_fd): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist\_ext): Likewise.



(\_gpgme\_gpgsm\_op\_sign): Likewise.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (\_gpgme\_remove\_io\_cb): Unlock FDT->lock.

2002-06-20 Werner Koch <wk@gnupg.org>

\* runpgp.c (build\_argv): Ignore GPG\_AGENT\_INFO if set but empty.

\* verify.c (calc\_sig\_summary): Set bad policy for wrong key usage.

(skip\_token): New.

(\_gpgme\_verify\_status\_handler): Watch out for wrong key usage.

(gpgme\_get\_sig\_string\_attr): Hack to return info on the key usage. Does now make use of the former RESERVED argument which has been renamed to WHATIDX.

(gpgme\_get\_sig\_ulong\_attr): Renamed RESERVED to WHATIDX.

2002-06-14 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (do\_select): Return -1 on error, and 0 if nothing to run.

(\_gpgme\_wait\_one): Only set HANG to zero if do\_select returned an error, or there are no more file descriptors to wait on.

(\_gpgme\_wait\_on\_condition): Ignore return value from do\_select for now.

2002-06-13 Werner Koch <wk@gnupg.org>

\* verify.c (gpgme\_op\_verify): Make sure that we never access an uninitialized result structure.

2002-06-12 Werner Koch <wk@gnupg.org>

\* keylist.c (struct keylist\_result\_s): New.

(\_gpgme\_release\_keylist\_result): Release it here

(keylist\_status\_handler): Handle truncated.

(append\_xml\_keylistinfo): New.

\* gpgme.c (\_gpgme\_release\_result): and use it here.

\* types.h: Declare the new type here.

\*

context.h (struct gpgme\_context\_s): Use it here.

2002-06-11 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_release): Close status\_cb.fd.

(\_gpgme\_gpgsm\_new): Duplicate status file descriptor, so we can use our own close notification mechanism without interfering with

assuan.

2002-06-11 Werner Koch <wk@gnupg.org>

\* gpgme.h: Add GPGME\_ATTR\_SIG\_SUMMARY and the GPGME\_SIGSUM\_ constants.

\* verify.c (calc\_sig\_summary): New.

(gpgme\_get\_sig\_ulong\_attr): And use it here.

2002-06-10 Werner Koch <wk@gnupg.org>

\* runpgg.h: Add new status codes TRUNCATED and ERROR.

\* verify.c (is\_token, copy\_token): New.

(\_gpgme\_verify\_status\_handler): Use copy\_token, handle the new ERROR status and store the errorcode used withpggsm and trust status codes.

\* gpgme.h: New attribute ERRTOK.

\* key.c (gpgme\_key\_get\_string\_attr): Add dummy case for it.

(gpgme\_get\_sig\_string\_attr): Use it here to return the last error.

2002-06-10 Marcus Brinkmann <marcus@g10code.de>

\*

engine-gpgsm.c (\_gpgme\_gpgsm\_start): Move the code that sets the close notification for the status fd to ...

(\_gpgme\_gpgsm\_new): ... here.

\* wait.h: Include "sema.h". Remove prototypes of

\_gpgme\_remove\_proc\_from\_wait\_queue and

\_gpgme\_register\_pipe\_handler. Add prototypes of

\_gpgme\_fd\_table\_init, \_gpgme\_fd\_table\_deinit, \_gpgme\_fd\_table\_put,

\_gpgme\_add\_io\_cb, \_gpgme\_remove\_io\_cb, \_gpgme\_wait\_event\_cb and

\_gpgme\_wait\_one..

\* wait.c: Remove global variables PROC\_QUEUE, PROC\_QUEUE\_LOCK,

FD\_TABLE\_SIZE, FD\_TABLE, FD\_TABLE\_LOCK. New global variables

FDT\_GLOBAL, CTX\_DONE\_LIST, CTX\_DONE\_LIST\_SIZE,

CTX\_DONE\_LIST\_LENGTH and CTX\_DONE\_LIST\_LOCK. Remove struct

proc\_s. Replace struct wait\_item\_s.

(\_gpgme\_fd\_table\_init): New function.

(\_gpgme\_fd\_table\_deinit): Likewise.

(\_gpgme\_fd\_table\_put): Likewise.

(set\_process\_done): Remove function.

(do\_select): Take argument FDT. Use that to decide which fds to select on.

(\_gpgme\_remove\_proc\_from\_wait\_queue): Remove function.

(\_gpgme\_wait\_event\_cb):

New function.

(\_gpgme\_wait\_one): Likewise.

(\_gpgme\_register\_pipe\_handler): Remove function.

(\_gpgme\_add\_io\_cb): New function.  
 (\_gpgme\_remove\_io\_cb): Likewise.  
 (\_gpgme\_freeze\_fd): Remove function.  
 (\_gpgme\_thaw\_fd): Remove function.  
 \* runpgg.c (struct fd\_data\_map\_s): Add new member TAG.  
 (struct gpg\_object\_s): Likewise for STATUS and COLON. Add member  
 IDX to CMD. Add new member IO\_CBS.  
 (close\_notify\_handler): New variables POSSIBLY\_DONE and NOT\_DONE.  
 For each I/O callback, check if it should be unregistered. If all  
 callbacks have been unregistered, trigger GPGME\_EVENT\_DONE.  
 Remove member RUNNING.  
 (\_gpgme\_gpg\_new): Initialize new members.  
 (\_gpgme\_gpg\_release): Check PID not RUNNING. Don't call  
 \_gpgme\_remove\_proc\_from\_wait\_queue. Close GPG->CMD.FD if set.  
 (build\_argv): Store away the index instead the file descriptor for  
 CMD.  
 (\_gpgme\_gpg\_add\_io\_cb): New function.  
 (\_gpgme\_gpg\_spawn): Use \_gpgme\_gpg\_add\_io\_cb to register IO  
 callbacks.  
 (gpg\_status\_handler):  
 Change return type to void, remove PID  
 argument, close filedescriptor if EOF or error occurs.  
 (read\_status): Use \_gpgme\_gpg\_add\_io\_cb instead \_gpgme\_thaw\_fd.  
 Use IO\_CBS->remove instead \_gpgme\_freeze\_fd.  
 (gpg\_colon\_line\_handler): Change return type to void, remove PID  
 argument, close filedescriptor if EOF or error occurs.  
 (command\_cb): Use IO\_CBS->remove instead \_gpgme\_freeze\_fd.  
 (\_gpgme\_gpg\_set\_io\_cbs): New function.  
 \* runpgg.h (\_gpgme\_gpg\_set\_io\_cbs): Prototype for  
 \_gpgme\_gpg\_set\_io\_cbs.  
 \* gpgme.h (GpgmeIOCb): New type.  
 (GpgmeRegisterIOCb): Likewise.  
 (GpgmeRemoveIOCb): Likewise.  
 (GpgmeEventIO): Likewise.  
 (GpgmeEventIOCb): Likewise.  
 (struct GpgmeIOCbs): New structure to hold I/O callbacks.  
 (gpgme\_set\_op\_io\_cbs): New prototype.  
 (gpgme\_get\_op\_io\_cbs): Likewise.  
 \* ops.h: New prototype for \_gpgme\_op\_event\_cb. Remove prototypes  
 for \_gpgme\_freeze\_fd and \_gpgme\_thaw\_fd. Remove PID argument from  
 \_gpgme\_data\_inbound\_handler and \_gpgme\_data\_outbound\_handler  
 prototype.  
 Add prototype for \_gpgme\_op\_reset.  
 Add synchronous argument to \_gpgme\_decrypt\_start prototype.  
 \* io.h: Beautification.  
 \* gpgme.c: Include "wait.h".  
 (gpgme\_new): Initialize FDT.  
 (gpgme\_set\_io\_cbs): New function.

(gpgme\_get\_io\_cbs): Likewise.

(\_gpgme\_op\_event\_cb): Likewise.

\* data.c (\_gpgme\_data\_inbound\_handler): Change return type to void. Drop PID argument. Close FD on error and EOF.

(write\_mem\_data): Don't close FD here ...

(write\_cb\_data): ... or here ...

(\_gpgme\_data\_outbound\_handler): ... but here. Change return type to void. Drop PID argument.

\* context.h: Include "wait.h".

(struct gpgme\_context\_s): New members FDT and IO\_CBS.

\* op-support.c: New file.

\* Makefile.am (libgpgme\_la\_SOURCES): Add op-support.c.

\* ops.h: Add prototype for \_gpgme\_op\_reset().

\* decrypt.c (\_gpgme\_decrypt\_start): New argument SYNCHRONOUS. Use \_gpgme\_op\_reset.

(gpgme\_op\_decrypt\_start): Add synchronous argument.

(gpgme\_op\_decrypt): Likewise. Use \_gpgme\_wait\_one instead gpgme\_wait.

\*

delete.c (gpgme\_op\_delete\_start): Rename to ...

(\_gpgme\_op\_delete\_start): ... this. New argument SYNCHRONOUS. Use \_gpgme\_op\_reset. Make function static.

(gpgme\_op\_delete\_start): Just a wrapper around \_gpgme\_op\_delete\_start now.

(gpgme\_op\_delete): Add synchronous argument. Use \_gpgme\_wait\_one instead gpgme\_wait.

\* encrypt.c: Include "wait.h".

(gpgme\_op\_encrypt\_start): Rename to ...

(\_gpgme\_op\_encrypt\_start): ... this. New argument SYNCHRONOUS. Use \_gpgme\_op\_reset. Make function static.

(gpgme\_op\_encrypt\_start): Just a wrapper around \_gpgme\_op\_encrypt\_start now.

(gpgme\_op\_encrypt): Add synchronous argument. Use \_gpgme\_wait\_one instead gpgme\_wait.

\* encrypt\_sign.c (gpgme\_op\_encrypt\_sign\_start): Rename to ...

(\_gpgme\_op\_encrypt\_sign\_start): ... this. New argument SYNCHRONOUS. Use \_gpgme\_op\_reset. Make function static.

(gpgme\_op\_encrypt\_sign\_start): Just a wrapper around \_gpgme\_op\_encrypt\_sign\_start now.

(gpgme\_op\_encrypt\_sign): Add synchronous argument.

Use

\_gpgme\_wait\_one instead gpgme\_wait.

\* export.c (gpgme\_op\_export\_start): Rename to ...

(\_gpgme\_op\_export\_start): ... this. New argument SYNCHRONOUS. Use \_gpgme\_op\_reset. Make function static.

(gpgme\_op\_export\_start): Just a wrapper around \_gpgme\_op\_export\_start now.

(gpgme\_op\_export): Add synchronous argument. Use \_gpgme\_wait\_one

instead `gpgme_wait`.

\* `genkey.c` (`gpgme_op_genkey_start`): Rename to ...  
(`_gpgme_op_genkey_start`): ... this. New argument `SYNCHRONOUS`.  
Use `_gpgme_op_reset`. Make function static.  
(`gpgme_op_genkey_start`): Just a wrapper around  
`_gpgme_op_genkey_start` now.  
(`gpgme_op_genkey`): Add synchronous argument. Use `_gpgme_wait_one`  
instead `gpgme_wait`.

\* `import.c` (`gpgme_op_import_start`): Rename to ...  
(`_gpgme_op_import_start`): ... this. New argument `SYNCHRONOUS`.  
Use `_gpgme_op_reset`. Make function static.  
(`gpgme_op_import_start`): Just a wrapper around  
`_gpgme_op_import_start` now.  
(`gpgme_op_import`): Add synchronous argument. Use `_gpgme_wait_one`  
instead  
`gpgme_wait`.

\* `keylist.c` (`gpgme_op_keylist_start`): Use `_gpgme_op_reset`.  
(`gpgme_op_keylist_ext_start`): Likewise.

\* `sign.c` (`gpgme_op_sign_start`): Rename to ...  
(`_gpgme_op_sign_start`): ... this. New argument `SYNCHRONOUS`. Use  
`_gpgme_op_reset`. Make function static.  
(`gpgme_op_sign_start`): Just a wrapper around `_gpgme_op_sign_start`  
now.  
(`gpgme_op_sign`): Add synchronous argument. Use `_gpgme_wait_one`  
instead `gpgme_wait`.

\* `trustlist.c` (`gpgme_op_trustlist_start`): Use `_gpgme_op_reset`.

\* `verify.c` (`gpgme_op_verify_start`): Rename to ...  
(`_gpgme_op_verify_start`): ... this. New argument `SYNCHRONOUS`.  
Use `_gpgme_op_reset`. Make function static.  
(`gpgme_op_verify_start`): Just a wrapper around  
`_gpgme_op_verify_start` now.  
(`gpgme_op_verify`): Add synchronous argument. Use `_gpgme_wait_one`  
instead `gpgme_wait`.

\* `engine-gpgsm.c` (`iocb_data_t`): New type.  
(`struct gpgsm_object_s`): New member `status_cb`. Replace `input_fd`  
and `input_data` with `input_cb`. Replace `output_fd` and `output_data`  
with  
`output_cb`. Replace `message_fd` and `message_data` with  
`message_cb`. New member `io_cbs`.  
(`_gpgme_gpgsm_new`): Initialize all new members (and drop the old  
ones).  
(`close_notify_handler`): New variable `POSSIBLY_DONE`. For each I/O  
callback, check if it should be unregistered. If all callbacks  
have been unregistered, trigger `GPGME_EVENT_DONE`.  
(`_gpgme_gpgsm_release`): Remove variable `PID`. Use new variable  
names to close the file descriptors.  
(`_gpgme_gpgsm_op_decrypt`): Use new variable names,  
(`_gpgme_gpgsm_op_encrypt`): Likewise.

(\_gpgme\_gpgsm\_op\_genkey): Likewise.  
(\_gpgme\_gpgsm\_op\_import): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist\_ext): Likewise.  
(\_gpgme\_gpgsm\_op\_sign): Likewise.  
(\_gpgme\_gpgsm\_op\_verify): Likewise.  
(gpgsm\_status\_handler): Drop argument PID. Change return type to void. Close status pipe before returning because of EOF or error.  
(\_gpgme\_gpgsm\_add\_io\_cb): New function.  
(\_gpgme\_gpgsm\_start): Use \_gpgme\_gpgsm\_add\_io\_cb to register callback function.  
(\_gpgme\_gpgsm\_set\_io\_cbs): New function.  
\* engine-gpgsm.h: New prototype for \_gpgme\_gpgsm\_set\_io\_cbs.  
\* engine.c (\_gpgme\_engine\_set\_io\_cbs): New function.  
\* engine.h: New prototype for \_gpgme\_engine\_set\_io\_cbs.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_la\_SOURCES): Remove mutex.h.

2002-06-03 Marcus Brinkmann <marcus@g10code.de>

\* key.c: Include <ctype.h>.  
(\_gpgme\_key\_append\_name): Skip one more char when processing escaped char. Submitted by Marc Mutz <mutz@kde.org>. Handle hexadecimal encodings. Also reported by Marc. Thanks!

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* ath.h: Enable the \_gpgme\_ prefix. Fix all those prefix macros.  
\* posix-sema.c: Use that prefix here.  
\* posix-io.c: Include "ath.h".  
(\_gpgme\_io\_read): Use \_gpgme\_ath\_read instead read.  
(\_gpgme\_io\_write): Use \_gpgme\_ath\_write instead write.  
(\_gpgme\_io\_waitpid): Use \_gpgme\_ath\_waitpid instead waitpid.  
(\_gpgme\_io\_select): Use \_gpgme\_ath\_select instead select.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (ath\_components): New variable.  
(ath\_components\_pthread): Likewise.  
(ath\_components\_pth): Likewise.  
(system\_components): Add ath\_componentes.

\* ath.h: New file.  
\* ath.c: Likewise.

- \* ath-pthread.c: Likewise.
- \* ath-pth.c: Likewise.
- \* posix-sema.c (`_gpgme_sema_cs_enter`): Rework to use the ATH interface.
- \* mutex.h: Remove file.

2002-05-30 Werner Koch <wk@gnupg.org>

- \* key.c (`gpgme_key_get_string_attr`): Return NULL when asking for an issuer with `IDX > 0`. We don't support `altIssuerNames` for now.

2002-05-22 Werner Koch <wk@gnupg.org>

- \* engine-gpgsm.c (`_gpgme_gpgsm_op_keylist_ext`): Aehmm, added missing variable definition. Oohh - Marcus was faster.

2002-05-22 Marcus Brinkmann <marcus@gnu.org>

- \* engine-gpgsm.c (`_gpgme_gpgsm_op_keylist_ext`): Fix last change.

2002-05-21 Werner Koch <wk@gnupg.org>

- \* engine-gpgsm.c (`_gpgme_gpgsm_op_keylist`)  
(`_gpgme_gpgsm_op_keylist_ext`):  
Pass the keylist mode to gpgsm.

2002-05-10 Werner Koch <wk@gnupg.org>

- \* key.h (`gpgme_key_s`): Add OTRUST.
- \* keylist.c (`set_ownertrust`): New.  
(`keylist_colon_handler`): Get the ownertrust value
- \* key.c (`gpgme_key_get_string_attr`, `gpgme_key_get_ulong_attr`):  
Return that value.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

- \* w32-util.c: New static variable `GET_PATH_LOCK`.  
(`_gpgme_get_gpg_path`): Remove superfluous NULL initializer.  
Take lock while determining path.
- (`_gpgme_get_gpgsm_path`): Likewise.
- \* version.c (`do_subsystem_inits`): Set `DONE` to 1 after initialization.
- (`gpgme_get_engine_info`): New variable `ENGINE_INFO_LOCK`. Take lock while determining engine info.
- \* runpg.c (`_gpgme_gpg_get_version`): New variable `GPG_VERSION_LOCK`. Take the lock while determining the program version.
- \* posix-io.c: Include "sema.h".

(\_gpgme\_io\_spawn): New variable FIXED\_SIGNALS\_LOCK. Take the lock while fixing the signals.  
(\_gpgme\_io\_select): Make READFDS and WRITEFDS non-static.  
\*  
key.c: Include "sema.h". New globals KEY\_CACHE\_LOCK and KEY\_REF\_LOCK.  
(capabilities\_to\_string): Make STRINGS very const.  
(\_gpgme\_key\_cache\_add): Lock the key cache.  
(\_gpgme\_key\_cache\_get): Likewise.  
(gpgme\_key\_ref, gpgme\_key\_release): Lock the key\_ref\_lock.  
\* import.c (append\_xml\_impinfo): Make IMPORTED\_FIELDS and IMPORT\_RES\_FIELDS very const. Make FIELD and FIELD\_NAME a little const.  
\* engine.c (\_gpgme\_engine\_get\_info): New variable ENGINE\_INFO\_LOCK. Take lock while determining engine info.  
\* engine-gpgsm.c: Include "sema.h".  
(\_gpgme\_gpgsm\_get\_version): New variable GPGSM\_VERSION\_LOCK. Take lock while getting program version.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

\* debug.h: New file.  
\* Makefile.am (libgpgme\_la\_SOURCES): Add debug.h.  
\* util.h: Removed all prototypes and declarations related to debugging. Include "debug.h".  
  
\* debug.c (debug\_level): Comment variable and remove superfluous zero initializer.  
(errfp): Likewise.  
(\_gpgme\_debug\_enabled):  
Function removed.  
(struct debug\_control\_s): Definition removed.  
(\_gpgme\_debug\_level): Function removed.  
(\_gpgme\_debug\_begin): Rewritten to use vasprintf. Accept a printf-style format specification and a variable number of arguments.  
(\_gpgme\_debug\_add): Rewritten using vasprintf. Expect that format starts out with "%s" for simplicity.  
(\_gpgme\_debug\_end): Rewritten using vasprintf. Do not accept a TEXT argument anymore.  
  
\* posix-io.c (\_gpgme\_io\_select): Use new level argument for DEBUG\_BEGIN instead explicit if construct.  
  
\* debug.c (debug\_init): Remove superfluous zero initializer, remove volatile flag of INITIALIZED. Do not use the double-checked locking algorithm, it is fundamentally flawed and will empty your fridge (on a more serious note, despite the



volatile flag it doesn't give you the guarantee you would expect, for example on a DEC Alpha or an SMP machine. The volatile only serializes accesses to the volatile variable, but not to the other variables).

2002-05-03

Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (`_gpgme_gpgsm_new`): Redirect any gpgsm error output to `/dev/null`.

\* verify.c (`gpgme_get_sig_key`): Set the protocol of the listctx.

\* gpgme.c (`gpgme_get_protocol`): New.

\* data.c (`gpgme_data_write`): Changed type of BUFFER to void\*. (`gpgme_data_read`): Ditto.

\* verify.c (`_gpgme_verify_status_handler`): Handle TRUST\_\* status lines so that a claim can be made without looking up the key.

(`gpgme_get_sig_string_attr`): New.

(`gpgme_get_sig_ulong_attr`): New.

\* gpgme.h (`GpgmeAttr`): Added `GPGME_ATTR_SIG_STATUS`.

\* runpgg.h: Add new status codes from gpg 1.0.7 and formatted the list to align with the status.h file from gnupg.

\* gpgme.h (`GpgmeSigStat`): Add `_GOOD_EXP` and `_GOOD_EXPKEY`.

\* verify.c (`_gpgme_verify_status_handler`, `finish_sig`): Handle these new status codes. Store the expiration time

2002-04-27 Werner Koch <wk@gnupg.org>

\* gpgme.h (`GpgmeData_Encoding`): New.

\* data.c (`gpgme_data_get_encoding`, `gpgme_data_set_encoding`): New.

\* engine-gpgsm.c (`map_input_enc`): New. Use it in all local functions where the INPUT command gets send.

2002-04-27 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (`_gpgme_gpgsm_op_verify`): Close the output descriptor only when we don't need it anymore. Close the message descriptor if we don't need it.

2002-04-26 Werner Koch <wk@gnupg.org>

\* Makefile.am (`libgpgme_la_LIBADD`): Use libtool libraries.

2002-04-25 Marcus Brinkmann <marcus@g10code.de>

\* `runpg.c` (`_gpgme_gpg_release`): Call `gpgme_data_release` on GPG->cmd.cb\_data, not xfree.

2002-04-25 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`_gpgme_gpgsm_new`): Set the display, ttyname, ttytype, lc\_ctype and lc\_messages options in the server.

2002-04-24 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`map_assuan_error`): Add new error codes.

2002-04-23 Werner Koch <wk@gnupg.org>

\* `key.c` (`gpgme_key_get_ulong_attr`): Swapped use of `can_encrypt` and `can_certify` to return the requested values.

2002-04-23 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.c` (`gpgme_get_progress_cb`): Allow either return parameter to be NULL.  
(`gpgme_get_passphrase_cb`): Likewise.

2002-04-22 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.c` (`gpgme_get_passphrase_cb`): New function.  
(`gpgme_get_progress_cb`): New function.  
\* `gpgme.h`: Add new prototypes for `gpgme_get_passphrase_cb` and `gpgme_get_progress_cb`.

2002-03-28 Werner Koch <wk@gnupg.org>

\* `gpgme.h` (`GpgmeAttr`): Add values for issuer and chaining.  
\* `key.h` (`gpgme_key_s`): Add issuer and chaining elements for X509.  
\* `keylist.c` (`keylist_colon_handler`): Store them.  
\* `key.c` (`gpgme_key_release`): Free them.  
(`gpgme_key_get_as_xml`, `gpgme_key_get_string_attr`): Print them.

2002-03-26 Werner Koch <wk@gnupg.org>

\* `Makefile.am` (`libgpgme_la_SOURCES`): Add `mutex.h`

2002-03-21 Werner Koch <wk@gnupg.org>

\* util.h [!HAVE\_FOPENCOOKIE]: Make sure off\_t and ssize\_t are defined.

2002-03-18 Marcus Brinkmann <marcus@g10code.de>

\*

Makefile.am (system\_components): New variable, set depending on HAVE\_DOSISH\_SYSTEM.

(libpgpme\_la\_SOURCES): Use system\_components. Remove `syshdr.h'.

\* syshdr.h: File removed.

\* posix-io.c: Remove !HAVE\_DOSISH\_SYSTEM safeguard. Clean up source.

\* posix-sema.c: Likewise.

\* posix-util.c: Likewise.

\* w32-io.c: Remove HAVE\_DOSISH\_SYSTEM safeguard.

\* w32-sema.c: Likewise.

\* w32-util.c: Likewise.

\* posix-io.c: Include `unistd.h', do not include `syshdr.h'.

\* posix-sema.c: Likewise.

\* w32-io.c: Include `io.h', do not include `syshdr.h'.

\* w32-sema.c: Likewise.

\* w32-util.c: Likewise.

\* data.c: Do not include `syshdr.h'.

\* wait.c: Likewise.

\* wait.h: Code cleanup.

\* mutex.h: New file.

\* posix-sema.c: Implement.

2002-03-08 Werner Koch <wk@gnupg.org>

\* util.h [!HAVE\_FOPENCOOKIE]: Fixed type. Thanks to Frank Heckenbach.

2002-03-07 Werner Koch <wk@gnupg.org>

\* gpgme.h (gpgme\_op\_keylist\_ext\_start): Add prototype.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

\*

encrypt.c (\_gpgme\_encrypt\_sym\_status\_handler): New function.

(gpgme\_op\_encrypt\_start): New variable SYMMETRIC, set it if RECP is null, and if it is set, use \_gpgme\_encrypt\_sym\_status\_handler as status handler and run \_gpgme\_passphrase\_start.

\* runpgp.c (\_gpgme\_gpg\_op\_encrypt): If RECP is zero, do symmetric encryption.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_encrypt): If RECP is zero, return error value.

\* runpgg.c (\_gpgme\_gpg\_op\_verify): Add "--" argument.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Also set the error No\_Passphrase if only a bad passphrase was provided.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_op\_verify): If TEXT is of mode GPGME\_DATA\_MODE\_IN, construct a command line that stores the plaintext in TEXT.

\* verify.c (gpgme\_op\_verify\_start): Accept TEXT being uninitialized, and in this case interpret SIG as a normal or cleartext signature and TEXT as a return data object.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist\_ext) [ENABLE\_GPGSM]: Add stub function.

2002-02-28 Werner Koch <wk@gnupg.org>

\* key.h (subkey\_s): New member expires\_at.

\* keylist.c (keylist\_colon\_handler): Set it here

\* key.c (gpgme\_key\_get\_as\_xml, gpgme\_key\_get\_ulong\_attr): Return it.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.h (\_gpgme\_gpg\_op\_keylist\_ext): New prototype.

\* runpgg.c (\_gpgme\_gpg\_op\_keylist\_ext): New function.

\* engine-gpgsm.h (\_gpgme\_gpgsm\_op\_keylist\_ext): New prototype.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist\_ext): New function.

\* engine.h (\_gpgme\_engine\_op\_keylist\_ext): New prototype.

\* engine.c (\_gpgme\_engine\_op\_keylist\_ext): New function.

\* keylist.c (gpgme\_op\_keylist\_ext\_start): New function.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add new error code GPGME\_Invalid\_Recipient.

\* encrypt.c (struct

encrypt\_result\_s): New member invalid\_recipients,

rename no\_recipients to no\_valid\_recipients.

(\_gpgme\_encrypt\_status\_handler): Include error for invalid recipients.

\* engine-gpgsm.c (gpgsm\_set\_recipients): Change type of first argument to GpgsmObject. Use that to report back the status about the recipients.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (\_gpgme\_verify\_status\_handler): Fix the last change.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (\_gpgme\_verify\_status\_handler): Parse the args line to see if the problem is due to a missing key, and report that back to the user.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

\* engine.c (\_gpgme\_engine\_op\_encrypt\_sign): New function.  
\* engine.h (\_gpgme\_engine\_op\_encrypt\_sign): New prototype.  
\* runpg.c (\_gpgme\_append\_gpg\_args\_from\_signers): New function.  
(\_gpgme\_gpg\_op\_sign): Use that new function.  
(\_gpgme\_gpg\_op\_encrypt\_sign): New function.  
\* runpg.h (\_gpgme\_gpg\_op\_encrypt\_sign):  
New prototype.  
\* gpgme.h (gpgme\_op\_encrypt\_sign\_start): New prototype.  
(gpgme\_op\_encrypt\_sign): Likewise.  
\* Makefile.am (libgpgme\_la\_SOURCES): Add encrypt-sign.c.  
\* ops.h (\_gpgme\_encrypt\_status\_handler): Add prototype.  
(\_gpgme\_sign\_status\_handler): Add prototype.  
\* sign.c (sign\_status\_handler): Rename to ...  
(\_gpgme\_sign\_status\_handler): ... this and make non-static.  
\* encrypt.c (encrypt\_status\_handler): Rename to ...  
(\_gpgme\_encrypt\_status\_handler): ... this and make non-static.  
\* encrypt.c (gpgme\_op\_encrypt\_start): Use new status handler name.  
\* sign.c (gpgme\_op\_sign\_start): Likewise.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

\* context.h (struct gpgme\_context\_s): New member include\_certs.  
\* gpgme.h (gpgme\_set\_include\_certs): Add prototype.  
(gpgme\_get\_include\_certs): Likewise.  
\* gpgme.c (gpgme\_set\_include\_certs): New function.  
(gpgme\_get\_include\_certs): Likewise.  
(gpgme\_new): Set include\_certs to 1 (the default).  
\* engine.c (\_gpgme\_engine\_op\_sign): Accept  
new argument include\_certs,  
and pass it to \_gpgme\_gpgsm\_op\_sign.

- \* engine.h (\_gpgme\_engine\_op\_sign): Likewise for prototype.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign): Accept new argument include\_certs and handle it.
- \* engine-gpgsm.h (\_gpgme\_gpgsm\_start): Add new argument include\_certs.
- \* sign.c (gpgme\_op\_sign\_start): Add new argument to \_gpgme\_engine\_op\_sign call.

2002-02-14 Werner Koch <wk@gnupg.org>

- \* keylist.c (gpgme\_op\_keylist\_start): Do not use a verbose listing.

2002-02-13 Werner Koch <wk@gnupg.org>

- \* vasprintf.c, fopencookie.c: Add replacement functions.
- \* util.h: Add prototypes for them.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c (gpgsm\_assuan\_simple\_command): Return 0 if we reach the end of the function.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

- \* genkey.c (gpgme\_op\_genkey\_start): Fix logic in validity check.
- (gpgme\_op\_genkey\_start): Skip newlines after opening tag.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_start): Remove cruft.

2002-02-08

Marcus Brinkmann <marcus@g10code.de>

- \* genkey.c (gpgme\_op\_genkey\_start): Allow PUBKEY and SECKEY to be set, and pass them down to the crypto engine.
- \* engine-gpgsm.h (\_gpgme\_gpgsm\_start): New arguments PUBKEY and SECKEY.
- \* engine.h: Likewise.
- \* runpg.h (\_gpgme\_gpg\_spawn): Likewise.
- \* engine.c (\_gpgme\_engine\_op\_genkey): Likewise. Use those arguments.
- \* runpg.c (\_gpgme\_gpg\_op\_genkey): Likewise. Complain if those arguments are set.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_genkey): Likewise. Implement function.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist): Beautify comment.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

- \* runpg.c (\_gpgme\_gpg\_op\_keylist): Remove handling of keylist

mode (for now).

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

- \* wait.c (gpgme\_wait): Add new argument STATUS, in which the status of the returned context is returned.
- (\_gpgme\_wait\_on\_condition): Rework the function a bit, to make it aware of cancelled processes, and to allow to use gpgme\_wait with CTX being NULL (as documented in the source).
- (struct proc\_s): New member REPORTED.
- \* gpgme.h: Fix prototype.
- \* verify.c (gpgme\_op\_verify): Fix use of gpgme\_wait.
- \* sign.c (gpgme\_op\_sign): Likewise.
- \* import.c (gpgme\_op\_import): Likewise.
- \* genkey.c (gpgme\_op\_genkey): Likewise.
- \* export.c (gpgme\_op\_export): Likewise.
- \* encrypt.c (gpgme\_op\_encrypt): Likewise.
- \* delete.c (gpgme\_op\_delete): Likewise.
- \* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Likewise.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_set\_keylist\_mode): Possibly return an error value.
- (gpgme\_get\_keylist\_mode): New function.
- (gpgme\_new): Set the default for keylist\_mode member of CTX.
  
- \* gpgme.h (gpgme\_set\_keylist\_mode): Fix prototype.
- (gpgme\_get\_keylist\_mode): New prototype.
- (GPGME\_KEYLIST\_MODE\_LOCAL): New macro.
- (GPGME\_KEYLIST\_MODE\_EXTERN): Likewise..

2002-02-02 Marcus Brinkmann <marcus@g10code.de>

This patch has gotten a bit large... mmh. The main thing that happens here is that error values are now not determined in the operation function after gpgme\_wait completed, but in the status handler when EOF is received. It should always be the case that either an error is flagged or EOF is received, so that after a gpgme\_wait you should never have the situation that no error is flagged and EOF is not received. One problem is that the engine status handlers don't have access to the context, a horrible kludge works around this for now. All errors that happen during a pending operation should be caught and reported in ctx->error, including out-of-core and cancellation. This rounds up neatly a couple of loose ends, and makes it possible to pass up any errors

in the communication with the backend as well. As a bonus, there will be a function to access `gpgme->wait`, so that the operations can truly be implemented with their `_start` function.

\* `engine-gpgsm.c` (`gpgsm_status_handler`): Horrible kludge to report error back

to the context.

\* `rungpg.c` (`gpg_status_handler`): Same horrible kludge applied here.

\* `engine-gpgsm.c` (`gpgsm_assuan_simple_command`): Add error checking.

\* `wait.c` (`_gpgme_wait_on_condition`): If canceled, set `CTX->error` to a value indication that.

\* `verify.c` (`add_notation`): Set error, not `out_of_core`.

(`finish_sig`): Likewise.

(`gpgme_op_verify_start`): Don't clear `out_of_core`.

(`_gpgme_verify_status_handler`): At EOF, clean up the notation data.

(`gpgme_op_verify`): And don't do it here.

\* `trustlist.c` (`trustlist_status_handler`): Check error, not `out_of_core`.

(`gpgme_op_trustlist_start`): Don't clear `out_of_core`.

(`gpgme_op_trustlist_next`): Check error, not `out_of_core`.

(`gpgme_op_trustlist_end`): Likewise.

\* `ops.h` (`test_and_allocate_result`): New macro.

(`_gpgme_passphrase_result`): Remove prototype.

\* `delete.c` (`gpgme_op_delete`): Return error from context.

(`delete_status_handler`): Use macro `test_and_allocate_result`.

Perform error checking at EOF.

(`gpgme_op_delete_start`): Release result.

\* `passphrase.c` (`_gpgme_passphrase_status_handler`): Use macro `test_and_allocate_result`, and perform error checking here.

(`_gpgme_passphrase_result`): Function removed.

\* `sign.c` (`gpgme_op_sign_start`): Do not set `out_of_core` to zero.

(`gpgme_op_sign`): Just return the error value from the context.

(`sign_status_handler`): Only progress if no error is set yet. If we process an EOF, set the resulting error value (if any).

\* `decrypt.c` (`_gpgme_decrypt_result`): Function removed.

(`create_result_struct`): Function removed.

(`_gpgme_decrypt_status_handler`): Use macro `test_and_allocate_result`, calculate error on EOF, do not progress with errors.

(`_gpgme_decrypt_start`): Do not set `out_of_core` to zero.

(`gpgme_op_decrypt`): Just return the error value from the context.

\* `encrypt.c` (`encrypt_status_handler`): Perform the error checking here.

(`gpgme_op_encrypt_start`): Do not clear `out_of_core`.



\* export.c (export\_status\_handler): Return if error is set in context.  
(gpgme\_op\_export\_start):  
Release result.  
(gpgme\_op\_export): Return error from context.  
\* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Return the error in  
the context.  
\* genkey.c (genkey\_status\_handler): Use macro  
test\_and\_allocate\_result. Perform error checking at EOF.  
(gpgme\_op\_genkey): Just return the error from context.  
\* import.c (gpgme\_op\_import): Return the error from context.  
(import\_status\_handler): Use macro test\_and\_allocate\_result.  
\* keylist.c (gpgme\_op\_keylist\_start): Do not clear out\_of\_core.  
(gpgme\_op\_keylist\_next): Return error of context.  
(keylist\_colon\_handler): Set error instead out\_of\_code.  
(finish\_key): Likewise.

\* context.h: Remove member out\_of\_core, add member error.  
\* gpgme.c (\_gpgme\_release\_result): Clear error flag.

\* engine.h (\_gpgme\_engine\_get\_error): New prototype.  
\* engine.c (\_gpgme\_engine\_get\_error): New function.  
\* engine-gpgsm.c (\_gpgme\_gpgsm\_get\_error): New function.

\* engine-gpgsm.c (map\_assuan\_error): New function.  
(gpgsm\_assuan\_simple\_command): Change  
return type to GpgmeError,  
use the new function to map error values.  
(gpgsm\_set\_fd): Change return type to GpgmeError.  
(\_gpgme\_gpgsm\_op\_decrypt): Change type of ERR to GpgmeError.  
(gpgsm\_set\_recipients): Likewise. Change type of return value  
equivalently. Adjust error values.  
(\_gpgme\_gpgsm\_op\_import): Likewise.  
(\_gpgme\_gpgsm\_op\_sign): Likewise.  
(struct gpgsm\_object\_s): New member error.  
(gpgsm\_status\_handler): Set error if error occurs. Determine  
error number from ERR line received. If assuan\_read\_line fails,  
terminate the connection.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (MOSTLYCLEANFILES): New variable.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): At error, terminate the  
connection to the server.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

- \* runpgg.h: Add STATUS\_KEY\_CREATED.
- \* progress.c: New file.
- \* Makefile.am (libpggme\_la\_SOURCES): Add progress.c.
  
- \* genkey.c (genkey\_status\_handler):  
Use  
\_gpgme\_progress\_status\_handler. Add check for status.  
(struct genkey\_result\_s): New structure.  
(\_gpgme\_release\_genkey\_result): New function.  
(gpgme\_op\_genkey): Check for error.
- \* gpgme.c (\_gpgme\_release\_result): Call  
\_gpgme\_release\_genkey\_result.
- \* ops.h (\_gpgme\_release\_genkey\_result): Add prototype.
- \* types.h (GenKeyResult): New type.
- \* context.h (gpgme\_context\_s): Add GenKeyResult to member result.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (\_gpgme\_release\_result): Call  
\_gpgme\_release\_delete\_result.
- \* ops.h (\_gpgme\_release\_delete\_result): Add prototype.
- \* types.h (DeleteResult): New type.
- \* context.h (gpgme\_context\_s): Add DeleteResult to member result.
  
- \* delete.c (enum delete\_problem): New type.  
(struct delete\_result\_s): New structure.  
(\_gpgme\_release\_delete\_result): New function.  
(delete\_status\_handler): Implement more status codes.  
(gpgme\_op\_delete): Return error on failure.
  
- \* import.c (MAX\_IMPORTED\_FIELDS): Bump up to 14.

2002-01-30

Marcus Brinkmann <marcus@g10code.de>

- \* import.c (struct import\_result\_s): New structure.  
(\_gpgme\_release\_import\_result): New function.  
(append\_xml\_impinfo): Likewise.  
(import\_status\_handler): Implement.
- \* gpgme.c (\_gpgme\_release\_result): Add call to  
\_gpgme\_release\_import\_result.
- \* ops.h (\_gpgme\_release\_import\_result): Add prototype.
- \* types.h (ImportResult): New type.
- \* context.h (gpgme\_context\_s): Add ImportResult to member result.
  
- \* encrypt.c (gpgme\_op\_encrypt): Code clean up.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add lots of comment and fix the formatting. Add gpgme\_trustlist\_end prototype.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add new type GpgmeIdleFunc. Change type of gpgme\_register\_idle to return and accept this type.

\* wait.c (gpgme\_register\_idle): Fix type.

Save and return old value of idle\_function.

2002-01-29 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist): Implement secret only mode.

\* keylist.c (keylist\_colon\_handler): Add support for the new "crs" record type.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_release): Call assuan\_disconnect, not assuan\_pipe\_disconnect.

\* Makefile.am (libgpgme\_la\_LIBADD): Change to link assuan and jnlib (needed by assuan) statically into libgpgme. Linking a static library into a shared library this way is not portable.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (GpgmePassphraseCb): Change type of R\_HD from void\* to void\*\*.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* data.c (gpgme\_data\_new\_from\_filepart): Change type of LENGTH from off\_t to size\_t.

\* gpgme.h: Likewise.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (\_gpgme\_wait\_on\_condition): If the process finished, reset the pending flag. Also if the operation was cancelled.

(struct proc\_s): Rename READY to DONE.

(wait\_item\_s): Likewise.

(set\_process\_ready): Rename  
to ...  
(set\_process\_done): ... this.  
(\_gpgme\_remove\_proc\_from\_wait\_queue): Call set\_process\_done  
instead set\_process\_ready.  
(\_gpgme\_wait\_on\_condition): Likewise.  
(do\_select): Rename READY to DONE.

\* verify.c (gpgme\_op\_verify): Do not set pending to zero here.  
\* sign.c (gpgme\_op\_sign): Likewise.  
\* import.c (gpgme\_op\_import): Likewise.  
\* genkey.c (gpgme\_op\_genkey): Likewise.  
\* export.c (gpgme\_op\_export): Likewise.  
\* encrypt.c (gpgme\_op\_encrypt): Likewise.  
\* delete.c (gpgme\_op\_delete): Likewise.  
\* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Likewise.  
\* decrypt.c (gpgme\_op\_decrypt): Likewise.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* export.c: Cleanup.

2002-01-15 Marcus Brinkmann <marcus@g10code.de>

\* trustlist.c: Various source clean ups.  
(my\_isdigit): Removed.  
(gpgme\_op\_trustlist\_end): New function.

2002-01-13 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c: Various source clean ups, like renaming C to CTX where  
appropriate.  
(gpgme\_new): Clear  
R\_CTX before starting the work.  
(my\_isdigit): Removed.  
(my\_isxdigit): Likewise.

\* data.c: Various source clean ups.  
(gpgme\_data\_new\_from\_mem): Check BUFFER after clearing R\_DH.  
(gpgme\_data\_new\_with\_read\_cb): Similar for READ\_CB.  
(gpgme\_data\_new\_from\_file): Loop over fread while EINTR.  
(gpgme\_data\_new\_from\_filepart): Rediddled a bit. Allow LENGTH to  
be zero. Loop over fread while EINTR.

(my\_isdigit): Removed.  
(my\_isxdigit): Likewise.

2001-12-21 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Replace General\_Error with Pipe\_Error where appropriate.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* engine.c: Include `string.h'. Reported by Stphane Corthisy.

\* version.c (get\_engine\_info): Remove prototype.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): New variable CHILD\_FDS. Fill it with the servers fds, and pass it to assuan\_pipe\_connect.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\*

keylist.c (gpgme\_op\_keylist\_end): New function.

\* gpgme.h (gpgme\_op\_keylist\_end): New prototype.

\* engine.h (gpgme\_engine\_check\_version): Move prototype to ...

\* gpgme.h (gpgme\_engine\_check\_version): ... here.

\* genkey.c (gpgme\_op\_genkey\_start): Remove unused variable.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* version.c (gpgme\_get\_engine\_info): Reimplemented.

(gpgme\_check\_engine): Reimplemented.

(\_gpgme\_compare\_versions): Return NULL if MY\_VERSION is NULL.

\* engine.c: Include `io.h'.

(gpgme\_engine\_get\_info): New function.

\* engine.h (gpgme\_engine\_check\_version, \_gpgme\_engine\_get\_info):

Add prototype.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (struct reap\_s, reap\_list, reap\_list\_lock): Moved to ...

\* engine.c (struct reap\_s, reap\_list, reap\_list\_lock): ... here.

Include `time.h', `sys/types.h', `assert.h', and `sema.h'.

\* runpg.c (\_gpgme\_engine\_add\_child\_to\_reap\_list): New function.

(do\_reaping, \_gpgme\_gpg\_housecleaning): Moved to

...

\* engine.c (do\_reaping, \_gpgme\_engine\_housecleaning): ... here.

\* runpg.c (\_gpgme\_gpg\_release): Replace code that is now in its

own function by call to `_gpgme_engine_add_child_to_reap_list()`.

\* `wait.c`: Include ``engine.h'`.

`(run_idle)`: Call `_gpgme_engine_housecleaning()`, not `_gpgme_gpg_housecleaning()`.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* `key.c` (`_gpgme_key_append_name`): Append, not prepend, the uid. Initialize the next field of the uid structure.  
`(gpgme_key_get_as_xml)`: Do not list last uid first.

2001-12-17 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`_gpgme_gpgsm_set_colon_line_handler`): New function [!ENABLE\_GPGSM].

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`_gpgme_gpgsm_op_verify`): Put TEXT into `message_data`, not SIG.  
`(_gpgme_gpgsm_op_sign)`: Use ``--detached'`, not ``--detach'`.

\* `sign.c` (`sign_status_handler`): Call `_gpgme_passphrase_status_handler` early.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\*  
`engine-gpgsm.c`: Revert last change.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`gpgsm_status_handler`): Freeze the output file handler when ending this operation, otherwise the wait function will sit on it.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`struct gpgsm_object_s`): New member `colon.attic`.  
`(_gpgme_gpgsm_new)`: Initialize some more members.  
`(_gpgme_gpgsm_release)`: Free the colon line handler's attic line.  
`(gpgsm_status_handler)`: Rework the inline-data processing.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* `rungpg.c` (`_gpgme_gpg_spawn`): Do not add the fds to the child list that are not dup'ed, for those the close-on-exec flag is set

now.

\* version.c (`_gpgme_get_program_version`): Remove first entry in CFD, as the close-on-exec flag is now set for this fd.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (`_gpgme_gpgsm_op_encrypt`): Do not add `armor' option to `ENCRYPT'.

\* engine-gpgsm.c

(`gpgsm_set_recipients`): Free LINE when returning successfully.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (`close_notify_handler`): New function.

(`_gpgme_gpgsm_new`): Manage the file descriptors a bit differently. Do not set close-on-exec flags.

(`_gpgme_gpgsm_op_decrypt`): Do not set message\_fd to -1, this is done by the close handler.

(`_gpgme_gpgsm_op_encrypt`): Likewise.

(`_gpgme_gpgsm_op_import`): Likewise (also for output\_fd).

(`_gpgme_gpgsm_op_keylist`): Likewise (also for input\_fd and output\_fd).

(`_gpgme_gpgsm_op_sign`): Likewise.

(`_gpgme_gpgsm_op_verify`): Likewise, but for output\_fd.

\* posix-io.c (`_gpgme_io_pipe`): Set the close-on-exec flag for the non-inherited file descriptor index of the pipe.

2001-12-13 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (`_gpgme_gpgsm_set_colon_line_handler`): New.

(`gpgsm_status_handler`): Pass datalines to a colon handler

\* engine.c (`_gpgme_engine_set_colon_line_handler`): Set the colon handler for gpgsm.

\* engine-gpgsm.c

(`_gpgme_gpgsm_op_keylist`): Allow NULL for pattern.

(`gpgsm_assuan_simple_command`): Removed underscore from `assuan_write_line`.

(`_gpgme_gpgsm_start`): Ditto.

(`gpgsm_assuan_simple_command`): Replaced internal Assuan read function by the new `assuan_read_line`. Removed the use of the internal header.

(`gpgsm_status_handler`): Ditto. Use the new `assuan_pending_line`.

(`_gpgme_gpgsm_start`): Use the documented way to get an fd from `assuan`.

\* keylist.c (keylist\_colon\_handler): Handle "crt" records  
\* key.h (gpgme\_key\_s): Add an x509 flag.  
\* key.c (parse\_x509\_user\_id): New.  
(\_gpgme\_key\_append\_name): Handle x.509 names.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): Make it work with current version of assuan.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_set\_fd): Accept one more argument OPT.  
(\_gpgme\_gpgsm\_op\_encrypt): Pass armor argument to gpgsm\_set\_fd for output descriptor.  
(\_gpgme\_gpgsm\_op\_sign):  
Likewise.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (gpgme\_op\_keylist\_next): Set pending to 0 if EOF occurs.

2001-11-26 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign): Fix stupid typo.

2001-11-24 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): Don't break if bsearch fails.  
Deal with assuan read line returning more than one line (for now).

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign): Implement it according to the current protocol definition.

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Set CLOEXEC flag for parent ends of the pipe.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Include stdlib.h and string.h. Also include, for now, runpg.h and status-table.h.  
(gpgsm\_status\_handler): Implement more of the status handler.



2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\*

engine.c (\_gpgme\_engine\_op\_decrypt): Implement CMS case.

(\_gpgme\_engine\_op\_delete): Likewise.

(\_gpgme\_engine\_op\_encrypt): Likewise.

(\_gpgme\_engine\_op\_export): Likewise.

(\_gpgme\_engine\_op\_genkey): Likewise.

(\_gpgme\_engine\_op\_keylist): Likewise.

(\_gpgme\_engine\_op\_sign): Likewise.

(\_gpgme\_engine\_op\_trustlist): Likewise.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_encrypt): New function.

(gpgsm\_assuan\_simple\_command): Likewise.

(gpgsm\_set\_recipients): Likewise.

(gpgsm\_set\_fd): Reimplement using gpgsm\_assuan\_simple\_command.

(\_gpgme\_gpgsm\_op\_delete): New function.

(\_gpgme\_gpgsm\_op\_export): Likewise.

(\_gpgme\_gpgsm\_op\_genkey): Likewise.

(\_gpgme\_gpgsm\_op\_sign): Likewise.

(\_gpgme\_gpgsm\_op\_keylist): Likewise.

(\_gpgme\_gpgsm\_op\_trustlist): Likewise.

(\_gpgme\_gpgsm\_release): Release command.

(\_gpgme\_gpgsm\_op\_decrypt): Allocate command.

(\_gpgme\_gpgsm\_op\_import): Likewise.

(gpgsm\_status\_handler): Also treat `ERR` strings as EOF.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h

(gpgme\_set\_protocol): New prototype.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_decrypt): New function.

(\_gpgme\_gpgsm\_op\_import): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Shuffle around header inclusion a bit, to still keep them separate.

(\_gpgme\_set\_status\_handler) [!ENABLE\_GPGSM]: New function.

2001-11-22 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c: Include more headers so that NULL and mk\_error is defined even with an undefined GPGSM\_PATH.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (gpg\_inbound\_handler, write\_mem\_data, write\_cb\_data, gpg\_outbound\_handler): Moved to ...

\* data.c (\_gpgme\_data\_inbound\_handler, write\_mem\_data, write\_cb\_data, \_gpgme\_data\_outbound\_handler): ... here. Make the \_gpgme\_\* ones non-static.

\* data.c: Include io.h.

\* ops.h (\_gpgme\_data\_inbound\_handler): New prototype.

(\_gpgme\_data\_outbound\_handler): Likewise.

(\_gpgme\_gpg\_spawn): Use these new functions.

\* engine-gpgsm.h (\_gpgme\_gpgsm\_op\_decrypt, \_gpgme\_gpgsm\_op\_delete, \_gpgme\_gpgsm\_op\_encrypt, \_gpgme\_gpgsm\_op\_export, \_gpgme\_gpgsm\_op\_genkey, \_gpgme\_gpgsm\_op\_import, \_gpgme\_gpgsm\_op\_keylist, \_gpgme\_gpgsm\_op\_sign, \_gpgme\_gpgsm\_op\_trustlist, \_gpgme\_gpgsm\_op\_verify, \_gpgme\_gpgsm\_start, \_gpgme\_gpgsm\_set\_status\_handler): New prototype. Include <runpg.h> for status handler function.

\* engine-gpgsm.c (struct gpgsm\_object\_s): New members input\_fd, input\_data, output\_fd, output\_data, message\_fd, message\_data, command and status.

(\_gpgme\_gpgsm\_new): Open input, output and message pipes before connecting to the client. Close server's ends afterwards.

(\_gpgme\_gpgsm\_release): Close open file descriptors. Remove server process from wait queue.

(\_gpgme\_gpgsm\_op\_verify, \_gpgme\_gpgsm\_start, \_gpgme\_gpgsm\_set\_status\_handler, gpgms\_status\_handler): New function.

\* engine.c (\_gpgme\_engine\_start): Implement for GPGME\_PROTOCOL\_CMS.

(\_gpgme\_engine\_set\_status\_handler):

Likewise.

(\_gpgme\_engine\_op\_verify): Likewise.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

\* context.h: Do not include runpg.h, but engine.h.

(struct gpgme\_context\_s): Replace member gpg with engine.

\* gpgme.c (gpgme\_release): Release engine, not gpg.

\* recipient.c (\_gpgme\_append\_gpg\_args\_from\_recipients): Function moved ...

\* runpg.c (\_gpgme\_append\_gpg\_args\_from\_recipients): ... here.

Make static, change order of arguments, and return an error value.

\* ops.h (\_gpgme\_append\_gpg\_args\_from\_recipients): Removed prototype.

\* `runpgg.h` (`_gpgme_gpg_op_verify`): Add prototype.  
(`_gpgme_gpg_op_encrypt`): Likewise.  
(`_gpgme_gpg_op_decrypt`): Likewise.  
(`_gpgme_gpg_op_delete`): Likewise.  
(`_gpgme_gpg_op_export`): Likewise.  
(`_gpgme_gpg_op_genkey`): Likewise.  
(`_gpgme_gpg_op_import`): Likewise.  
(`_gpgme_gpg_op_keylist`): Likewise.  
(`_gpgme_gpg_op_sign`): Likewise.  
(`_gpgme_gpg_op_trustlist`): Likewise.  
\* `runpgg.c` (`_gpgme_gpg_op_verify`): New function.  
(`_gpgme_gpg_op_encrypt`): Likewise.  
(`_gpgme_gpg_op_decrypt`):  
Likewise.  
(`_gpgme_gpg_op_delete`): Likewise.  
(`_gpgme_gpg_op_export`): Likewise.  
(`_gpgme_gpg_op_genkey`): Likewise.  
(`_gpgme_gpg_op_import`): Likewise.  
(`_gpgme_gpg_op_keylist`): Likewise.  
(`_gpgme_gpg_op_sign`): Likewise.  
(`_gpgme_gpg_op_trustlist`): Likewise.  
  
\* `engine.h` (`_gpgme_engine_set_status_handler`): Add prototype.  
(`_gpgme_engine_set_command_handler`): Likewise.  
(`_gpgme_engine_set_colon_line_handler`): Likewise.  
(`_gpgme_engine_op_decrypt`): Likewise.  
(`_gpgme_engine_op_delete`): Likewise.  
(`_gpgme_engine_op_encrypt`): Likewise.  
(`_gpgme_engine_op_export`): Likewise.  
(`_gpgme_engine_op_genkey`): Likewise.  
(`_gpgme_engine_op_import`): Likewise.  
(`_gpgme_engine_op_keylist`): Likewise.  
(`_gpgme_engine_op_sign`): Likewise.  
(`_gpgme_engine_op_trustlist`): Likewise.  
(`_gpgme_engine_op_verify`): Likewise.  
(`_gpgme_engine_start`): Likewise.  
\* `engine.c` (`_gpgme_engine_set_status_handler`): New function.  
(`_gpgme_engine_set_command_handler`): Likewise.  
(`_gpgme_engine_set_colon_line_handler`):  
Likewise.  
(`_gpgme_engine_op_decrypt`): Likewise.  
(`_gpgme_engine_op_delete`): Likewise.  
(`_gpgme_engine_op_encrypt`): Likewise.  
(`_gpgme_engine_op_export`): Likewise.  
(`_gpgme_engine_op_genkey`): Likewise.  
(`_gpgme_engine_op_import`): Likewise.  
(`_gpgme_engine_op_keylist`): Likewise.

(\_gpgme\_engine\_op\_sign): Likewise.  
(\_gpgme\_engine\_op\_trustlist): Likewise.  
(\_gpgme\_engine\_op\_verify): Likewise.  
(\_gpgme\_engine\_start): Likewise.

\* verify.c (gpgme\_op\_verify\_start): Reimplement in terms of above functions.

\* encrypt.c (gpgme\_op\_encrypt\_start): Likewise.  
\* decrypt.c (\_gpgme\_decrypt\_start): Likewise.  
\* passphrase.c (\_gpgme\_passphrase\_start): Likewise.  
\* keylist.c (gpgme\_op\_keylist\_start): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* types.h: Add types EngineObject and GpgsmObject.

\* Makefile.am (libgpgme\_la\_SOURCES): Add engine-gpgsm.h, engine-gpgsm.c, engine.h and engine.c.

\* engine.h: New file.  
\* engine.c: Likewise.  
\* engine-gpgsm.h: Likewise.  
\*  
engine-gpgsm.c: Likewise.

\* runpgg.c (\_gpgme\_gpg\_get\_version): New function.  
(\_gpgme\_gpg\_check\_version): Likewise.  
\* runpgg.h: Add prototypes for \_gpgme\_gpg\_get\_version and \_gpgme\_gpg\_check\_version.

\* version.c (compare\_versions): Rename to ...  
(\_gpgme\_compare\_versions): ... this. Make non-static.  
(gpgme\_check\_version): Use \_gpgme\_compare\_versions rather than compare\_versions.  
(gpgme\_check\_engine): Likewise.  
\* ops.h (\_gpgme\_get\_program\_version): Add prototype.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_la\_INCLUDES): Remove obsolete directive.  
(AM\_CPPFLAGS): New directive [BUILD\_ASSUAN].  
(libgpgme\_la\_LIBADD): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* version.c: Remove global variables lineno and tmp\_engine\_version.  
(version\_handler): Removed.  
(\_gpgme\_get\_program\_version): New function.

(get\_engine\_info): Don't use context and version\_handler,  
but \_gpgme\_get\_program\_version.  
\* ops.h (\_gpgme\_get\_program\_version):  
Add prototype for  
\_gpgme\_get\_program\_version (we expect to use it elsewhere soon).

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

\* version.c (get\_engine\_info): If GnuPG is not available, return  
an error message.  
\* posix-util.c (\_gpgme\_get\_gpg\_path): Allow GPG\_PATH to be  
undefined.  
(\_gpgme\_get\_gpgsm\_path): New function.  
\* w32-util.c (find\_program\_in\_registry): New static function.  
(\_gpgme\_get\_gpg\_path): Allow GPG\_PATH to be undefined. Rework  
to use find\_program\_in\_registry.  
(\_gpgme\_get\_gpgsm\_path): New function.  
(util.h): Prototype \_gpgme\_get\_gpgsm\_path).  
\* runpg.c (\_gpgme\_gpg\_spawn): Verify that \_gpgme\_get\_gpg\_path()  
returns non-null.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

\* decrypt-verify.c: New file.  
\* Makefile.am (libgpgme\_la\_SOURCES): Add decrypt-verify.c.  
\* types.h: Add decrypt-verify types.  
\* ops.h: Likewise.  
\* context.h: Add result type for decrypt-verify.  
\* gpgme.h: Add decrypt-verify prototypes.

\* decrypt.c (decrypt\_status\_handler):  
Renamed to ...  
(\_gpgme\_decrypt\_status\_handler): ... this. Make non-static.  
(\_gpgme\_decrypt\_start): New function, derived from  
gpgme\_op\_decrypt\_start.  
(gpgme\_op\_decrypt\_start): Reimplement in terms of  
\_gpgme\_decrypt\_start.  
(\_gpgme\_decrypt\_result): New function to retrieve error value.  
(gpgme\_op\_decrypt): Use \_gpgme\_decrypt\_result.  
\* ops.h: Add prototypes for new functions.

\* verify.c (verify\_status\_handler): Renamed to ...  
(\_gpgme\_verify\_status\_handler): ... this. Make non-static.  
(gpgme\_op\_verify\_start): Use new function name.  
(intersect\_stati): Renamed to ...  
(\_gpgme\_intersect\_stati): ... this. Make non-static.  
(gpgme\_op\_verify): Use new name.  
\* ops.h: Add prototypes for new functions.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

- \* passphrase.c: New file.
- \* Makefile.am (libgpgme\_la\_SOURCES): Add passphrase.c.
- \* ops.h (\_gpgme\_passphrase\_result): Add prototypes from passphrase.c.
- \* types.h: Likewise.
- \* context.h: Add member passphrase to result.
- \*
- gpgme.c (\_gpgme\_release\_result): Release passphrase member.
  
- \* decrypt.c: Some formatting and variable name changes (like CTX instead C).  
(struct decrypt\_result\_s): Remove members now found in passphrase result.  
(\_gpgme\_release\_decrypt\_result): Don't release removed members.  
(decrypt\_status\_handler): Call \_gpgme\_passphrase\_status\_handler, and don't handle the cases caught there.  
(command\_handler): Removed.  
(gpgme\_op\_decrypt\_start): Don't set command handler, but invoke \_gpgme\_passphrase\_start which does it.  
(gpgme\_op\_decrypt): Invoke \_gpgme\_passphrase\_result and drop the cases covered by it.
  
- \* sign.c Some formatting and variable name changes (like CTX instead C).  
(struct sign\_result\_s): Remove members now found in passphrase result.  
(\_gpgme\_release\_sign\_result): Don't release removed members.  
(sign\_status\_handler): Call \_gpgme\_passphrase\_status\_handler, and don't handle the cases caught there.  
(command\_handler): Removed.  
(gpgme\_op\_sign\_start): Don't set command handler, but invoke \_gpgme\_passphrase\_start which does it.  
(gpgme\_op\_sign): Invoke \_gpgme\_passphrase\_result and drop the cases covered by it.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

- \* decrypt.c (command\_handler): Fix last change.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

- \* verify.c (\_gpgme\_release\_verify\_result): Rename RES to RESULT.  
Rename R2 to NEXT\_RESULT.  
(intersect\_stati): Rename RES to RESULT.

(gpgme\_get\_sig\_status): Likewise. Do not check return\_type, but the member verify of result.

(gpgme\_get\_sig\_key): Likewise.

\* sign.c (\_gpgme\_release\_sign\_result): Rename RES to RESULT. If RESULT is zero, return.

(sign\_status\_handler, command\_handler): Do not check return\_type, but the member sign of result.

(gpgme\_op\_sign): Likewise. Drop assertion.

\* encrypt.c (\_gpgme\_release\_encrypt\_result): Rename RES to RESULT. If RESULT is zero, return.

(encrypt\_status\_handler): Do not check return\_type, but the member encrypt of result.

(gpgme\_op\_encrypt):

Likewise. Drop assertion.

\* decrypt.c (\_gpgme\_release\_decrypt\_result): Rename RES to RESULT.

(create\_result\_struct): Do not set result\_type.

(command\_handler, decrypt\_status\_handler): Do not check return\_type, but the member decrypt of result.

(gpgme\_op\_decrypt): Likewise. Drop assertion.

\* context.h (enum ResultType): Removed.

(struct gpgme\_context\_s): Remove member result\_type.

(struct result): Replaces union result.

\* gpgme.c: Include string.h.

(\_gpgme\_release\_result): Release all members of c->result, which is now a struct. Zero out all members of the struct afterwards.

2001-11-11 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (\_gpgme\_gpg\_release): Release GPG->cmd.cb\_data.

Release all members of the list GPG->arglist.

Reported by Michael Schmidt <mschmidt@cs.uni-sb.de>.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (pipemode\_copy): Change type of NBYTES to size\_t.

\* key.c: Include string.h.

\* data.c: Likewise.

\* recipient.c: Likewise.

2001-10-29

Marcus Brinkmann <marcus@g10code.de>

\* context.h: New member signers\_len.

\* signers.c (gpgme\_signers\_clear): Require that signers are non-NULL with assertion. Use signers\_len to determine how much keys to release. Add documentation.  
(gpgme\_signers\_add): Use signers\_len to determine if the buffer is large enough. Use xtryrealloc rather than xtrymalloc and copying. Add documentation.  
(gpgme\_signers\_enum): Use signers\_len to determine if key is available. Add documentation.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* data.c (\_gpgme\_data\_append): Check if LENGTH is smaller than ALLOC\_CHUNK, not DH->length.

2001-10-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_set\_protocol): Fix last change.

2001-10-15 Werner Koch <wk@gnupg.org>

\* gpgme.h (GpgmeProtocol): New.  
\* gpgme.c (gpgme\_set\_protocol): New.

2001-09-26 Werner Koch <wk@gnupg.org>

\* gpgme.c (gpgme\_set\_passphrase\_cb): Ignore a NULL context.  
(gpgme\_set\_progress\_cb): Ditto.  
Suggested by Mark Mutz.

2001-09-17 Werner Koch <wk@gnupg.org>

\* keylist.c (finish\_key): Shortcut for no tmp\_key. Changed all callers to use this function without a check for tmp\_key.  
\* keylist.c (gpgme\_op\_keylist\_next): Reset the key\_cond after emptying the queue. Bug reported by Stphane Corthsy.

2001-09-12 Werner Koch <wk@gnupg.org>

\* data.c (gpgme\_data\_rewind): Allow rewind for callbacks.

2001-09-07 Werner Koch <wk@gnupg.org>

\* runpg.h: Add NO\_RECP.  
\* encrypt.c (encrypt\_status\_handler): Take on No\_RECP.  
(gpgme\_op\_encrypt): Better error return.  
\* verify.c (verify\_status\_handler): Take on NODATA.



2001-09-03 Werner Koch <wk@gnupg.org>

- \* runpg.h: Added STATUS\_INV\_RECP.
- \* gpgme.c (\_gpgme\_release\_result): Add support for new EncryptResult object.
- \* encrypt.c (append\_xml\_encinfo): New.  
(encrypt\_status\_handler): Add some status parsing.  
(\_gpgme\_release\_encrypt\_result): New.

2001-08-29 Werner Koch <wk@gnupg.org>

- \* recipient.c (gpgme\_recipients\_release):  
Free the list. By Timo.
- \* keylist.c (keylist\_colon\_handler): Do a finish key if we receive an EOF here. This is probably the reason for a lot of bugs related to keylisting. It is so obvious. Kudos to Enno Cramer for pointing that out.

2001-08-28 Werner Koch <wk@gnupg.org>

- \* gpgme.c, gpgme.h (gpgme\_get\_op\_info): New.  
(\_gpgme\_set\_op\_info): New.  
(\_gpgme\_release\_result): Reset the op\_info here.
- \* sign.c (append\_xml\_siginfo): New.  
(sign\_status\_handler): Store the sig create information.

2001-07-31 Werner Koch <wk@gnupg.org>

- \* encrypt.c (gpgme\_op\_encrypt): Hack to detect no valid recipients.

2001-07-30 Werner Koch <wk@gnupg.org>

- \* gpgme.c (gpgme\_get\_armor,gpgme\_get\_textmode): New.
- \* runpg.c (build\_argv): Disable armor comments
- \* w32-io.c (build\_commandline): Need to add quotes here

2001-07-24 Werner Koch <wk@gnupg.org>

- \* data.c (gpgme\_data\_read): Add a way to return the available bytes.

2001-07-23 Werner Koch <wk@gnupg.org>

- \* util.c: Removed  
stpcpy() because we use the version from jnlib.

2001-07-19 Werner Koch <wk@gnupg.org>

\* mkstatus: Define the collating sequence for sort.

2001-06-26 Werner Koch <wk@gnupg.org>

\* runpgg.h: Add STATUS\_UNEXPECTED as suggested by Timo.

2001-06-15 Werner Koch <wk@gnupg.org>

\* keylist.c (set\_userid\_flags): Fixed the assigned values. Kudos to Timo for pointing this out.

2001-06-01 Werner Koch <wk@gnupg.org>

\* debug.c (\_gpgme\_debug\_begin): Fixed a /tmp race. Noted by Johannes Poehlmann.

2001-05-28 Werner Koch <wk@gnupg.org>

\* version.c (gpgme\_check\_engine): Stop version number parsing at the opening angle and not the closing one. By Tommy Reynolds.

2001-05-01 Jos Carlos Garca Sogo <jose@jaimedelamo.eu.org>

\* encrypt.c (gpgme\_op\_encrypt\_start): Deleted the assert ( !c->gpg ) line, because it gave an error if another operation had been made before using the same context.

\* decrypt.c (gpgme\_op\_decrypt\_start): The same as above. Also added one line to release the gpg object in the context (if any).

2001-04-26 Werner Koch <wk@gnupg.org>

\* key.c, key.h (\_gpgme\_key\_cache\_init): New.

(\_gpgme\_key\_cache\_add): New.

(\_gpgme\_key\_cache\_get): New.

\* version.c (do\_subsystem\_inits): Init the cache.

\* keylist.c (finish\_key): Put key into the cache

\* verify.c (gpgme\_get\_sig\_key): First look into the cache.

2001-04-19 Werner Koch <wk@gnupg.org>

\* keylist.c (parse\_timestamp): Adjusted for the changed --fixed-list-mode of gpg 1.0.4h.

2001-04-05 Werner Koch <wk@gnupg.org>

\* verify.c (gpgme\_op\_verify\_start): Enabled pipemode for detached sigs.

2001-04-04 Werner Koch <wk@gnupg.org>

\* w32-io.c (\_gpgme\_io\_select): Don't select on the writer if there are still bytes pending. Timo found this not easy to track down race condition.

2001-04-02 Werner Koch <wk@gnupg.org>

\* gpgme.h: Add GPGME\_ATTR\_KEY\_{EXPIRED,DISABLED}.

\* key.c (gpgme\_key\_get\_ulong\_attr): And return those attribs.

\* verify.c (gpgme\_get\_sig\_key): Set keyliosting mode depending on the mode set in the current context. Suggested by Timo.

\* key.c (gpgme\_key\_get\_ulong\_attr): Return can\_certify and not can\_encrypt. By Timo.

2001-03-30 Werner Koch <wk@gnupg.org>

\* debug.c (debug\_init): Allow to specify a debug file.  
(\_gpgme\_debug\_level): New.

\* posix-io.c (\_gpgme\_io\_read, \_gpgme\_io\_write): Print output.  
(\_gpgme\_io\_select): Debug only with level > 2.

2001-03-15 Werner Koch <wk@gnupg.org>

\* runpgg.c: Included time.h.

\* key.h: New keyflags for capabilities.

\* keylist.c (set\_mainkey\_capability, set\_subkey\_capability): New.  
(keylist\_colon\_handler): Parse them.

\* gpgme.h: New attribute values for capabilities.

\* key.c (gpgme\_key\_get\_string\_attr): Return them.

(capabilities\_to\_string): New.

(gpgme\_key\_get\_ulong\_attr): Return the global caps.

2001-03-14 Werner Koch <wk@gnupg.org>

\* w32-io.c (destroy\_reader,destroy\_writer): Fixed syntax error.  
Thanks to Jan Oliver Wagner.

2001-03-13 Werner Koch <wk@gnupg.org>

\* context.h: Add  
invalid and revoke flags to user\_id structure.  
\* keylist.c (gpgme\_op\_keylist\_start): Use --fixed-list-mode.  
(keylist\_colon\_handler): Adjust for that.  
(set\_userid\_flags): New.  
(set\_mainkey\_trust\_info): Handle new key invalid flag  
(set\_subkey\_trust\_info): Ditto.  
\* gpgme.h: Add new attributes for key and user ID flags.  
\* key.c (\_gpgme\_key\_append\_name): Init these flags  
(gpgme\_key\_get\_as\_xml): Print them.  
(one\_uid\_as\_xml): New helper for above.  
(gpgme\_key\_get\_string\_attr, gpgme\_key\_get\_ulong\_attr):  
Return the new attributes. Enhanced, so that subkey information  
can be returned now.

2001-02-28 Werner Koch <wk@gnupg.org>

\* w32-io.c (destroy\_reader): Set stop\_me flag.  
(writer,create\_writer,destroy\_writer,find\_writer,kill\_writer): New.  
(\_gpgme\_io\_write): Use a writer thread to avoid blocking.  
(\_gpgme\_io\_close): Cleanup a writer thread  
(\_gpgme\_io\_select): Replace the faked wait on writing by a real  
waiting which is now possible due to the use of a writer thread.

2001-02-20

Werner Koch <wk@gnupg.org>

\* w32-io.c (destroy\_reader,kill\_reader): New.  
(create\_reader, reader): Add a new event to stop the thread.  
(\_gpgme\_io\_close): Kill the reader thread.  
  
\* posix-io.c (\_gpgme\_io\_select): Handle frozen fds here.  
\* 32-io.c (\_gpgme\_io\_select): Ditto. Removed a bunch of unused code.  
  
\* wait.c: Reworked the whole thing.  
\* runpg.c (\_gpgme\_gpg\_new): Init pid to -1.  
(\_gpgme\_gpg\_release): Remove the process from the wait queue.

2001-02-19 Werner Koch <wk@gnupg.org>

\* w32-io.c (\_gpgme\_io\_set\_close\_notify): New.  
(\_gpgme\_io\_close): Do the notification.  
  
\* posix-io.c (\_gpgme\_io\_select): Use a 1 sec timeout and not 200  
microseconds.  
  
\* wait.c (remove\_process): Don't close the fd here.  
(do\_select): Set the fd to -1 and remove the is\_closed flag everywhere.

(\_gpgme\_wait\_on\_condition): Remove the assert on the queue and break out if we could not find the queue. The whole thing should be reworked.

\* posix-io.c (\_gpgme\_io\_set\_close\_notify): New.

(\_gpgme\_io\_close):

Do the notification.

\* runpgg.c (close\_notify\_handler): New.

(\_gpgme\_gpg\_new): Register a callback for the fd.

(\_gpgme\_gpg\_set\_colon\_line\_handler): Ditto.

(build\_argv): Ditto

2001-02-13 Werner Koch <wk@gnupg.org>

\* runpgg.c (struct reap\_s): Replaced pid\_t by int.

\* types.h: Add ulong typedef.

\* runpgg.c (do\_reaping, \_gpgme\_gpg\_housecleaning): New.

(\_gpgme\_gpg\_release): Reap children.

\* io.h, posix-io.c (\_gpgme\_io\_kill): New.

\* w32-io.c (\_gpgme\_io\_kill): New (dummy).

\* keylist.c (gpgme\_op\_keylist\_start): Cancel a pending request.

\* posix-io.c (\_gpgme\_io\_read): Add some debug output.

(\_gpgme\_io\_write): Ditto.

(\_gpgme\_io\_select): Increased the timeout.

2001-02-12 Werner Koch <wk@gnupg.org>

Enhanced the signature verification, so that it can now handle more than one signature and is able to return more information on the signatures.

\* verify.c (gpgme\_get\_sig\_key): New.

(gpgme\_get\_sig\_status): New.

\* gpgme.h: Add stdio.h.

(GpgmeSigStat):

New status DIFF.

2001-02-01 Werner Koch <wk@gnupg.org>

\* w32-io.c (set\_synchronize): Add EVENT\_MODIFY\_STATE. Add Debug code to all Set/ResetEvent().

\* runpgg.c (read\_status): Check for end of stream only if we have

an r. By Timo.

2001-01-31 Werner Koch <wk@gnupg.org>

\* wait.c (`_gpgme_wait_on_condition`): Removed all exit code processing.  
(`propagate_term_results,clear_active_fds`): Removed.  
(`count_active_fds`): Renamed to ..  
(`count_active_and_thawed_fds`): .. this and count only thawed fds.

\* `rungpg.c` (`gpg_colon_line_handler`): Return `colon.eof` and not `status.eof` ;-)

2001-01-30 Werner Koch <wk@gnupg.org>

\* `w32-io.c` (`_gpgme_io_spawn`): Use the supplied path arg.

\* `version.c` (`get_engine_info`): Return better error information.

\* `posix-util.c`, `w32-util.c`: New.

(`_gpgme_get_gpg_path`): New, suggested by Jan-Oliver.

\* `rungpg.c` (`_gpgme_gpg_spawn`): Use new function to get GPG's path.

\* `signers.c` (`gpgme_signers_add`): Oops, one should test code and not just write it;  
the newarr was not assigned. Thanks to Jos  
for pointing this out. Hmmm, still not tested, why should a coder  
test his fix :-)

\* `w32-io.c`: Does now use reader threads, so that we can use  
`WaitForMultipleObjects`.

\* `sema.h`, `posix-sema.c`, `w32-sema.c`: Support for Critical sections.  
Does currently only work for W32.

\* `debug.c`, `util.h` : New. Changed all `fprintfs` to use this new  
set of debugging functions.

2001-01-23 Werner Koch <wk@gnupg.org>

\* `data.c` (`_gpgme_data_release_and_return_string`): Fixed string  
termination.

2001-01-22 Werner Koch <wk@gnupg.org>

\* `delete.c`: New.

\* `signers.c`: New.

\* `key.c` (`gpgme_key_ref`, `gpgme_key_unref`): New.

\* `sign.c` (`gpgme_op_sign_start`): Allow the use of other keys.

\* version.c (gpgme\_get\_engine\_info,gpgme\_check\_engine): New.

\* runpgg.c (\_gpgme\_gpg\_set\_simple\_line\_handler): New.

2001-01-05 Werner Koch <wk@gnupg.org>

\* data.c (gpgme\_data\_rewind): Allow to rewind data\_type\_none.

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;;; -\*- Mode: lisp -\*-

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(defpackage #:gpgme-system

(:use #:common-lisp #:asdf))

(in-package #:gpgme-system)

```

(defsystem gpgme
:description "GnuPG Made Easy."
:author "g10 Code GmbH"
:version "1.15.1"
:licence "GPL"
:defsystem-depends-on ("cffi-grovel")
:depends-on ("cffi" "gpg-error" "trivial-garbage")
:components ((:file "gpgme-package")
 (:cffi-grovel-file "gpgme-grovel"
 :depends-on ("gpgme-package")))
 (:file "gpgme"
 :depends-on ("gpgme-package" "gpgme-grovel"))))
- mode: org --
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

```

\* GPGME Python Bindings

```

:PROPERTIES:
:CUSTOM_ID: top
:END:

```

\*\* Contents

```

:PROPERTIES:
:CUSTOM_ID: contents
:END:

```

- [[file:short-history]] [A short history of the project]
- [[file:what-is-new]] [What's New]
- [[file:maintenance-mode]] [Maintenance Mode] (from January, 2019)
- [[file:what-was-new]] [What Was New]
- [[file:gpgme-python-howto]] [GPGME Python Bindings HOWTO]

```

{
 "components": [{
 "name": "gpg",
 "description": "OpenPGP",
 "options": [{
 "name": "Monitor",
 "flags": 1,

```



```

 "level": 0,
 "type": 0,
 "alt_type": 0
 }, {
 "name": "verbose",
 "description": "verbose",
 "level": 0,
 "type": 0,
 "alt_type": 0
 }
]
}
{
 "keys": [{
 "revoked": false,
 "expired": false,
 "disabled": false,
 "invalid": false,
 "can_encrypt": true,
 "can_sign": true,
 "can_certify": true,
 "can_authenticate": true,
 "secret": false,
 "is_qualified": false,
 "protocol": "OpenPGP",
 "fingerprint": "23FD347A419429BACCD5E72D6BC4778054ACD246",
 "subkeys": [{
 "revoked": false,
 "expired": false,
 "disabled": false,
 "invalid": false,
 "can_encrypt": false,
 "can_sign": true,
 "can_certify": true,
 "can_authenticate": true,
 "secret": false,
 "is_qualified": false,
 "is_cardkey": false,
 "is_de_vs": false,
 "pubkey_algo_name":
"DSA",
 "pubkey_algo_string": "dsa1024",
 "pubkey_algo": 17,
 "length": 1024,
 "timestamp": 920892875,
 "expires": 0
 }, {
 "revoked": false,

```

```

 "expired": false,
 "disabled": false,
 "invalid": false,
 "can_encrypt": true,
 "can_sign": false,
 "can_certify": false,
 "can_authenticate": false,
 "secret": false,
 "is_qualified": false,
 "is_cardkey": false,
 "is_de_vs": false,
 "pubkey_algo_name": "ELG-E",
 "pubkey_algo_string": "elg1024",
 "pubkey_algo": 16,
 "length": 1024,
 "timestamp": 920892914,
 "expires": 0
 }],
 "userids": [{
 "revoked": false,
 "invalid": false,
 "validity": "unknown",
 "uid": "Zulu Test (demo key) <zulu@example.net>",
 "name": "Zulu Test",
 "email": "zulu@example.net",
 "comment": "demo key",
 "address": "zulu@example.net"
 }]
}
{
 "op": "verify",
 "data": "Hello world",
 "signature": "-----BEGIN PGP SIGNATURE-----
\n\niHAEABECADAWIQSg/0WQu2Ei7e9uPFQtcnzHaGI3NAUCW+we3RIcYWxwaGFAZXhh\nbXBsZS5uZXQ
ACgkQLXJ8x2hpdzSwIgcfdk+n6SsYwa9SYfBwr/o4FmWsa8Anj3V\n8p3ahr3rxNbK7cDbSk/p1zD0\n=oS5d\n---
--END PGP SIGNATURE-----"
}
{
 "env": {
 "browser": true,
 "es6": true
 },
 "extends": "eslint:recommended",
 "parserOptions": {
 "sourceType": "module"
 },
 "rules": {

```

```

"indent": [
 "warn",
 4
],
"linebreak-style": [
 "error",
 "unix"
],
"quotes": [
 "error",
 "single"
],
"semi": [
 "error",
 "always"
],
"no-var": [
 "warn"
],
"max-len": 1,
"default-case": 2,
"no-invalid-this": 2,
"no-lone-blocks": 1,
"no-self-compare": 2,
"radix": 2,
"no-use-before-define": ["error", {
 "functions": false,
 "classes": false,
 "variables": true
}],
"no-useless-constructor": 1,
"space-before-function-paren": ["error", "always"],
"keyword-spacing": 2,
"spaced-comment": 1,
"space-unary-ops":
2,
"object-curly-spacing": ["error", "always"],
"array-bracket-spacing": ["error", "never"]
}
}
{
"result": {
 "considered": 1,
 "no_user_id": 0,
 "imported_rsa": 0,
 "new_user_ids": 0,
 "new_sub_keys": 0,
 "new_signatures": 0,

```

```
"new_revocations": 0,
"secret_read": 0,
"secret_imported": 0,
"secret_unchanged": 0,
"skipped_new_keys": 0,
"not_imported": 0,
"skipped_v3_keys": 0,
"imports": [{
 "fingerprint": "E8143C489C8D41124DC40D0B47AF4B6961F04784",
 "error_string": "Success",
 "status": 1
}]
}
}
```

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```
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under certain conditions; type `show c' for details.
```

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```
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`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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```
{
 "keys": [{
 "revoked": false,
 "expired": false,
 "disabled": false,
 "invalid": false,
 "can_encrypt": true,
 "can_sign": true,
 "can_certify": true,
 "can_authenticate": true,
 "secret": true,
 "is_qualified": false,
 "protocol": "OpenPGP",
```

```

"fingerprint": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
"subkeys": [{
 "revoked": false,
 "expired": false,
 "disabled": false,
 "invalid": false,
 "can_encrypt": false,
 "can_sign": true,
 "can_certify": true,
 "can_authenticate": true,
 "is_qualified": false,
 "is_cardkey": false,
 "is_de_vs": false,
 "pubkey_algo_name": "DSA",

"pubkey_algo_string": "dsa1024",
 "keyid": "2D727CC768697734",
 "keygrip": "76F7E2B35832976B50A27A282D9B87E44577EB66",
 "pubkey_algo": 17,
 "length": 1024,
 "timestamp": 920882846,
 "expires": 0
}, {
 "revoked": false,
 "expired": false,
 "disabled": false,
 "invalid": false,
 "can_encrypt": true,
 "can_sign": false,
 "can_certify": false,
 "can_authenticate": false,
 "is_qualified": false,
 "is_cardkey": false,
 "is_de_vs": false,
 "pubkey_algo_name": "ELG-E",
 "pubkey_algo_string": "elg1024",
 "keyid": "6AE6D7EE46A871F8",
 "keygrip":
"A0747D5F9425E6664F4FFBEED20FBCA79FDED2BD",
 "pubkey_algo": 16,
 "length": 1024,
 "timestamp": 920882959,
 "expires": 0
}],
"userids": [{
 "revoked": false,
 "invalid": false,
 "validity": "unknown",

```

```

 "uid": "Alfa Test (demo key) <alfa@example.net>",
 "name": "Alfa Test",
 "email": "alfa@example.net",
 "comment": "demo key",
 "address": "alfa@example.net"
 }, {
 "revoked": false,
 "invalid": false,
 "validity": "unknown",
 "uid": "Alpha Test (demo key) <alpha@example.net>",
 "name": "Alpha Test",
 "email": "alpha@example.net",
 "comment": "demo key",
 "address":
"alpha@example.net"
 }, {
 "revoked": false,
 "invalid": false,
 "validity": "unknown",
 "uid": "Alice (demo key)",
 "name": "Alice",
 "email": "",
 "comment": "demo key",
 "origin": 0,
 "last_update": 0
 }
]
}, {
 "revoked": false,
 "expired": false,
 "disabled": false,
 "invalid": false,
 "can_encrypt": true,
 "can_sign": true,
 "can_certify": true,
 "can_authenticate": true,
 "is_qualified": false,
 "protocol": "OpenPGP",
 "fingerprint": "D695676BDCEDCC2CDD6152BCFE180B1DA9E3B0B2",
 "owner_trust": "unknown",
 "origin": 0,
 "last_update": 0,
 "subkeys":
[
 {
 "revoked": false,
 "expired": false,
 "disabled": false,
 "invalid": false,
 "can_encrypt": false,

```

```

"can_sign": true,
"can_certify": true,
"can_authenticate": true,
"secret": false,
"is_qualified": false,
"is_cardkey": false,
"is_de_vs": false,
"pubkey_algo_name": "DSA",
"pubkey_algo_string": "dsa1024",
"keyid": "FE180B1DA9E3B0B2",
"pubkey_algo": 17,
"length": 1024,
"timestamp": 920888034,
"expires": 0
}, {
"revoked": false,
"expired": false,
"disabled": false,
"invalid": false,
"can_encrypt":
true,
"can_sign": false,
"can_certify": false,
"can_authenticate": false,
"secret": false,
"is_qualified": false,
"is_cardkey": false,
"is_de_vs": false,
"pubkey_algo_name": "ELG-E",
"pubkey_algo_string": "elg1024",
"keyid": "5381EA4EE29BA37F",
"pubkey_algo": 16,
"length": 1024,
"timestamp": 920888071,
"expires": 0
}],
"userids": [{
"revoked": false,
"invalid": false,
"validity": "unknown",
"uid": "Bob (demo key)",
"name": "Bob",
"email": "",
"comment": "demo key"
}, {
"revoked": false,
"invalid": false,

```

```

 "validity": "unknown",
 "uid": "Bravo Test (demo key) <bravo@example.net>",
 "name": "Bravo Test",
 "email": "bravo@example.net",
 "comment": "demo key",
 "address": "bravo@example.net"
 }}
}
{
 "name": "gpgmejson",
 "description": "Integration with GnuPG",
 "path": "/usr/bin/gpgme-json",
 "type": "stdio",
 "allowed_origins": [
 "chrome-extension://kajibbejlbohfggdiogboambcijhkke/"
]
}
{
 "op": "export",
 "keys": "alpha@example.net",
 "armor": true,
 "with-sec-fprs": true
}

```

-----BEGIN PGP PUBLIC KEY BLOCK-----

```

mQENBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJIO1s0N2c
PSHtr98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRjLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAG0EHRlc3RAZXhhbXBsZS5v
cmeJAVQEEwEIAD4WIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8Jn
AAULCQGhAgYVCgkICwIEFgIDAQIeAQIXgAAKCRAjAWNe7/DLBf9kB/wOQ/S60HGw
Fq07W9N01HWULyhHKoMmcHL6rfZ64oDqLxolPSasz7WAMW1jN4qtWJ0mFzwo83V6
kaBe+wF6Kqir6udFSBW9rPcFg6/VZXPltT0a6uacIHq6DyQ5iMW4YQWbV9OR2rN
GkYo1JCBR0XdRjYCSX3yB4TWv/eXnZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k7
0DevQeBsv+UjVXjWpNTZmPbvDnd995uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6U
unOf9Rlp1oMzdxMool/d1MICxg2h3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ
1J8Nsv87SZeEuQENBFrsKEkBCADjoEBhG/QPqZHg8VyoD1xYRAWGxyDJKX/GrSs6
yE+x2hk5FoQCajxKa/d4AVxOnJpdwhAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0p
O7bgAiZxkA6RHxtNqhpPnPQoXvUzkzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/
8i9Taz67pdZwuJjac8qBuJHjzAo1bjYctFYUSG5pbmMQyNLySzziNkFa4DajODlt
3RuqVGP316Fk+Sy2+60tC/HIX8jgMyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyL
UGKU+L8cB2g1PGGp2biBFWqZbudZoyRBet/0yH/zirBdQJw1ABEBAAGJATwEGAEI
ACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAKCRAjAWNe
7/DLBf0pCACPP5hBuUWngu2Hqvg+tNiujsfYzId3MffFxEk3CbXeHcJ5F32NDJ9
PYCnra4L8wSv+Nzt9gIa8IFwoFSFQCjzH7KE86XcV3MhfdJTnb/+9CR7Jq3e/4Iy

```

```
0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02Lkr+2Cc/Q
k6H+vIHOHGRgnpl/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe23nntMSD
A+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t9Mmd7bM1
+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=QyY6
```

-----END

PGP PUBLIC KEY BLOCK-----

```
{
 "op": "decrypt",
 "data":
 "hQEOA2rm1+5GqHH4EAQAHzzu7VYpE9vFVdqkAALRHSyz8698b8MES7j5ldzXGVnGSWmN0+YXGyWyeB
5tnAXAvUiV10tzoINaPXoNeOFrHQOWrDsQ1vYukdtblDc3FW/Ywf7aelcFIGh9qydmkPX/EPeULsbgdZp6sybGo
PpEuxzb4CYeRjogB9VvPCRAPb4D/1hRdpoVgWI78JvaeI+xwrP71RuHggZEsM8FSYFBD8c5dY+iAHbPSBI6Q
SZMvMHCu8YVIV40rHFjjoKQ1ox9DHHyvaZkwAZbI/U7+CYZoPoXMAARjCCCW4TIB3VrM70QLjnLSVfW
aCtTnYp2KwARae0Ze7yPt/h1dYe4ofn/O3UH0kEBqJ99Srtrmr9UWdgikgrWCz5TAV27g2vsZubfMe8vC1QnqAS
azyBy74ibvrXrIvHnhHQvPckZFRdbgYhV/+KQIQ==",
 "base64": true
}
```

Using gpgme.js

-----

At first, make sure that the environment you want to use gpgme.js in has access and permissions for nativeMessaging, and gpgme-json installed. For details, see the README.

The library itself is started via the { @link init } method. This will test the nativeMessaging connection, and then resolve into an Object offering the top level API:

```
* [encrypt]{ @link GpgME#encrypt }
* [decrypt]{ @link GpgME#decrypt }
* [sign]{ @link GpgME#sign }
* [verify]{ @link GpgME#verify }
* [Keyring]{ @link GPGME_Keyring }
```

...

```
gpgmejs.init()
 .then(function(GPGME) {
 // using GPGME
 }, function(error){
 // error handling;
 })
...
```

All methods that require communication with nativeMessaging are asynchronous, using Promises. Rejections will be instances of { @link GPGME\_Error }.

An exception are Keys, which can be initialized in a 'sync' mode, allowing them to be cached and used synchronously until manually refreshed.



## Keyring and Keys

-----  
The gnupg keys

can be accessed via the [Keyring]{ @link GPGME\_Keyring}.

The Keyring offers the methods for accessing information on all Keys known to gnupg.

**\*\*Due to security constraints, the javascript-binding currently only offers limited support for secret-Key interaction.\*\***

The existence of secret Keys is not secret, and those secret Keys can be used for signing, but Operations that may expose, modify or delete secret Keys are not supported.

```
* [getKeysArmored]{ @link GPGME_Keyring#getKeysArmored }
* [getKeys]{ @link GPGME_Keyring#getKeys }
* [getDefaultKey]{ @link GPGME_Keyring#getDefaultKey }
* [generateKey]{ @link GPGME_Keyring#generateKey }
* [deleteKey]{ @link GPGME_Keyring#deleteKey }
;;; gpgme-grovel.lisp
```

```
;;; This file is part of GPGME-CL.
```

```
;;;
```

```
;;; GPGME-CL is free software; you can redistribute it and/or modify it
;;; under the terms of the GNU General Public License as published by
;;; the Free Software Foundation; either version 2 of the License, or
;;; (at your option) any later version.
```

```
;;;
```

```
;;; GPGME-CL is distributed in the hope that it will be useful, but
;;; WITHOUT ANY WARRANTY; without even the implied warranty of
;;; MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
;;; Lesser General Public License for more details.
```

```
;;;
```

```
;;; You should have received a copy of the GNU General Public License
;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.
```

```
(in-package :gpgme)
```

```
(include "errno.h" "sys/types.h")
```

```
(constant (+ebadf+ "EBADF"))
```

```
(ctype off-t "off_t")
```

```
(ctype size-t "size_t")
(ctype ssize-t "ssize_t")
```

```
(cvar ("errno" *errno*) :int)
```

```
{
 "op": "version"
}
```

```
(21:protected-private-key(3:dsa(1:p129:_d8|po3s@!WGUOAXRC$_[8SN:y|o?2[.pVxn(kOc\Bk0zu&FnK)(1:q21:
vBeOP\p)(1:g129:fU/e(2hp@hjc2uE=Sg GO;ZkIyFnGM!GsG@
= _SZkII)(1:y128:K:9tA)4SU1 }sG`nZpx/imV^>A;V%?5!!sS{!=-6@|
=d
)(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:Li7:6452224)16:,kO{,}80:z7OCG/sB48(H9%*ojSO
OGSma`YUs1h<_)(12:protected-at15:20130812T105134)))
```

For a list of the authors of the source code of GPGME, please see the file AUTHORS. The following people supported GPGME development in various ways (for example by finding bugs or giving advice), and we want to thank them for their help. If we forgot you, please let us know.

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implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

```
% Created 2019-01-18 Fri 10:10
% Intended LaTeX compiler: xelatex
\documentclass[12pt]{article}
\usepackage{graphicx}
\usepackage{grffile}
\usepackage{longtable}
\usepackage{wrapfig}
\usepackage{rotating}
\usepackage[normalem]{ulem}
\usepackage{amsmath}
\usepackage{textcomp}
\usepackage{amssymb}
\usepackage{capt-of}
\usepackage{hyperref}
\usepackage{xltxtra}
\usepackage[margin=1in]{geometry}
\setmainfont[Ligatures={Common}]{Times New Roman}
\author{Ben McGinnes <ben@gnupg.org>}
\author{Ben McGinnes}
\date{\today}
\title{GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)}
\hypersetup{
pdfauthor={Ben McGinnes},
pdftitle={GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)},
pdfkeywords={},
pdfsubject={},
pdfcreator={Emacs 26.1 (Org mode 9.1.14)},
pdflang={English}}
\begin{document}

\maketitle
\tableofcontents

\section{Introduction}
\label{sec:org8e5fa02}
\begin{center}
\begin{tabular}{ll}
Version: & 0.1.4\\
GPGME Version: & 1.12.1\\
Author: & Ben
McGinnes <ben@gnupg.org>\\
Author GPG Key: & DB4724E6FA4286C92B4E55C4321E4E2373590E5D\\
Language: & Australian English, British English\\
Language codes: & en-AU, en-GB, en\\
\end{tabular}
\end{center}
```

\end{center}

This document provides basic instruction in how to use the GPGME Python bindings to programmatically leverage the GPGME library.

\subsection{Python 2 versus Python 3}

\label{sec:org517cbf4}

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

\subsection{Examples}

\label{sec:org2c08d53}

All of the examples found in this document can be found as Python 3 scripts in the `\lang/python/examples/howto` directory.

\subsection{Unofficial Drafts}

\label{sec:orgceb2216}

In addition to shipping with each release of GPGME, there is a section on locations to read or download [\hyperref\[sec:org080a94a\]{draft editions}](#) of this document from at the end of it. These are unofficial versions produced in between major releases.

\subsection{What's New}

\label{sec:orga79ddc2}

Full

details of what is new are now available in the [\href{what-is-new.org}](http://what-is-new.org) {What's New} file and archives of the preceding [\emph{What's New}](#) sections are available in the [\href{what-was-new}](http://what-was-new) {What Was New} file.

[\subsection{New in GPGME 1130}](#)

[\label{sec:org746b75d}](#)

See the [\href{what-is-new/#new-stuff-1-13-0}](http://what-is-new/#new-stuff-1-13-0) {What's New} document for what is new in version 1.13.0.

[\subsection{New in GPGME 1120}](#)

[\label{sec:org7adcade}](#)

See the [\href{what-was-new/#new-stuff-1-12-0}](http://what-was-new/#new-stuff-1-12-0) {What Was New} document for what was new in version 1.12.0.

[\section{GPGME Concepts}](#)

[\label{sec:orgb257fc1}](#)

[\subsection{A C API}](#)

[\label{sec:org4fe1dfa}](#)

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `\texttt{gpgme.h}` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some means of providing an interface to those languages. This is where the need for bindings in various languages stems.

[\subsection{Python bindings}](#)

[\label{sec:org0e49e52}](#)

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of `\texttt{gpgme.h}` generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of `\texttt{gpgme.h}`.

[\subsection{Difference between the Python bindings and other GnuPG Python packages}](#)

\label{sec:org97acfd7}

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

\subsubsection{The python-gnupg package maintained by Vinay Sajip}

\label{sec:org0136847}

This is arguably the most popular means of integrating GPG with Python. The package utilises the `subprocess` module to implement wrappers for the `gpg` and `gpg2` executables normally invoked on the command line (`gpg.exe` and `gpg2.exe` on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the `subprocess` calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those `subprocess` calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

\subsubsection{The gnupg package created and maintained by Isis Lovecruft}

\label{sec:orgdc03987}

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the python-gnupg package as just gnupg. This new package also relied on `subprocess` to call the `gpg` or `gpg2` binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original python-gnupg and since its functions were called in a different manner to python-gnupg, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License version 3.0 (or any later version).

\subsubsection{The PyME package maintained by Martin}

Albrecht}

\label{sec:org715600b}

This package is the origin of these bindings, though they are somewhat different now. For details of when and how the PyME package was folded back into GPGME itself see the [\href{short-history.org}](http://short-history.org) {Short History} document. [\footnote{\texttt{short-history}}](#) and/or [\texttt{short-history.html}](#) .}

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the [\texttt{python-gnupg}](#) or [\texttt{gnupg}](#) packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

\section{GPGME Python bindings installation}

\label{sec:org73d8d6f}

\subsection{No PyPI}

\label{sec:org9a038}

Most third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against [\texttt{gpgme.h}](#) and [\texttt{gpgme.h}](#) is generated from [\texttt{gpgme.h.in}](#) at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding [\hyperref\[sec:org645735a\]{CFFI and SWIG}](#) at the end of this section for further details.

\subsection{Requirements}

\label{sec:org2f7f06c}

The

GPGME Python bindings only have three requirements:

```
\begin{enumerate}
```

```
\item A suitable version of Python 2 or Python 3. With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.
```

```
\item https://www.swig.org {SWIG}.
```

```
\item GPGME itself. Which also means that all of GPGME's dependencies must be installed too.
```

```
\end{enumerate}
```

```
\subsubsection{Recommended Additions}
```

```
\label{sec:org25bd7d4}
```

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

```
\begin{enumerate}
```

```
\item If possible, use Python 3 instead of 2.
```

```
\item Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.
```

```
\item If possible add the
```

```
following Python modules which are not part of
```

```
the standard library: http://docs.python-requests.org/en/latest/index.html {Requests},
```

```
https://cython.org/ {Cython}, https://pendulum.eustace.io/ {Pendulum} and
```

```
https://github.com/Selfnet/hkp4py {hkp4py}.
```

```
\end{enumerate}
```

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

```
\subsection{Installation}
```

```
\label{sec:orgf1c7587}
```

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.



Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your `\texttt{\$PATH}`.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in `\texttt{\$PATH}`. It specifically checks for the `\texttt{python}` and `\texttt{python3}` executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: `\texttt{python}`, `\texttt{python2}` and `\texttt{python2.7}`.

For Python 3 it checks for these executables in this order: `\texttt{python3}`, `\texttt{python3.7}`, `\texttt{python3.6}`, `\texttt{python3.5}` and `\texttt{python3.4}`.<sup>footnote{With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported minor release is quite possible too.}</sup>

On systems where `\texttt{python}` is actually `\texttt{python3}` and not `\texttt{python2}` it may be possible that `\texttt{python2}` may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred Python versions has been changed to move Python 3.7 ahead of Python 3.6.

#### `\subsubsection{Installing GPGME}`

`\label{sec:org903bd67}`

See the GPGME `\texttt{README}` file for details of how to install GPGME from source.

#### `\subsection{Known Issues}`

`\label{sec:org0d2a332}`

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should

they be encountered.

`\subsubsection{Breaking Builds}`

`\label{sec:orgbac75f3}`

Occasionally when installing GPGME with the Python bindings included it may be observed that the `\texttt{make}` portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with `\texttt{make check}` and `\texttt{make install}` appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce `\texttt{lang/python/python2-gpg/}` and `\texttt{lang/python/python3-gpg/}` directories. These should contain the build output generated during compilation, including the complete bindings and module installed into `\texttt{site-packages}`.

Occasionally the errors in the early part or some other conflict

(e.g. not installing

as `\textbf{\emph{root}}` or `\textbf{\emph{su}}`) may result in nothing being installed to the relevant `\texttt{site-packages}` directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the

`\textbf{root}` user or prepended with `\texttt{sudo -H}`<sup>\footnote{ Yes, even if you use virtualenv with everything you do in</sup>

Python. If you want to install this module as just your user account

then you will need to manually configure, compile and install the

`\emph{entire}` GnuPG stack as that user as well. This includes libraries

which are not often installed that way. It can be done and there are

circumstances under which it is worthwhile, but generally only on

POSIX systems which utilise single user mode (some even require it.) in the `\texttt{lang/python/}`

directory:

```
\begin{verbatim}
```

```
/path/to/pythonX.Y setup.py build
```

```
/path/to/pythonX.Y setup.py
```

```
build
```

```
/path/to/pythonX.Y setup.py install
```

```
\end{verbatim}
```

Yes, the build command does need to be run twice. Yes, you still need

to run the potentially failing or incomplete steps during the

`\texttt{configure}`, `\texttt{make}` and `\texttt{make install}` steps with installing GPGME.

This is because those steps generate a lot of essential files needed,

both by and in order to create, the bindings (including both the

`\texttt{setup.py}` and `\texttt{gpgme.h}` files).

`\begin{enumerate}`

`\item IMPORTANT Note`

`\label{sec:org37f3d4a}`

If specifying a selected number of languages to create bindings for, try to leave Python last. Currently the majority of the other language bindings are also preceding Python of either version when listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative `\texttt{configure}` steps for GPGME using the `\texttt{-{ }-enable-languages=\$LANGUAGE}` option.

Alternatively `\texttt{make}` (or `\texttt{gmake}`), depending on your platform) may be run with the `\texttt{-k}` option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

`\end{enumerate}`

`\subsubsection{Reinstalling Responsibly}`

`\label{sec:org21e4dec}`

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing the previous version(s) is simply a matter of changing to the relevant `\texttt{site-packages}` directory for the version of Python in question and removing the `\texttt{gpg/}` directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on

the system, but the same is true of installing the module in the first place.

`\subsubsection{Multiple installations}`

`\label{sec:org30b18bd}`

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings `\textbf{must}` match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME `\href{https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e}{1.12.1}` the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, 3.6, 3.7 and 3.8 (dev branch) that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the `\texttt{\$PATH}` when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

`\subsubsection{Won't Work With Windows}`

`\label{sec:org0ebae3a}`

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the `\href{https://python.org}{Python website}` (i.e. mostly MSI installers, sometimes self-extracting `\texttt{.exe}` files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is *considerably* more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of

Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

`\begin{enumerate}`

`\item` Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

`\item` Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

`\end{enumerate}`

Do `\textbf{not}` use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released `\href{https://www.python.org/downloads/windows/}{for Windows}`:

`\begin{center}`

`\begin{tabular}{rll}`

CPython & Microsoft product name & runtime filename\\

2.7.6 & Visual Studio 2008 & MSVCR90.DLL\\

3.4.0 & Visual Studio 2010 & MSVCR100.DLL\\

```
3.5.0 & Visual Studio 2015 & \textbf{see below}\\
3.6.0 & Visual Studio 2015 & \textbf{see below}\\
3.7.0 & Visual Studio 2017* & \textbf{see below}\\
\end{tabular}
\end{center}
```

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus \textbf{incompatible} with all the versions of CPython which can be used with the GPGME Python bindings.

It is

also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [\href{https://matthew-brett.github.io/pydagogue/python\\\_msvc.html}](https://matthew-brett.github.io/pydagogue/python\_msvc.html) {Using Microsoft Visual C with Python}. It is also worth reading the Microsoft Developer Network blog post on [\href{http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx}](http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx) {the universal CRT} and Steve Dower's blog posts on Python extensions ([\href{http://stevedower.id.au/blog/building-for-python-3-5}](http://stevedower.id.au/blog/building-for-python-3-5) {part 1} and [\href{http://stevedower.id.au/blog/building-for-python-3-5-part-two}](http://stevedower.id.au/blog/building-for-python-3-5-part-two) {part 2}).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [\href{https://wiki.python.org/moin/WindowsCompilers}](https://wiki.python.org/moin/WindowsCompilers) {Windows compilers} wiki page on the CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct

binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare \textbf{minimum}, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from \texttt{python.org} the advanced options available which utilise \hyperref[sec:org3b53926]{Cython} will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

\begin{enumerate}

\item Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.

\item

Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).

\item Compile both CPython and GPGME with these bindings using the tools selected in step 2.

\item Ignore MingW, Msys2 and the official CPython binary installers.

\item Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

\end{enumerate}

\subsubsection{CFFI is the Best and GPGME should use it instead of SWIG}

\label{sec:org645735a}

There are many reasons for favouring \href{https://cffi.readthedocs.io/en/latest/overview.html}{CFFI} and proponents of it are

quite happy to repeat these things as if all it would take to switch from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the

bindings to Python using the `gpgme.h` file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable codebase. If there were some means of applying SWIG's dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the `gpgme-tool.c` file in the GPGME `src/` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

`\subsubsection{Virtualised Environments}`

`\label{sec:orgb0d56f5}`

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with `virtualenv`, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix

like `/usr/local` or

`/opt/local` then the bindings would need to be installed to the main

Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.



As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a `site.pth` file in the `site-packages/` directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. <https://docs.pytest.org/en/latest/index.html> {pytest}) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. <https://www.virtualbox.org/> {VirtualBox}), a hardware emulation layer (e.g. <https://www.qemu.org/> {QEMU}) or an application container (e.g. <https://www.docker.com/why-docker/> {Docker}).

Finally it should be noted that the limited tests conducted thus far have been using the `virtualenv` command in a new directory to create the virtual python environment. As opposed to the standard `python3 -m venv` and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command `python3 -m virtualenv /path/to/install/virtual/thingy` instead.

`\section{Fundamentals}`

`\label{sec:org832642e}`

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

`\subsection{No REST}`

`\label{sec:org3d694ba}`

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is `\emph{\textbf{not}}` a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

`\subsection{Context}`

`\label{sec:org10e4004}`

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

`\section{Working with keys}`

```
\label{sec:orgff114ca}
```

```
\subsection{Key selection}
```

```
\label{sec:org6589217}
```

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
\begin{verbatim}
```

```
import gpg
```

```
k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
```

```
keys = list(k)
```

```
\end{verbatim}
```

This is passable and very likely to be common:

```
\begin{verbatim}
```

```
import gpg
```

```
k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
```

```
keys = list(k)
```

```
\end{verbatim}
```

And this is a really bad idea:

```
\begin{verbatim}
```

```
import
```

```
gpg
```

```
k = gpg.Context().keylist(pattern="0xDEADBEEF")
```

```
keys = list(k)
```

```
\end{verbatim}
```

Alternatively it may be that the intention is to create a list of keys

which all match a particular search string. For instance all the addresses at a particular domain, like this:

```
\begin{verbatim}
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
\end{verbatim}
```

```
\subsubsection{Counting keys}
\label{sec:org63a3d62}
```

Counting the number of keys in your public keybox (`\texttt{pubring.kbx}`), the format which has superseded the old keyring format (`\texttt{pubring.gpg}` and `\texttt{secring.gpg}`), or the number of secret keys is a very simple task.

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)
```

```
seclist = list(seckeys)
secnum = len(seclist)
```

```
publist = list(pubkeys)
pubnum = len(publist)
```

```
print("""
Number of secret keys: {0}
Number of public keys: {1}
""").format(secnum, pubnum)
\end{verbatim}
```

NOTE:

The <https://sec.org/3b53926> {Cython} introduction in the <https://sec.org/944cc00> {Advanced and Experimental}

section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

```
\subsection{Get key}
\label{sec:org26adb2e}
```

An alternative method of getting a single key via its fingerprint is available directly within a Context with `\texttt{Context().get\_key}`. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

```
\begin{verbatim}
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
\end{verbatim}
```

Whereas this example demonstrates selecting the author's current key with the `\texttt{secret}` key word argument set to `\texttt{True}`:

```
\begin{verbatim}
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
\end{verbatim}
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
\subsection{Importing keys}
\label{sec:org1ad598a}
```

Importing keys is possible with the `\texttt{key\_import()}` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyservers via the web using the requests module. Since requests

returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
\begin{verbatim}
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyserver.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
 print(result)
elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scr = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

 Number of keys revoked: {1}
 Number of new signatures: {2}
 Number of new subkeys: {3}
 Number of new user IDs: {4}
 Number of new secret keys: {5}
 Number of unchanged keys: {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scr,
 nochange))
 for i in range(num_keys):
 print("{0}\n".format(result.imports[i].fpr))
else:
 pass
\end{verbatim}
```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading `{0x}` indicative of hexadecimal be included. Also note that the old short

key IDs (e.g. `\texttt{0xDEADBEEF}`) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal

value which may be missing the leading `\texttt{0x}` is a simple matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a `ValueError` simply results in treating the string as a string. This is the method and logic utilised in the `\texttt{import-keys-hkp.py}` script (see below).

`\subsection{Working with ProtonMail}`

`\label{sec:org27b0d6f}`

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

`\begin{verbatim}`

`import gpg`

`import requests`

`import sys`

`print("""`

`This script searches the ProtonMail key server for the specified key and imports it.`

`""")`

`c = gpg.Context(armor=True)`

`url = "https://api.protonmail.ch/pks/lookup"`

`ksearch = []`

`if len(sys.argv) >= 2:`

`keyterm = sys.argv[1]`

`else:`

`keyterm = input("Enter the key ID, UID or search string: ")`

`if keyterm.count("@") == 2 and keyterm.startswith("@") is`

`True:`

`ksearch.append(keyterm[1:])`

`ksearch.append(keyterm[1:])`

`ksearch.append(keyterm[1:])`

`elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:`

`ksearch.append("{}@protonmail.com".format(keyterm[1:]))`

`ksearch.append("{}@protonmail.ch".format(keyterm[1:]))`

`ksearch.append("{}@pm.me".format(keyterm[1:]))`

```

elif keyterm.count("@") == 0:
 ksearch.append("{0}@protonmail.com".format(keyterm))
 ksearch.append("{0}@protonmail.ch".format(keyterm))
 ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
else:
 ksearch.append(keyterm)

```

```

for k in ksearch:
 payload = {"op": "get", "search": k}
 try:
 r = requests.get(url, verify=True, params=payload)
 if r.ok is True:
 result = c.key_import(r.content)
 elif r.ok is False:
 result = r.content
 except Exception as e:
 result = None

```

```

if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))

```

```

elif result is not None and hasattr(result, "considered") is True:

```

```

 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scert = result.secret_imported
 nochange = result.unchanged
 print("""

```

```

The total number of keys considered for import was: {0}

```

With UIDs wholly or partially matching the following string:

```
{1}
```



Number of keys revoked: {2}  
Number of new signatures: {3}  
Number of new subkeys: {4}  
Number of new user IDs: {5}  
Number of new secret keys: {6}  
Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
 nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)
print("")
elif result is None:
 print(e)
\end{verbatim}
```

Both the above example, [../examples/howto/pmkey-import.py]( ../examples/howto/pmkey-import.py), and a version which prompts for an alternative GnuPG home directory, [../examples/howto/pmkey-import-alt.py]( ../examples/howto/pmkey-import-alt.py), are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers, their server is related more to their API and is not feature complete by comparison to the servers in the SKS pool. One notable difference being that the ProtonMail server does not permit non ProtonMail users to update their own keys, which could be a vector for attacking ProtonMail users who may not receive a key's revocation if it had been compromised.

[Importing with HKP for Python](#)

[sec:org592d7ab](#)

Performing the same tasks with the [hkp4py module](https://github.com/Selfnet/hkp4py) (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some checks on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The hkp4py module permits such checks prior to the importing of the keys found.

```
\begin{verbatim}
```

```
import gpg
```

```
import hkp4py
```

```
import sys
```

```
c = gpg.Context()
```

```

server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
 pattern = " ".join(sys.argv[1:])
elif
len(sys.argv) == 2:
 pattern = sys.argv[1]
else:
 pattern = input("Enter the pattern to search for keys or user IDs: ")

if pattern is not None:
 try:
 key = server.search(hex(int(pattern, 16)))
 keyed = True
 except ValueError as ve:
 key = server.search(pattern)
 keyed = False

 if key is not None:
 keys.append(key[0])
 if keyed is True:
 try:
 fob = server.search(pattern)
 except:
 fob = None
 if fob is not None:
 keys.append(fob[0])
 else:
 pass
 else:
 pass

for logrus in pattern.split():
 try:
 key = server.search(hex(int(logrus, 16)))
 hexed = True
 except ValueError as ve:
 key = server.search(logrus)
 hexed = False

 if key is not None:
 keys.append(key[0])
 if hexed is True:
 try:

```

```

fob = server.search(logrus)
 except:
 fob = None
 if fob is not None:
 keys.append(fob[0])
 else:
 pass
else:
 pass

if len(keys) > 0:
 for key in keys:
 import_result = c.key_import(key.key_blob)
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print(result)
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scert = result.secret_imported
 nochange = result.unchanged
 print("""

```

The total number of keys considered for import was: {0}

```

 Number of keys revoked: {1}
 Number of new signatures: {2}
 Number of new subkeys: {3}
 Number
of new user IDs: {4}
 Number of new secret keys: {5}
 Number of unchanged keys: {6}

```

The key IDs for all considered keys were:

```

"".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scert,
 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
else:
 pass
\end{verbatim}

```

Since the `hkp4py` module handles multiple keys just as effectively as one (`\texttt{keys}` is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

`\subsection{Importing from ProtonMail with HKP for Python}`  
`\label{sec:org3966a76}`

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

`\begin{enumerate}`  
`\item Import from ProtonMail via HKP for Python Example no. 1`  
`\label{sec:org6cd15c3}`  
The following script is available with the rest of the examples under the somewhat less than original name, `\texttt{pmkey-import-hkp.py}`.

```
\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage: pmkey-import-hkp.py [search strings]
""")
```

`c`

```

= gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
 keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
 keyterm = sys.argv[1]
 keyterms.append(keyterm)
else:
 key_term = input("Enter the key ID, UID or search string: ")
 keyterms = key_term.split()

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{}@pm.me".format(keyterm[1:]))
 elif keyterm.count("@") == 0:
 ksearch.append("{}@protonmail.com".format(keyterm))
 ksearch.append("{}@protonmail.ch".format(keyterm))
 ksearch.append("{}@pm.me".format(keyterm))
 elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
 ksearch.append("{}@protonmail.ch".format(uid))
 ksearch.append("{}@pm.me".format(uid))
 elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{}@protonmail.com".format(uid))
 ksearch.append("{}@protonmail.ch".format(uid))
 ksearch.append("{}@pm.me".format(uid))
 else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking for key for: {}".format(k))

```

```

try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)

```

```

except Exception as e:
 import_result = c.key_import(key.key)
else:
 paradox.append(keys)
 import_result = None
except Exception as e:
 import_result = None
results.append(import_result)

```

```

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_sprt = result.secret_imported
 nochange = result.unchanged
 print("""

```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

Number of keys revoked: {2}

Number of new signatures: {3}

Number of new subkeys: {4}

Number of new user IDs: {5}

Number of new secret keys: {6}

Number of unchanged keys: {7}

The key IDs for all considered keys were:

```

"""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_sprt,
 nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)

```

```

 print("")
elif result is None:
 pass
\end{verbatim}

```

\item Import from ProtonMail via HKP for Python Example no. 2

\label{sec:org3b674e5}

Like its counterpart above, this script can also be found with the rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything passed as a \texttt{homedir} which either does not exist or which is not a directory, as also being a possible user ID to check for. It's not guaranteed to pick up on all such cases, but it should cover most of them.

```

\begin{verbatim}

```

```

import gpg
import hkp4py
import os.path
import sys

```

```

print("""

```

```

This script searches the ProtonMail key server
for the specified key and
imports it. Optionally enables specifying a different GnuPG home directory.

```

```

Usage: pmkey-import-hkp.py [homedir] [search string]

```

```

or: pmkey-import-hkp.py [search string]

```

```

""")

```

```

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

```

```

if len(sys.argv) > 3:

```

```

 homedir = sys.argv[1]

```

```

 keyterms = sys.argv[2:]

```

```

elif len(sys.argv) == 3:

```

```

 homedir = sys.argv[1]

```

```

 keyterm = sys.argv[2]

```

```

 keyterms.append(keyterm)

```

```

elif len(sys.argv) == 2:
 homedir = ""
 keyterm = sys.argv[1]
 keyterms.append(keyterm)
else:
 keyterm = input("Enter the key ID, UID or search string: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
 keyterms.append(keyterm)

if len(homedir) == 0:
 homedir = None
 homeless = False

if homedir is not None:
 if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir))
is True:
 if os.path.isdir(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.realpath(os.path.expanduser(homedir))
 else:
 homeless = True
 else:
 homeless = True
 elif os.path.exists(os.path.realpath(homedir)) is True:
 if os.path.isdir(os.path.realpath(homedir)) is True:
 c.home_dir = os.path.realpath(homedir)
 else:
 homeless = True
 else:
 homeless = True

First check to see if the homedir really is a homedir and if not, treat it as
a search string.
if homeless is True:
 keyterms.append(homedir)
 c.home_dir = None
else:
 pass

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{}@pm.me".format(keyterm[1:]))

```



```

elif keyterm.count("@") == 0:
 ksearch.append("{0}@protonmail.com".format(keyterm))
 ksearch.append("{0}@protonmail.ch".format(keyterm))
 ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking
for key for: {0}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)
 except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None
 except Exception as e:
 import_result = None
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_s crt = result.secret_imported

```

```
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}
```

With UIDs wholly or partially matching the following string:

```
{1}
```

```
 Number of keys revoked: {2}
Number of new signatures: {3}
 Number of new subkeys: {4}
 Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}
```

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
 elif result is None:
 pass
\end{verbatim}
\end{enumerate}
```

`\subsection{Exporting keys}`

`\label{sec:org4596a77}`

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

`\subsubsection{Exporting`

`public keys}`

`\label{sec:org873704f}`

There are two methods of exporting public keys, both of which are very similar to the other. The default method, `\texttt{key\_export()}`, will export a public key or keys matching a specified pattern as normal. The alternative, the `\texttt{key\_export\_minimal()}` method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

`\begin{verbatim}`

`import gpg`

`import os.path`

```

import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the
GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif os.path.exists(homedir) is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export(pattern=logrus)
except:
 result = c.key_export(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
else:
 pass
\end{verbatim}

```

It should be noted that the result will only return `\texttt{None}` when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to `\texttt{None}` this triggers the exporting of the entire public keybox.

```
\begin{verbatim}
import
 gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif os.path.exists(homedir)
is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_minimal(pattern=logrus)
except:
```

```

result = c.key_export_minimal(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
else:
 pass
\end{verbatim}

```

\subsubsection{Exporting secret keys}

\label{sec:org6c28d3d}

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of \texttt{pinentry} via \texttt{gpg-agent} in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```

\begin{verbatim}
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile
 = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:

```

```

keyfile = input("Enter the path and filename to save the secret key to: ")
logrus = input("Enter the UID matching the secret key(s) to export: ")
homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir =
 None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_secret(pattern=logrus)
except:
 result = c.key_export_secret(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
 os.chmod(keyfile, 0o600)
else:
 pass
\end{verbatim}

```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (`\texttt{.gpg}`) and ASCII armoured (`\texttt{.asc}`) files.

```

\begin{verbatim}
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the
user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
 gpgconfgcmd = "gpgconf.exe --list-dirs homedir"
else:
 gpgconfgcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir)
== 0:
 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:

```

```

 homedir = os.path.realpath(userdir)
else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

if c.home_dir is not None:
 if c.home_dir.endswith("/"):
 gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
 else:
 gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
 if os.path.exists(os.environ["GNUPGHOME"]) is True:
 hd = os.environ["GNUPGHOME"]
 else:
 try:
 hd = subprocess.getoutput(gpgconfcmd)
 except:
 process = subprocess.Popen(gpgconfcmd.split(),
 stdout=subprocess.PIPE)
 procom = process.communicate()
 if sys.version_info[0] == 2:
 hd = procom[0].strip()
 else:
 hd = procom[0].decode().strip()
 gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
 ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
 a_result = a.key_export_secret(pattern=logrus)
 b_result = b.key_export_secret(pattern=logrus)
except:
 a_result = a.key_export_secret(pattern=None)

```



```

b_result = b.key_export_secret(pattern=None)

if a_result is not None:
 with open(ascfile, "wb") as f:
 f.write(a_result)
 os.chmod(ascfile, 0o600)
else:
 pass

if b_result is not None:
 with open(gpgfile, "wb") as f:
 f.write(b_result)
 os.chmod(gpgfile, 0o600)
else:
 pass
\end{verbatim}

```

\subsubsection{Sending public keys to the SKS Keyservers }

\label{sec:org82d4958}

As with the previous section on importing keys, the \texttt{hkp4py} module adds another option with exporting keys in order to send them to the public key servers.

The following example demonstrates how this may be done.

```

\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS key servers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if len(sys.argv) > 2:
 logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
 logrus = sys.argv[1]
else:
 logrus = input("Enter the UID matching the key(s) to send: ")

```

```

if len(logrus) > 0:
 try:
 export_result = c.key_export(pattern=logrus)
 except Exception as e:
 print(e)
 export_result = None
else:
 export_result = c.key_export(pattern=None)

if export_result is not None:
 try:
 try:
 send_result = server.add(export_result)
 except:
 send_result = server.add(export_result.decode())
 if send_result is not None:
 print(send_result)
 else:
 pass
 except Exception as e:
 print(e)
else:
 pass
\end{verbatim}

```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as `\texttt{send-key-to-keyserver.py}`.

The `\texttt{hkp4py}` module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

`\section{Basic Functions}`

`\label{sec:orgb40b488}`

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

`\subsection{Encryption}`

`\label{sec:org3170365}`

Encrypting

is very straight forward. In the first example below the message, `\texttt{text}`, is encrypted to a single recipient's key. In the

second example the message will be encrypted to multiple recipients.

```
\subsection{Encrypting to one key}
\label{sec:org8098c64}
```

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the `\texttt{gpg.Context().encrypt()}` method.

Those keyword arguments are: `\texttt{recipients}`, a list of keys encrypted to (covered in greater detail in the following section); `\texttt{sign}`, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to `\texttt{True}`); `\texttt{sink}`, to write results or partial results to a secure sink instead of returning it (defaults to `\texttt{None}`); `\texttt{passphrase}`, only used when utilising symmetric encryption (defaults to `\texttt{None}`); `\texttt{always\_trust}`, used to override the trust model settings for recipient keys (defaults to `\texttt{False}`); `\texttt{add\_encrypt\_to}`, utilises any preconfigured `\texttt{encrypt-to}` or `\texttt{default-key}` settings in the user's `\texttt{gpg.conf}` file (defaults to `\texttt{False}`); `\texttt{prepare}`, prepare for encryption (defaults to `\texttt{False}`); `\texttt{expect\_sign}`, prepare for signing (defaults to `\texttt{False}`); `\texttt{compress}`, compresses the plaintext prior to encryption (defaults to `\texttt{True}`).

```
\begin{verbatim}
import gpg
```

```
a_key = "0x12345678DEADBEEF"
text = b""Some text to test with.
```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```

```
c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
\end{verbatim}
```

Though this is even more likely to be used like this; with the plaintext input read from a file, the recipient keys used for encryption regardless of key trust status and the encrypted output also encrypted to any preconfigured keys set in the `\texttt{gpg.conf}` file:

```

\begin{verbatim}
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
 text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
 always_trust=True,
 add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
\end{verbatim}

```

If the `\texttt{recipients}` parameter is empty then the plaintext is encrypted symmetrically. If no `\texttt{passphrase}` is supplied as a parameter or via a callback registered with the `\texttt{Context()}` then an out-of-band prompt for the passphrase via `pinentry` will be invoked.

```

\subsection{Encrypting to multiple keys}
\label{sec:orgdcf6e47}

```

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (`\texttt{text}`) to everyone with an email address on the `\texttt{gnupg.org}` domain, \footnote{You probably don't really want to do this. Searching the keyservers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.} but does **\emph{not}** encrypt to a default key or other key which is configured to normally encrypt to.

```

\begin{verbatim}
import gpg

text = b""Oh look, another test message.

```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an `input()` prompt.

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```

```
c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []
```

```
for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 sign=False, always_trust=True)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
\end{verbatim}
```

All it would take to change the above example to sign the message and also encrypt the message to any configured default keys would be to change the `\texttt{c.encrypt}` line to this:

```
\begin{verbatim}
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 always_trust=True,
 add_encrypt_to=True)
\end{verbatim}
```

The only keyword arguments requiring modification are those for which the default values are changing. The default value of `\texttt{sign}` is `\texttt{True}`, the default of `\texttt{always\_trust}` is `\texttt{False}`, the default of `\texttt{add\_encrypt\_to}` is `\texttt{False}`.

If `\texttt{always\_trust}` is not set to `\texttt{True}` and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
\begin{verbatim}
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
 text = afile.read()
```

```

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])

 try:
 ciphertext, result,
sign_result = c.encrypt(text, recipients=logrus,
 add_encrypt_to=True)
 except gpg.errors.InvalidRecipients as e:
 for i in range(len(e.recipients)):
 for n in range(len(logrus)):
 if logrus[n].fpr == e.recipients[i].fpr:
 logrus.remove(logrus[n])
 else:
 pass
 try:
 ciphertext, result, sign_result = c.encrypt(text,
 recipients=logrus,
 add_encrypt_to=True)
 with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
 except:
 pass
\end{verbatim}

```

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

\subsection{Decryption}

\label{sec:org1282b3d}

Decrypting something encrypted to a key in one's secret

keyring is

fairly straight forward.

In this example code, however, preconfiguring either `gpg.Context()` or `gpg.core.Context()` as `c` is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to `c` simply adds lines for no gain.

\begin{verbatim}

import gpg

```

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
 try:
 plaintext, result, verify_result = gpg.Context().decrypt(cfile)
 except gpg.errors.GPGMEError as e:
 plaintext = None
 print(e)

if plaintext is not None:
 with open(newfile, "wb") as nfile:
 nfile.write(plaintext)
 else:
 pass
\end{verbatim}

```

The data available in `plaintext` in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in `result` and the results of verifying any signatures of the data in `verify_result`.

If `gpg.Context().decrypt(cfile, verify=False)` is called instead, then `verify_result` will be returned as `None` and the rest remains as described here.

`\subsection{Signing text and files}`  
`\label{sec:org59f1262}`

The following sections demonstrate how to specify keys to sign with.

`\subsubsection{Signing key selection}`  
`\label{sec:org909cb3c}`

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

`\begin{verbatim}`  
`import gpg`

```

logrus = input("Enter the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)

```

```
\end{verbatim}
```

The signing examples in the following sections include the explicitly designated `\texttt{signers}` parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the patten expects a string, bytes or None and not a list. A string with two fingerprints won't match any single key.

```
\subsubsection{Normal or default signing messages or files}
```

```
\label{sec:org6ee259d}
```

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of `\texttt{gpg.Context().armor}`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
\begin{verbatim}
```

```
import gpg
```

```
text0 = ""Declaration of ... something.
```

```
""
```

```
text = text0.encode()
```

```
c = gpg.Context(armor=True, signers=sig_src)
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)
```

```
with open("/path/to/statement.txt.asc", "w") as afile:
```

```
 afile.write(signed_data.decode())
```

```
\end{verbatim}
```



Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
"rb") as tfile:
 text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
 afile.write(signed_data)
\end{verbatim}
```

```
\subsection{Detached signing messages and files}
\label{sec:org51049d4}
```

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
\begin{verbatim}
import gpg

text0 = """"Declaration of ... something.

""""

text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc", "w") as afile:
 afile.write(signed_data.decode())
\end{verbatim}
```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```
\begin{verbatim}
import gpg
```

```

with open("/path/to/statement.txt",
"rb") as tfile:
 text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
 afile.write(signed_data)
\end{verbatim}

```

\subsubsection{Clearsigning messages or text}

\label{sec:orgf528a20}

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

```

\begin{verbatim}
import gpg

text0 = ""Declaration of ... something.

""
text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "w") as afile:
 afile.write(signed_data.decode())
\end{verbatim}

```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```

\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
"rb") as tfile:
 text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
 afile.write(signed_data)

```

```
\end{verbatim}
```

```
\subsection{Signature verification}
```

```
\label{sec:org6cd81af}
```

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
\begin{verbatim}
```

```
import gpg
```

```
import time
```

```
filename = "statement.txt"
```

```
gpg_file = "statement.txt.gpg"
```

```
c = gpg.Context()
```

```
try:
```

```
 data, result = c.verify(open(gpg_file))
```

```
 verified = True
```

```
except gpg.errors.BadSignatures as e:
```

```
 verified = False
```

```
 print(e)
```

```
if verified is True:
```

```
 for i in range(len(result.signatures)):
```

```
 sign = result.signatures[i]
```

```
 print("""Good signature from:
```

```
{0}
```

```
with key {1}
```

```
made at {2}
```

```
""").format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
```

```
 time.ctime(sign.timestamp)))
```

```
else:
```

```
 pass
```

```
\end{verbatim}
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
\begin{verbatim}
```

```
import gpg
```

```

import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
\end{verbatim}

```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `\texttt{data}` to see if it matches with something like this:

```

\begin{verbatim}
with open(filename, "rb") as afile:
 text = afile.read()

if text == data:
 print("Good signature.")
else:
 pass
\end{verbatim}

```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `\texttt{c.verify}`. So `\texttt{data}` is `\texttt{None}` and only the information in `\texttt{result}` is available.

```

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
 data, result = c.verify(open(filename), open(sig_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with
key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
\end{verbatim}

```

```

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(filename), open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):

```

```

 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""").format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
else:
 pass
\end{verbatim}

```

\section{Creating keys and subkeys}

\label{sec:org754c6df}

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to \texttt{SECRET} level clearance, so his keys will be 3072-bit keys.

The pre-configured \texttt{gpg.conf} file which sets cipher, digest and other preferences contains the following configuration parameters:

```

\begin{verbatim}
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences
ZLIB BZIP2 ZIP Uncompressed
\end{verbatim}

```

```
\subsection{Primary key}
```

```
\label{sec:org0185c23}
```

Generating a primary key uses the `create_key` method in a Context.

It contains multiple arguments and keyword arguments, including:

```
\code{userid}, \code{algorithm}, \code{expires_in}, \code{expires}, \code{sign}, \code{encrypt},
\code{certify}, \code{authenticate}, \code{passphrase} and \code{force}. The defaults for
all of those except \code{userid}, \code{algorithm}, \code{expires_in}, \code{expires} and
\code{passphrase} is False. The defaults for \code{algorithm} and
\code{passphrase} is None. The default for \code{expires_in} is 0. The
default for \code{expires} is True. There is no default for \code{userid}.
```

If `passphrase` is left as `None` then the key will not be generated with a passphrase, if `passphrase` is set to a string then that will be the passphrase and if

`passphrase` is set to `True` then `gpg-agent` will launch `pinentry` to prompt for a passphrase. For the sake of convenience, these examples will keep `passphrase` set to `None`.

```
\begin{verbatim}
```

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/gnupg-dm"
```

```
userid = "Danger Mouse <dm@secret.example.net>"
```

```
dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
 sign=True, certify=True)
```

```
\end{verbatim}
```

One thing to note here is the use of setting the `c.home_dir` parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, `~/.gnupg`, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The `temp-homedir-config.py` script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned `GenkeyResult` object, which includes the following data:

```
\begin{verbatim}
```

```

print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""").format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
 dmkey.uid))
\end{verbatim}

```

Alternatively the information can be confirmed using the command line program:

```

\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
\end{verbatim}

```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the `gpg.conf` file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own `gpg.conf` file in order to be able to generate this:

```

\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

```

```

sec rsa3072/026D2F19E99E63AA
 created: 2018-03-15 expires: 2019-03-15 usage: SC
 trust: ultimate validity: ultimate
[ultimate] (1). Danger Mouse <dm@secret.example.net>

```

```

[ultimate] (1). Danger Mouse <dm@secret.example.net>
 Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
 IDEA, CAST5, 3DES

```

```

 Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1

```

```

 Compression: ZLIB, BZIP2, ZIP, Uncompressed

```

```

 Features: MDC, Keyserver no-modify

```



```
bash-4.4$
\end{verbatim}
```

```
\subsection{Subkeys}
\label{sec:org5e2acbc}
```

Adding

subkeys to a primary key is fairly similar to creating the primary key with the `\texttt{create\_subkey}` method. Most of the arguments are the same, but not quite all. Instead of the `\texttt{userid}` argument there is now a `\texttt{key}` argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
 encrypt=True)
\end{verbatim}
```

As with the primary key, the results here can be checked with:

```
\begin{verbatim}
print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""").format(dmsub.fpr,
 dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
 dmsub.uid)
\end{verbatim}
```

As well as on the command line with:

```
\begin{verbatim}
```

```
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]
```

```
bash-4.4$
\end{verbatim}
```

```
\subsection{User IDs}
```

```
\label{sec:org4869c58}
```

```
\subsubsection{Adding User IDs}
```

```
\label{sec:orgebb13ca}
```

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is

`\texttt{key\_add\_uid}` and the only arguments it takes are for the `\texttt{key}` and the new `\texttt{uid}`.

```
\begin{verbatim}
```

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/.gnupg-dm"
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
```

```
key = c.get_key(dmfpr, secret=True)
```

```
uid
```

```
= "Danger Mouse <danger.mouse@secret.example.net>"
```

```
c.key_add_uid(key, uid)
```

```
\end{verbatim}
```

Unsurprisingly the result of this is:

```
\begin{verbatim}
```

```
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
```

```
~/.gnupg-dm/pubring.kbx
```

```

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
```

```
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
```

```
uid [ultimate] Danger Mouse <danger.mouse@secret.example.net>
```

```
uid [ultimate] Danger Mouse <dm@secret.example.net>
```

```
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]
```

```
bash-4.4$
```

```
\end{verbatim}
```

```
\subsubsection{Revoking User IDs}
```

```
\label{sec:org1683695}
```

Revoking a user ID is a fairly similar process, except that it uses the `\texttt{key\_revoke\_uid}` method.

```
\begin{verbatim}
```

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/gnupg-dm"
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
```

```
key = c.get_key(dmfpr, secret=True)
```

```
uid = "Danger Mouse <danger.mouse@secret.example.net>"
```

```
c.key_revoke_uid(key, uid)
```

```
\end{verbatim}
```

```
\subsection{Key certification}
```

```
\label{sec:orgf431bf8}
```

Since

key certification is more frequently referred to as key signing, the method used to perform this function is `\texttt{key\_sign}`.

The `\texttt{key\_sign}` method takes four arguments: `\texttt{key}`, `\texttt{uids}`, `\texttt{expires\_in}` and `\texttt{local}`. The default value of `\texttt{uids}` is `\texttt{None}` and which results in all user IDs being selected. The default value of both `\texttt{expires\_in}` and `\texttt{local}` is `\texttt{False}`; which results in the signature never expiring and being able to be exported.

The `\texttt{key}` is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the `\texttt{uids}` value is not `\texttt{None}` then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger

Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
\begin{verbatim}
```

```

import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
\end{verbatim}

\subsection{Verifying key certifications}
\label{sec:org87abdd3}
\begin{verbatim}
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
\end{verbatim}

```

Which for Danger Mouse displays the following:

```

\begin{verbatim}
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@adversary.org>
\end{verbatim}

```

The

two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year. Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```

\begin{verbatim}
import gpg
import math
import pendulum
import time

```

```

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys = list(c.keylist(pattern=dmuid,
mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
\end{verbatim}

```

Note that this final code block includes the use of a module which is *not* part of Python's standard library, the <https://pendulum.eustace.io/> {pendulum module}. Unlike the standard datetime module, pendulum makes working with dates and times significantly easier in Python; just as the requests module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using the GPGME Python bindings, they are both highly recommended more generally.

*Advanced or Experimental Use Cases*

*sec:org944cc00*

*C plus Python plus SWIG plus Cython*

*sec:org3b53926*

In spite of the apparent incongruence of using Python bindings to a C interface only to generate

more C from the Python; it is in fact quite

possible to use the GPGME bindings with <http://docs.cython.org/en/latest/index.html> {Cython}. Though in many cases

the benefits may not be obvious since the most computationally

intensive work never leaves the level of the C code with which GPGME itself is interacting with.

Nevertheless, there are some situations where the benefits are demonstrable. One of the better and easier examples being the one of the early examples in this HOWTO, the [key counting](https://www.gnupg.org/faq/key-counting.html) code. Running that example as an executable Python script, `keycount.py` (available in the `examples/howto/` directory), will take a noticeable amount of time to run on most systems where the public keybox or keyring contains a few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that script on my laptop; as I tend to do periodically and timed it using `time` utility, with the following results:

```
\begin{verbatim}
bash-4.4$
time keycount.py
```

```
Number of secret keys: 23
Number of public keys: 12112
```

```
real 11m52.945s
user 0m0.913s
sys 0m0.752s
```

```
bash-4.4$
\end{verbatim}
```

Sometime after that I imported another key and followed it with a little test of Cython. This test was kept fairly basic, essentially lifting the material from the [Cython Basic Tutorial](http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html) to demonstrate compiling Python code to C. The first step was to take the example key counting code quoted previously, essentially from the importing of the `gpg` module to the end of the script:

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)
```

```
publist = list(pubkeys)
pubnum = len(publist)

print("""
 Number of secret keys: {0}
 Number of public keys: {1}

""".format(secnum, pubnum))
\end{verbatim}
```

Save

that into a file called `keycount.pyx` and then create a `setup.py` file which contains this:

```
\begin{verbatim}
from distutils.core import setup
from Cython.Build import cythonize

setup(
 ext_modules = cythonize("keycount.pyx")
)
\end{verbatim}
```

Compile it:

```
\begin{verbatim}
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
\end{verbatim}
```

Then run it in a similar manner to `keycount.py`:

```
\begin{verbatim}
bash-4.4$ time python3.7 -c "import keycount"
```

```
Number of secret keys: 23
Number of public keys: 12113
```

```
real 6m47.905s
user 0m0.785s
sys 0m0.331s
```

```
bash-4.4$
\end{verbatim}
```

Cython turned `keycount.pyx` into an 81KB `keycount.o` file in the `build/` directory, a 24KB `keycount.cpython-37m-darwin.so` file to be

imported into Python 3.7 and a 113KB `keycount.c` generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the `keycount.pyx` file or the full 1,452 bytes of the full executable `keycount.py` example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The `keycount.pyx` and `setup.py` files used to generate this example have been added to the `examples/howto/advanced/cython/` directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the <http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd> {Magic Attributes} section of the Cython documentation.

## Miscellaneous extras and work-arounds

`sec:orgd72f7de`

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with `group lines`.

### Group lines

`sec:org83f4d00`

There is not yet an easy way to access groups configured in the `gpg.conf` file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
\begin{verbatim}
```

```
import subprocess
import sys
```

```
if sys.platform == "win32":
 gpgconfgcmd = "gpgconf.exe --list-options gpg"
else:
 gpgconfgcmd = "gpgconf --list-options gpg"
```

```
process = subprocess.Popen(gpgconfgcmd.split(), stdout=subprocess.PIPE)
```



```

procom = process.communicate()

if sys.version_info[0] == 2:
 lines = procom[0].splitlines()
else:
 lines = procom[0].decode().splitlines()

for line in lines:
 if line.startswith("group") is True:
 break

groups = line.split(" ")[-1].replace("'", "").split(',')

group_lines
= []
group_lists = []

for i in range(len(groups)):
 group_lines.append(groups[i].split("="))
 group_lists.append(groups[i].split("="))

for i in range(len(group_lists)):
 group_lists[i][1] = group_lists[i][1].split()
\end{verbatim}

```

The result of that code is that `group_lines` is a list of lists where `group_lines[i][0]` is the name of the group and `group_lines[i][1]` is the key IDs of the group as a string.

The `group_lists` result is very similar in that it is a list of lists. The first part, `group_lists[i][0]` matches `group_lines[i][0]` as the name of the group, but `group_lists[i][1]` is the key IDs of the group as a list.

A demonstration of using the `groups.py` module is also available in the form of the executable `mutt-groups.py` script. This second script reads all the group entries in a user's `gpg.conf` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

`\subsection{Keyserver access for Python}`

`\label{sec:org5ad99aa}`

The `\href{https://github.com/Selfnet/hkp4py}{hkp4py}` module by Marcel Fest was originally a port of the old `\href{https://github.com/dgladkov/python-hkp}{python-hkp}` module from Python 2 to Python 3 and updated to use the

`\href{http://docs.python-requests.org/en/latest/index.html}{requests}` module instead. It has since been modified to

provide support for Python 2.7 as well and is available via PyPI.

Since it rewrites the `\texttt{hkp}` protocol prefix as `\texttt{http}` and `\texttt{hkps}` as `\texttt{https}`, the module is able to be used even with servers which do not support the full scope of keyserver functions.<sup>Footnote</sup> {Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as as HKP or HKPS within the Python Code. The `\texttt{hkp4py}` module will rewrite these appropriately when the connection is made to the server.} It also works quite readily when incorporated into a `\hyperref[sec:org3b53926]{Cython}` generated and compiled version of any code.

`\subsubsection{Key import format}`

`\label{sec:org1e47c97}`

The `hkp4py` module returns key data via requests as string literals (`\texttt{r.text}`) instead of byte literals (`\texttt{r.content}`). This means that the returned key data must be encoded to UTF-8 when importing that key material using a `\texttt{gpg.Context().key_import()}` method.

For this reason an alternative method has been added to the `\texttt{search}` function of `\texttt{hkp4py.KeyServer()}` which returns the key in the correct format as expected by `\texttt{key_import}`. When importing using this module, it is now possible to import with this:

```
\begin{verbatim}
```

```
for key in keys:
```

```
 if key.revoked is False:
```

```
 gpg.Context().key_import(key.key_blob)
```

```
 else:
```

```
 pass
```

```
\end{verbatim}
```

Without that recent addition it would have been necessary to encode the contents of each `\texttt{hkp4py.KeyServer().search()[i].key}` in `\texttt{hkp4py.KeyServer().search()}` before trying to import it.

An example of this is included in the `\hyperref[sec:org1ad598a]{Importing Keys}` section of this HOWTO and the corresponding executable version of that example is available in the `\texttt{lang/python/examples/howto}` directory as normal; the executable version is the `\texttt{import-keys-hkp.py}` file.

`\subsection{GPGME version checking}`

`\label{sec:org18b8ef8}`

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the `gpg.version.versionstr` and `gpg.version.versionlist` methods have been quite sufficient. The former returns the same string as `gpgme-config --version`, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

```
\begin{verbatim}
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
 stdout=subprocess.PIPE,
 stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
 gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0] >= 3:
 gpgme_version = gpgme_version_str[0].decode().strip()
else:
 gpgme_version = None

if gpgme_version is not None:
 if gpgme_version == gpg.version.versionstr:
 print("The GPGME Python bindings match libgpgme.")
 else:
 print("The GPGME Python bindings do NOT match libgpgme.")
else:
 print("Upgrade Python and reinstall the GPGME Python bindings.")
\end{verbatim}
```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the `gpg.version.versionintlist` method (added in version `1.12.1-beta79`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```

\begin{verbatim}
import gpg

try:
 if gpg.version.is_beta is True:
 print("The installed GPGME Python bindings were built from beta code.")
 else:
 print("The installed GPGME Python bindings are a released version.")
except Exception as e:
 print(e)

try:
 if gpg.version.versionintlist[0] == 1:
 if gpg.version.versionintlist[1] == 12:
 if gpg.version.versionintlist[2] == 1:
 print("This is the minimum version for using versionintlist.")
 elif gpg.version.versionintlist[2] > 1:
 print("The versionintlist method is available.")

 else:
 pass
 elif gpg.version.versionintlist[1] > 12:
 print("The versionintlist method is available.")
 else:
 pass
 elif gpg.version.versionintlist[0] > 1:
 print("The versionintlist method is available.")
 else:
 pass
except Exception as e:
 print(e)
\end{verbatim}

```

The points where `\texttt{pass}` is used in the above example will most likely also produce an `\texttt{Exception}` error since those results should only occur in versions which do not have the `\texttt{gpgme.version.is_beta}` and `\texttt{gpgme.version.versionintlist}` methods available.

`\section{Copyright and Licensing}`

`\label{sec:org9d52a23}`

`\subsection{Copyright}`

`\label{sec:org26ed04d}`

Copyright The GnuPG Project, 2018.

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\subsection{Draft Editions of this HOWTO}

\label{sec:org080a94a}

Draft editions of this HOWTO may be periodically available directly from the author at any of the following URLs:

\begin{itemize}

\item

\href{https://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 SSL)}

\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 no SSL)}

\item \href{https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 SSL)}

\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 no SSL)}

\end{itemize}

All of these draft versions except for one have been generated from this document via GNU Emacs \href{https://orgmode.org/}{Org mode} and \href{https://www.gnu.org/software/texinfo/}{GNU Texinfo}. Though it is likely that the specific \href{https://files.au.adversary.org/crypto/gpgme-python-howto}{file} \href{http://files.au.adversary.org/crypto/gpgme-python-howto.org}{version} used will be on the same server with the generated output formats.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

\begin{verbatim}

```
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
```

```
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
```

\end{verbatim}

The reStructuredText format is also generated from the Org-mode source file, except it is generated using \href{https://pandoc.org}{Pandoc} with either of the following commands:

\begin{verbatim}

```
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto.org
```

```
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
```

\end{verbatim}

In addition to these there is

a significantly less frequently updated version as a HTML [\href{https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html}](https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html) {WebHelp site} (AWS S3 SSL); generated from DITA XML source files, which can be found in [\href{https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/}](https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/) {an alternative branch} of the GPGME git repository.

Various generated output formats may occasionally be found in subdirectories of the [\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python}](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python) {gpgme-python} directory. In particular within the [\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita}](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita) {DITA}, [\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst}](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst) {reStructuredText} and [\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo}](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo) {Texinfo} subdirectories. The [\texttt{rst}](#) directory contains output files generated with Sphinx and may include a considerable number of its possible output formats.

These draft editions are not official documents and the version of documentation in the master branch or which ships with released versions is the only official documentation. Nevertheless, these draft editions may occasionally be of use by providing more accessible web versions which are updated between releases. They are provided on the understanding that they may contain errors or may contain content subject to change prior to an official release.

[\subsection{License GPL compatible}](#)

[\label{sec:orge78f3b7}](#)

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[\end{document}](#)

# This is a template. The dist target uses it to create the real file.

Summary: GPGME - GnuPG Made Easy

Name: gpgme

Version: 1.15.1

Release: 1

URL: <https://gnupg.org/gpgme.html>

Source: <https://www.gnupg.org/ftp/gcrypt/gpgme/%{name}-%{version}.tar.gz>

Group: Development/Libraries

Copyright: GPL

BuildRoot: [%{\\_tmppath}/%{name}-%{version}](#)

BuildRequires: make

Prereq: /sbin/ldconfig /sbin/install-info

Requires: gnupg

%description

GnuPG Made Easy (GPGME) is a library designed to make access to GnuPG easier for applications. It provides a High-Level Crypto API for encryption, decryption, signing, signature verification and key management.

%prep

%setup -q

%build

CFLAGS="\$RPM\_OPT\_FLAGS"; export CFLAGS

./configure --prefix=/usr

make

%install

rm -fr \$RPM\_BUILD\_ROOT

mkdir -p \$RPM\_BUILD\_ROOT

make install prefix=\$RPM\_BUILD\_ROOT/usr infodir=\$RPM\_BUILD\_ROOT%{\_infodir}

rm -f \$RPM\_BUILD\_ROOT%{\_infodir}/dir

%clean

rm -fr \$RPM\_BUILD\_ROOT

make distclean

%post

/sbin/ldconfig

/sbin/install-info % {\_infodir}/gpgme.info.gz

% {\_infodir}/dir

/sbin/install-info % {\_infodir}/gpgme-python-howto.info.gz % {\_infodir}/dir

%preun

if [ "\$1" = 0 ]; then

/sbin/install-info --delete % {\_infodir}/gpgme.info.gz % {\_infodir}/dir

/sbin/install-info --delete % {\_infodir}/gpgme-python-howto.info.gz % {\_infodir}/dir

fi

%postun

/sbin/ldconfig

%files

%defattr(-,root,root)

%doc COPYING COPYING.LESSER AUTHORS README INSTALL NEWS ChangeLog TODO THANKS

%attr(0755,root,root) % {\_bindir}/gpgme-config

%attr(0755,root,root) % {\_libdir}/\*gpgme.so\*

%attr(0755,root,root) % {\_libdir}/\*gpgme.la

```
%attr(0644,root,root) % {_libdir}/*gpgme.a
% {_includedir}/gpgme.h
% {_datadir}/aclocal/gpgme.m4
% {_infodir}/gpgme.info*
% {_infodir}/gpgme-python-howto.info*

%changelog
* Sat Aug 30 2003 Robert Schiele <rschiele@uni-mannheim.de>
- % {_infodir}/dir is not packaged, remove to prevent checking failure
* Mon Jul 01 2002 Wojciech Polak <polak@lodz.pdi.net>
- initial specfile release for GPGME.

EOF
```

## 1.243 kmod-libs 28-10.el9

### 1.243.1 Available under license :

GNU LESSER GENERAL PUBLIC LICENSE

Version 2.1, February 1999

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51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA

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[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

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This license, the Lesser General Public License, applies to some specially designated software packages--typically libraries--of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge



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For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

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Any executables

containing that work also fall under Section 6,

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```
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```

```
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```
LGPL
LGPL
LGPL
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## 1.244 audit-lib 3.1.5-1.el9

## 1.244.1 Available under license :

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## 1.246 python3-systemd 234-19.e19

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# 1.248 pcre2-syntax 10.40-6.el9

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THE BASIC LIBRARY FUNCTIONS

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Email local part: Philip.Hazel  
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## 1.249 rpm-libs 4.16.1.3-34.el9



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```
<one line to give the program's name and a brief idea of what it does.>
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```

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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this  
when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19yy name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate  
parts of the General Public License. Of course, the commands you use may  
be called something other than `show w'  
and `show c'; they could even be  
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necessary. Here is a sample; alter the names:

```
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`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The

former contains

code derived from the library, while the latter only works together with the library.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However,  
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Whether this is true is especially significant if the work can be  
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If such an object file uses only numerical parameters, data  
structure layouts and accessors, and small macros and small inline  
functions (ten lines or less in length), then the use of the object  
file is unrestricted, regardless of whether it is legally a derivative  
work.

(Executables containing this object code plus portions of the  
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may  
distribute the object code for the work under the terms of Section 6.  
Any executables containing that work also fall under Section 6,  
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or  
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with the Library, with the complete machine-readable "work that

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b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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END OF TERMS AND CONDITIONS

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Also add information on how to contact you by electronic and paper mail.

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`Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990  
Ty Coon, President of Vice

That's all there is to it!

# 1.250 libcurl 7.76.1-31.el9

## 1.250.1 Available under license :

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# 1.251 rpm-sign-libs 4.16.1.3-34.el9

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Version 2, June 1991

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```
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```

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<signature of Ty Coon>, 1 April 1989
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However,

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Julian Seward, jseward@bzip.org  
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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Any

executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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- a) Accompany the work with the complete corresponding machine-readable

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Version 3.1, 31 March 2009

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DRuntime: Runtime Library for the D Programming Language

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# 1.253 util-linux-core 2.37.4-20.el9

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```
NR START END SECTORS SIZE NAME UUID
1 32 7679 7648 3.7M 8f8378c0-01
2 7680 16383 8704 4.3M 8f8378c0-02
5 7936 12799 4864 2.4M
6 12544 16127 3584 1.8M
7zXZf!t/5]oK3&K6Y^
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;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%Q?f_{+T@Uo)2fgYZ
```

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```

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```
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```

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*/
7zXZF!t/]o."w[7gp<G
H:Oed 18uyMQ9]FO6
87I8.mhGl^eb_X/UQKuB
)Cdk!B_M/tw|11np#_(~*'uM%S61opMG`YfRXvY[R+t[BS=)d
;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d
;*!;_>KfBqxYm+sS|11np#_(~*'uM%S61opMG`YfRXvY[R+t[BS=)d
;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d;*!;_>KfBqxY(F|0.Ve%Q?
sS|11np#_(~'u7gi}[IgYZ

```

## 1.254 file-system 3.16-5.e19

## 1.254.1 Available under license :

No license file was found, but licenses were detected in source scan.

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Found in path(s):

\* /opt/cola/permits/2239271481\_1731916603.367698/0/filesystem-3.16-2.el9-1.src.rpm-cosi-expand-archive-dX4YKifE/filesystem.spec

## 1.255 libuuid 2.37.4-20.el9

### 1.255.1 Available under license :

```
NR START END SECTORS SIZE NAME UUID
1 32 7679 7648 3.7M 8f8378c0-01
2 7680 16383 8704 4.3M 8f8378c0-02
5 7936 12799 4864 2.4M
6 12544 16127 3584 1.8M
7zXZf!t/5]oK3&K6Y^
CP#vMOoYL?6]2z({CLYj0
LFIU<>Q&}7!C}e6]]e`M,J}.dE,4hVmp
RsTk!|r!Quo1OE|FfP+A}XBT9 \<
0<P9{>s\36R)m.S(bCb7S<DP(`ka")^oy`r)7I%tU6@AS.SMoOfF3whA!!WIMcK')e/eJ1F
g|B!W|j>jf_{JPP}oMd3rfQ+}_3<%<6jx{)11D5eg;NtD+~R]w[xiue@F#Em0hu;,,x{R7V2!Vq~AG{EX -
"0h*5x)*x\n)#I$*w!:499X1il:"P+=22cmr3J}/0o9nlB?N&(q=$pPc!ab,6f&v/RS>O./OW[INy(BM~]-uf$Ngl"_W[0;
OXY[aB*"/_U~fQHO(3[b%o)+lq#+_d<QdLd=$1p!h0h6nfN=I+GNRk gKOL3\N3"uGxfIC
zCTjtjSN:$gE11QQ$7*5++V=4Xt9V?r3_Vd2o8h"F8~qM,ZI6=Qgtw|11np#_(+?)zp;(H!E2Nz'WW_WmA,
FSYZE*-exTWFt#|
rd>k\R>aXrvXS~"9=U$puaqQb;\k,RD5(fu&#
?)w!nz>SbvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%S61opMG
1%QsS|11np#_(~*uM%S61opMG`YfRXvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[
BS=)d ;*!;_>KfB }&ea)F~H#@|DExb
Fw=|
;}8SPT"_p;27 *.D-sS|11np#_(~*uM%S61opMG`B=gD7~rFTvDY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d
;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXx+sS|11np#_(~*uM%S61opMG`YfRXvY[R+t[BS=)d
;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%Q?f_+T@Uo)2fgYZ
```

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Version 2.1, February 1999

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```

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7zXZF!t]o."w[7gp<G

H:Oed 18uyMQ9]FO6

87I8.mhGl^eb\_X/UQKuB

)Cdk!B\_M/tw|11np#\_(~\*uM%S61opMG`YfRXvY[R+t[ BS=)d

;\*;\_>KfBqxY(F)0.Ve%S61opMG`YfRXvY[R+t[ BS=)d

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# 1.256 libmount 2.37.4-20.el9

## 1.256.1 Available under license :

```
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2 7680 16383 8704 4.3M 8f8378c0-02
5 7936 12799 4864 2.4M
6 12544 16127 3584 1.8M
7zXZF!t/5]oK3&K6Y^
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OXY[aB*"/_U~fQHO(3[b%o)+lq#+_d<QdLd=$1p!h0h6nfN=I+GNRk gKOL3\N3"uGxfIC
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FSYzE*-exTWFt#|
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BS=)d ;*!;_>KfB }&ea)F~H#@|DExb
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;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%Q?f_{+T@Uo)2fgYZ
```

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Version 2.1, February 1999

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## 1.257 libgcc 11.5.0-2.el9

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Julian Seward, jseward@bzip.org  
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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Any

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Version 3.1, 31 March 2009

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DRuntime: Runtime Library for the D Programming Language

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## 1.258 dnf-data 4.14.0-17.el9

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```
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## 1.260 gdbm-libs 1.23-1.el9

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## 1.261 python3-setuptools-wheel 53.0.0-13.el9

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```
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```

```
<signature of Ty Coon>, 1 April 1989
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## 1.263 python3-dnf 4.14.0-17.el9

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Julian Seward, jseward@bzip.org  
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Any

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Version 3.1, 31 March 2009

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DRuntime: Runtime Library for the D Programming Language

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Developed by:

LLVM Team

University of Illinois at Urbana-Champaign

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Program	Directory
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mach_override	lib/interception/mach_override

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# 1.265 fdisk 2.37.4-20.e19

## 1.265.1 Available under license :

```
NR START END SECTORS SIZE NAME UUID
1 32 7679 7648 3.7M 8f8378c0-01
2 7680 16383 8704 4.3M 8f8378c0-02
5 7936 12799 4864 2.4M
6 12544 16127 3584 1.8M
7zXZf!t/5]oK3&K6Y^
CP#vMOoYL?6]2z({CLYj0
LFIU<>Q& }7!C}e6]]e`M,J}.dE,4hVmp
RsTk!|r!Quo1OE|FfP+A }XBT9 \<
0<P9{>s\36R)m.S(bCb7S<DP(`ka")^oy`r)7I%tU6@AS.SMoOfF3whA!!WIMcK')e/eJ1F
g|B|'W|j>jf_{JPp}oMd3rfQ+}_3<%<6jx{)11D5eg;NtD+~R]w[xiue@F#Em0hu;,,x{R7V2!Vq~AG{EX -
"0h*5x)*x\n)#!$*w!:499X1il:"P+=22cmr3J}/0o9nlB?|N&(q=$pPc!ab,6f&v/RS>O./OW[INy(BM~]~uf$Ngl"_W[0;
OXy[aB*"/_U~fQHO(3[b%o)+lq#+_d<QdLd=$!p!h0h6nfN=I+GNRk gKOL3\N3"uGxfIC
zCTJtjSN:$gE11QQ$7*5++V=4Xt9V?r3_Vd2o8h"F8~qM,ZI6=Qgtw|11np#_(+?)zP(;H!E2Nz'WW_WmA,
FSYZE*-exTWFt##
rd>k|R>aXrvXS~"9=U$puaOqQb;|k,RD5(fu&#
?}w!nz>SbvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%S61opMG
1%QsS|11np#_(~*uM%S61opMG`YfRXvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[
BS=)d ;*!;_>KfB }&ea)F~H#@|DExb
Fw=|
;}8SPT"_p;27 *,D-sS|11np#_(~*uM%S61opMG`B=gD7-`rFTvDY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d
;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXx+sS|11np#_(~*uM%S61opMG`YfRXvY[R+t[BS=)d
;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%Q?f_{+T@Uo)2fgYZ
```

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Version 2.1, February 1999

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# 1.266 python3-hawkey 0.69.0-12.el9

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Version 2.1, February 1999

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# 1.267 python3-dnf-plugins-core 4.3.0-16.el9

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## ## OpenSSL Notes

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\* erikcederstrand <<http://code.google.com/u/erikcederstrand/>>

\* NTLM-authenticated HTTPSConnectionPool

\* Basic-authenticated HTTPSConnectionPool (merged into make\_headers)

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\* Client-verified SSL certificates for HTTPSConnectionPool

\* Response gzip and deflate encoding support

\* Better unicode support for filepost using StringIO buffers

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\* Non-multipart encoding for POST requests

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\* brandon-rhodes <<http://rhodesmill.org/brandon>>

\* Design review, bugfixes, test coverage.

\* studer <theo.studer@gmail.com>

\* IPv6 url support and test coverage

\* Shivaram Lingamneni <slingamn@cs.stanford.edu>

\* Support for explicitly closing pooled connections

\* hartator <hartator@gmail.com>

\* Corrected multipart behavior for params

\* Thomas Weischuh <thomas@t-8ch.de>

\* Support for TLS SNI

\* API unification of ssl\_version/cert\_reqs

\* SSL fingerprint and alternative hostname verification

\* Bugfixes in testsuite

\* Sune Kirkeby <mig@ibofobi.dk>

\* Optional SNI-support for Python 2 via PyOpenSSL.

\* Marc Schlaich <marc.schlaich@gmail.com>

\* Various bugfixes and test improvements.

\* Bryce Boe <bbzbryce@gmail.com>

- \* Correct six.moves conflict
- \* Fixed pickle support of some exceptions
  
- \* Boris Figovsky <boris.figovsky@ravellosystems.com>
- \* Allowed to skip SSL hostname verification
  
- \* Cory Benfield
- <<https://lukasa.co.uk/about/>>
- \* Stream method for Response objects.
- \* Return native strings in header values.
- \* Generate 'Host' header when using proxies.
  
- \* Jason Robinson <jaywink@basshero.org>
- \* Add missing WrappedSocket.fileno method in PyOpenSSL
  
- \* Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
- \* Fixed a race condition
  
- \* Stanislav Vitkovskiy <stas.vitkovsky@gmail.com>
- \* Added HTTPS (CONNECT) proxy support
  
- \* Stephen Holsapple <sholsapp@gmail.com>
- \* Added abstraction for granular control of request fields
  
- \* Martin von Gagern <Martin.vGagern@gmx.net>
- \* Support for non-ASCII header parameters
  
- \* Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
- \* Support for separate connect and request timeouts
  
- \* Peter Waller <p@pwaller.net>
- \* HTTPResponse.tell() for determining amount received over the wire
  
- \* Nipunn Koorapati <nipunn1313@gmail.com>
- \* Ignore default ports when comparing hosts for equality
  
- \* Danilo @dbrgn <<https://dbrgn.ch/>>
- \* Disabled TLS compression by default on Python 3.2+
- \* Disabled TLS compression in pyopenssl contrib module
- \* Configurable cipher suites in pyopenssl contrib module
  
- \* Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
- \* Account retries on proxy errors
  
- \* Nicolas Delaby <nicolas.delaby@ezeep.com>
- \* Use the platform-specific CA certificate locations
  
- \* Josh Schneier <<https://github.com/jschneier>>

- \* HTTPHeaderDict and associated tests and docs
- \* Bugfixes, docs, test coverage
  
- \* Tahia Khan <<http://tahia.tk/>>
- \* Added Timeout examples in docs
  
- \* Arthur Grunseid <<https://grunseid.com>>
- \* source\_address support and tests (with <https://github.com/bui>)
  
- \* Ian Cordasco <[graffatcolmingov@gmail.com](mailto:graffatcolmingov@gmail.com)>
- \* PEP8 Compliance and Linting
- \* Add ability to pass socket options to an HTTP Connection
  
- \* Erik Tollerud <[erik.tollerud@gmail.com](mailto:erik.tollerud@gmail.com)>
- \* Support for standard library io module.
  
- \* Krishna Prasad <[kprasad.iitd@gmail.com](mailto:kprasad.iitd@gmail.com)>
- \* Google App Engine documentation
  
- \* Aaron Meurer  
<[asmeurer@gmail.com](mailto:asmeurer@gmail.com)>
- \* Added Url.url, which unparses a Url
  
- \* Evgeny Kapun <[abacabadabacaba@gmail.com](mailto:abacabadabacaba@gmail.com)>
- \* Bugfixes
  
- \* Benjamin Meyer <[bm\\_witness@yahoo.com](mailto:bm_witness@yahoo.com)>
- \* Security Warning Documentation update for proper capture
  
- \* Shivan Sornarajah <[github@sornars.com](mailto:github@sornars.com)>
- \* Support for using ConnectionPool and PoolManager as context managers.
  
- \* Alex Gaynor <[alex.gaynor@gmail.com](mailto:alex.gaynor@gmail.com)>
- \* Updates to the default SSL configuration
  
- \* Tomas Tomecek <[ttomecek@redhat.com](mailto:ttomecek@redhat.com)>
- \* Implemented generator for getting chunks from chunked responses.
  
- \* tlynn <<https://github.com/tlynn>>
- \* Respect the warning preferences at import.
  
- \* David D. Riddle <[ddriddle@illinois.edu](mailto:ddriddle@illinois.edu)>
- \* IPv6 bugfixes in testsuite
  
- \* Thea Flowers <[magicalgirl@google.com](mailto:magicalgirl@google.com)>
- \* App Engine environment tests.
- \* Documentation re-write.

- \* John Krauss <<https://github.com/talos>>
  - \* Clues to debugging problems with `cryptography` dependency in docs
  
- \* Disassem <<https://github.com/Disassem>>
  - \* Fix pool-default headers not applying for url-encoded requests like GET.
  
- \* James Atherfold <[jlatherfold@hotmail.com](mailto:jlatherfold@hotmail.com)>
  - \* Bugfixes relating to cleanup of connections during errors.
  
- \* Christian Pedersen <<https://github.com/chripede>>
  - \* IPv6 HTTPS proxy bugfix
  
- \* Jordan Moldow <<https://github.com/jmoldow>>
  - \* Fix low-level exceptions leaking from ``HTTPResponse.stream()``.
  - \* Bugfix for ``ConnectionPool.urlopen(release\_conn=False)``.
  - \* Creation of ``HTTPConnectionPool.ResponseCls``.
  
- \* Predrag Gruevski <<https://github.com/obi1kenobi>>
  - \* Made cert digest comparison use a constant-time algorithm.
  
- \* Adam Talsma <<https://github.com/a-tal>>
  - \* Bugfix to ca\_cert file paths.
  
- \* Evan Meagher <<https://evanmeagher.net>>
  - \* Bugfix related to `memoryview` usage in PyOpenSSL adapter
  
- \* John Vandenberg <[jayvdb@gmail.com](mailto:jayvdb@gmail.com)>
  - \* Python 2.6 fixes; pyflakes and pep8 compliance
  
- \* Andy Caldwell <[andy.m.caldwell@gmail.com](mailto:andy.m.caldwell@gmail.com)>
  - \* Bugfix related to reusing connections in indeterminate states.
  
- \* Ville Skytt <[ville.skytta@iki.fi](mailto:ville.skytta@iki.fi)>
  - \* Logging efficiency improvements, spelling fixes, Travis config.
  
- \* Shige Takeda <[smtakeda@gmail.com](mailto:smtakeda@gmail.com)>
  - \* Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response
  
- \* Jess Shapiro <[jesse@jesseshapiro.net](mailto:jesse@jesseshapiro.net)>
  - \* Various character-encoding fixes/tweaks
  - \* Disabling IPv6 DNS when IPv6 connections not supported
  
- \* David Foster <<http://dafoster.net/>>
  - \* Ensure order of request and response headers are preserved.
  
- \* Jeremy Cline <[jeremy@jcline.org](mailto:jeremy@jcline.org)>

- \* Added connection pool keys by scheme
  
- \* Aviv Palivoda <palaviv@gmail.com>
  - \* History list to Retry object.
  - \* HTTPResponse contains the last Retry object.
  
- \* Nate Prewitt <nate.prewitt@gmail.com>
  - \* Ensure timeouts are not booleans and greater than zero.
  - \* Fixed infinite loop in ``stream`` when amt=None.
  - \* Added length\_remaining to determine remaining data to be read.
  - \* Added enforce\_content\_length to raise exception when incorrect content-length received.
  
- \* Seth Michael Larson <sethmichaellarson@protonmail.com>
  - \* Created selectors backport that supports PEP 475.
  
- \* Alexandre Dias <alex.dias@smarkets.com>
  - \* Don't retry on timeout if method not in whitelist
  
- \* Moinuddin Quadri <moin18@gmail.com>
  - \* Lazily load idna package
  
- \* Tom White <s6yg1ez3@mail2tor.com>
  - \* Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.
  
- \* Tim Burke <tim.burke@gmail.com>
  - \* Stop buffering entire deflate-encoded responses.
  
- \* Tuukka Mustonen <tuukka.mustonen@gmail.com>
  - \* Add counter for status\_forcelist retries.
  
- \* Erik Rose <erik@mozilla.com>
  - \* Bugfix to pyopenssl vendoring
  
- \* Wolfgang Richter <wolfgang.richter@gmail.com>
  - \* Bugfix related to loading full certificate chains with PyOpenSSL backend.
  
- \* Mike Miller <github@mikeage.net>
  - \* Logging improvements to include the HTTP(S) port when opening a new connection
  
- \* Ioannis Tziakos <mail@itziakos.gr>
  - \* Fix ``util.selectors.\_fileobj\_to\_fd`` to accept ``long``.
  - \* Update appveyor tox setup to use the 64bit python.
  
- \* Akamai  
(through Jess Shapiro) <jshapiro@akamai.com>
  - \* Ongoing maintenance; 2017-2018
  
- \* Dominique Leuenberger <dimstar@opensuse.org>



- \* Minor fixes in the test suite
  
- \* Will Bond <will@wbond.net>
- \* Add Python 2.6 support to ``contrib.securetransport``
  
- \* Aleksei Alekseev <alekseev.yeskela@gmail.com>
- \* using auth info for socks proxy
  
- \* Chris Wilcox <git@crwilcox.com>
- \* Improve contribution guide
- \* Add ``HTTPResponse.geturl`` method to provide ``urllib2.urlopen().geturl()`` behavior
  
- \* Bruce Merry <https://www.brucemerry.org.za>
- \* Fix leaking exceptions when system calls are interrupted with zero timeout
  
- \* Hugo van Kemenade <https://github.com/hugovk>
- \* Drop support for EOL Python 2.6
  
- \* Tim Bell <https://github.com/timb07>
- \* Bugfix for responses with Content-Type: message/\* logging warnings
  
- \* Justin Bramley <https://github.com/jbramleycl>
- \* Add ability to handle multiple Content-Encodings
  
- \* Katsuhiko YOSHIDA <https://github.com/kyoshidajp>
- \* Remove Authorization header  
regardless of case when redirecting to cross-site
  
- \* James Meickle <https://permadeath.com/>
- \* Improve handling of Retry-After header
  
- \* Chris Jerdonek <chris.jerdonek@gmail.com>
- \* Remove a spurious TypeError from the exception chain inside  
HTTPConnectionPool.\_make\_request(), also for BaseExceptions.
  
- \* Jorge Lopez Silva <https://github.com/jalopezsilva>
- \* Added support for forwarding requests through HTTPS proxies.
  
- \* Benno Rice <benno@jeamland.net>
- \* Allow cadata parameter to be passed to underlying ``SSLContext.load\_verify\_locations()``.
  
- \* Keiichi Kobayashi <abok.1k@gmail.com>
- \* Rename VerifiedHTTPSConnection to HTTPSConnection
  
- \* Himanshu Garg <garg\_himanshu@outlook.com>
- \* DOC & LICENSE Update
  
- \* Hod Bin Noon <bin.noon.hod@gmail.com>

\* Test improvements

\* Chris Olufson <[tycarac@gmail.com](mailto:tycarac@gmail.com)>

\* Fix for connection not being released on HTTP redirect and response not preloaded

\* [Bastiaan Bakker] <<https://github.com/bastiaanb>>

\* Support for logging session keys

via environment variable ``SSLKEYLOGFILE`` (Python 3.8+)

\* [Ezzeri Esa] <<https://github.com/savarin>>

\* Ports and extends on types from typeshed

\* [Your name or handle] <[email or website]>

\* [Brief summary of your changes]

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## 1.275 coreutils 8.32-36.e19

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## 1.276 tar 1.34-7.el9

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## 1.277 pcre 8.44-4.el9

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PCRE2 LICENCE

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## THE BASIC LIBRARY FUNCTIONS

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## 1.278 systemd-libs 252-46.el9\_5.2

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## ## OpenSSL Notes

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same

year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All

Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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2 7680 16383 8704 4.3M 8f8378c0-02

5 7936 12799 4864 2.4M

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# 1.281 nghttp2 1.43.0-6.el9

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## 1.286 libdnf-plugin-subscription-manager

### 1.29.42-1.el9

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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(This file is under construction.) -\*- text -\*-

If you've contributed to gas and your name isn't listed here, it is not meant as a slight. I just don't know about it. Email me, [nickc@redhat.com](mailto:nickc@redhat.com) and I'll correct the situation.

This file will eventually be deleted: The general info will go into the documentation, and info on specific files will go into an AUTHORS file, as requested by the FSF.

+++++

Dean Elsner wrote the original gas for vax. [more details?]

Jay Fenlason maintained gas for a while, adding support for gdb-specific debug information and the 68k series machines, most of the preprocessing pass, and extensive changes in `messages.c`, `input-file.c`, `write.c`.

K. Richard Pixley maintained gas for a while, adding various enhancements and many bug fixes, including merging support for several processors, breaking gas up to handle multiple object file format backends (including heavy rewrite, testing, an integration of the `coff` and `b.out` backends), adding configuration including heavy testing and verification of cross assemblers and file splits and renaming, converted gas to strictly ansi C including full prototypes, added support for `m680[34]0` & `cpu32`, considerable work on `i960` including a `coff` port (including considerable amounts of reverse engineering), a `sparc` opcode file rewrite, `decstation`, `rs6000`, and `hp300hpux` host ports, updated "know" assertions and made them work, much other reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan. Eric Youngdale and Pat Rankin have done much work with it since.



The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of Buffalo University and Torbjorn Granlund of the Swedish Institute of Computer Science.

Keith

Knowles at the Open Software Foundation wrote the original MIPS back end (tc-mips.c, tc-mips.h), and contributed Rose format support that hasn't been merged in yet. Ralph Campbell worked with the MIPS code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors (tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format (obj-ieee), was written by Steve Chamberlain of Cygnus Solutions. Steve also modified the COFF back end (obj-coffbfd) to use BFD for some low-level operations, for use with the Hitachi, 29k and Zilog targets.

John Gilmore built the AMD 29000 support, added .include support, and simplified the configuration of which versions accept which pseudo-ops. He updated the 68k machine description so that Motorola's opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of Cygnus Solutions (original, incomplete implementation), Pete Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner of the Open Software Foundation (i386 mainly), and Ken Raeburn of

Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many small bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon University. Additional work was done by Ken Raeburn of Cygnus Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000 series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30 (tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error checking, updating the code, and improving the 16 bit support, using patches from the work of Martynas Kunigelis and H.J. Lu.

Many others have contributed large or small bugfixes and enhancements. If you've contributed significant work and are not mentioned on this list, and want to be, let us know. Some of the history has been lost; we aren't intentionally leaving anyone out.

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```
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Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.

Any

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The

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```
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```
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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# 1.295 python3-cloud-what 1.29.42-1.el9

## 1.295.1 Available under license :

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```
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`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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## 1.297.1 Available under license :

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End

### PCRE2 LICENCE

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### THE BASIC LIBRARY FUNCTIONS

-----

Written by: Philip Hazel  
Email local part: Philip.Hazel  
Email domain: gmail.com

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## 1.302 crypto-policies 20240828-

## 2.git626aa59.e19\_5

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Because of this blurred distinction, using the ordinary General Public

License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from

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The former contains code derived from the library, while the latter only works together with the library.

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## 1.305 python3-audit 3.1.5-1.el9

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ASM: a very small and fast Java bytecode manipulation framework

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## 1.306 curl-minimal 7.76.1-31.el9

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```
/* nicstar.c v0.22 Jawaid Bazyar (bazyar@hypermall.com)
* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)
*
* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.
* http://www.hypermall.com/
* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY
* interrupts us (except possibly for removal/insertion of the cable?)
* 10/4/97 - began heavy inline documentation of the code. Corrected typos
* and spelling mistakes.
* 10/5/97 - added code to handle PHY interrupts, disable PHY on
* loss of link, and correctly re-enable PHY when link is
* re-established. (put back CFG_PHYIE)
*
* Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.
*
* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997
*
* Linux driver for the IDT77201 NICStAR PCI ATM controller.
* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;
* see init_nicstar() for PHY initialization to change this. This driver
* expects the Linux ATM stack to support scatter-gather
 lists
* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.
*
* Implementing minimal-copy of received data:
* IDT always receives data into a small buffer, then large buffers
* as needed. This means that data must always be copied to create
* the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
* Fix is simple: make large buffers large enough to hold entire
* SDU, and leave <small_buffer_data> bytes empty at the start. Then
* copy small buffer contents to head of large buffer.
* Trick is to avoid fragmenting Linux, due to need for a lot of large
* buffers. This is done by 2 things:
* 1) skb->destructor / skb->atm.recycle_buffer
* combined, allow nicstar_free_rx_skb to be called to
* recycle large data buffers
* 2) skb_clone of received buffers
* See nicstar_free_rx_skb and linearize_buffer for implementation
* details.
*
*
*
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```

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\*

\* M. Welsh, 6 July 1996

\*

\*

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for merging the nxt2002 and nxt2004 modules into a  
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All

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Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
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```
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```

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

<signature of Ty Coon>, 1 April 1989

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```
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Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands

```
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```
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```

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```
Gnomovision version 69, Copyright (C) 19xx name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

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```
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program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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zip/usr/bin/cpp: binary file matches`

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```
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```

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```
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program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

<signature of Ty Coon>, 1 April 1989  
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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

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c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally

distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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# 1.316 systemd-pam 252-46.el9\_5.2

## 1.316.1 Available under license :

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- \* the header files contained in `src/basic/linux/` and `src/shared/linux/` are copied verbatim from the Linux kernel source tree and are licensed under **GPL-2.0 WITH Linux-syscall-note** and are used within the scope of the Linux-syscall-note exception provisions
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  - `tools/check-includes.pl`
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## ## OpenSSL Notes

Note that building the systemd project with OpenSSL does not affect the `libsystemd.so` shared library, which is not linked with the OpenSSL library.

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Most

GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

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Because of this blurred distinction, using the ordinary General Public

License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

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The former contains code derived from the library, while the latter only works together with the library.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library,

complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections

1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library

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b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All

Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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#### Contributors

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- Chris McDonough, 2011/02/16

- Wichert Akkerman, 2012/02/02

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This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#

This is a bundle of X.509 certificates of public Certificate Authorities (CA). These were automatically extracted from Mozilla's root certificates file (certdata.txt). This file can be found in the mozilla source tree:

<http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#>

It contains the certificates in PEM format and therefore can be directly used with curl / libcurl / php\_curl, or with an Apache+mod\_ssl webserver for SSL client authentication.

Just configure this file as the SSLCACertificateFile.#

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@(#) \$RCSfile: certdata.txt,v \$

\$Revision: 1.80 \$ \$Date: 2011/11/03 15:11:58 \$

## A. HISTORY OF THE SOFTWARE

=====

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes

2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3				
2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
2.7	2.6	2010	PSF	yes

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

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In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope

Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3				
2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
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2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes

2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
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```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>
```

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```
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under certain conditions; type `show c' for details.
```

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# 1.322 libuser 0.63-15.e19

## 1.322.1 Available under license :

```
NR START END SECTORS SIZE NAME UUID
1 32 7679 7648 3.7M 8f8378c0-01
2 7680 16383 8704 4.3M 8f8378c0-02
5 7936 12799 4864 2.4M
6 12544 16127 3584 1.8M
7zXZf!t/5]oK3&K6Y^
CP#vMOoYL?6]2z({CLYj0
LFIU<>Q& }7!C}e6]e`M,J}.dE,4hVmp
RsTk!|r!Quo1OE|FfP+A}XBT9 \<
0<P9{>s\36R)m.S(bCb7S<DP(`ka")^oy`r)7I%tU6@AS.SMoOfF3whA!!WIMcK')e/eJ1F
g\BI'W|j>jf_{JpP}oMd3rfQ+}_3<%<6jx{)11D5eg;NtD+~R]w[xiue@F#Em0hu,,x{R7V2!Vq~AG{EX -
"0h*5x)*x\n)#!$*w!:499X1il:"P+=22cmr3J}/0o9nlB?N&(q=$pPc!ab,6f&v/RS>O./OW[INy(BM~]~uf$Ng|"_W[0;
OXy[aB*"/_U~fQHO(3[b%o)+lq#+_d<QdLd=$!p!h0h6nfN=I+GNRk gKOL3\N3"uGxfIC
zCTJtjSN:$gE11QQ$7*5++V=4Xt9V?r3_Vd2o8h"F8~qM,ZI6=Qgtw|11np#_(+?)zp(;H!E2Nz'WW_WmA,
FSYZE*-exTWFt#|
rd>k|R>aXrvXS~"9=U$puaqQb;k,RD5(fu&#
?)w!nz>SbvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%S61opMG
1%QsS|11np#_(~*uM%S61opMG`YfRXvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[
BS=)d ;*!;_>KfB }&ea)F~H#@|DExb
Fw=|
;}8SPT"_p;27 *,D-sS|11np#_(~*uM%S61opMG`B=gD7~rFTvDY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d
;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXx+sS|11np#_(~*uM%S61opMG`YfRXvY[R+t[BS=)d
;*!;_>KfBqxY(F|0.Ve%S61opMG`YfRXvY[R+t[BS=)d ;*!;_>KfBqxY(F|0.Ve%Q?f_{+T@Uo)2fgYZ
```

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Version 2.1, February 1999

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```
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```

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```
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Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
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```

The hypothetical commands `show w' and `show c' should show the appropriate  
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```
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```

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code derived from the library, while the latter only  
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- cipher/sha256-avx2-bmi2-amd64.S
- cipher/sha256-ssse3-amd64.S
- cipher/sha512-avx-amd64.S
- cipher/sha512-avx2-bmi2-amd64.S
- cipher/sha512-ssse3-amd64.S
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- random/jitterentropy-gcd.c
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- random/jitterentropy-health.c
- random/jitterentropy-health.h
- random/jitterentropy-noise.c
- random/jitterentropy-noise.h
- random/jitterentropy-sha3.c
- random/jitterentropy-sha3.h
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## 1.325 virt-what 1.25-10.e19

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## 1.327 kmod 28-10.el9

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## 1.29.42-1.el9

## 1.328.1 Available under license :

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Version 2.1, February 1999

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

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You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which

must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

@item

A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a ``work that uses the Library''. Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a ``work that uses the library''. The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

@item

As an exception to the Sections above, you may also combine or link a ``work that uses the Library'' with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit

modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

@enumerate a

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Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable ``work that uses the Library'', as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

@item

Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

@item

Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

@end enumerate

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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@enumerate a

@item

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@item

Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

@end enumerate

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@subheading END OF TERMS AND CONDITIONS

@page

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Ty Coon, President of Vice  
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Version 2.1, February 1999

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We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free

library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means



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- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has

a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

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it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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- b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.
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- d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
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## 1.332 systemd-rpm-macros 252-46.el9\_5.2



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Version 2, June 1991

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ASM: a very small and fast Java bytecode manipulation framework

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## 1.335 kerberos 1.21.1-4.el9\_5

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cmd/krb5/kproplog/kproplog.c
cmd/krb5/slave/kpropd_rpc.c
lib/gss_mechs/mech_krb5/et/kdb5_err.c
lib/gss_mechs/mech_spnego/mech/gssapiP_spnego.h
lib/gss_mechs/mech_spnego/mech/spnego_mech.c
lib/krb5/kadm5/kadm_host_srv_names.c
lib/krb5/kdb/kdb_convert.c
lib/krb5/kdb/kdb_hdr.h
lib/krb5/kdb/kdb_log.c
lib/krb5/kdb/kdb_log.h
lib/libgss/g_accept_sec_context.c
lib/libgss/g_acquire_cred.c
lib/libgss/g_canon_name.c
lib/libgss/g_compare_name.c
lib/libgss/g_context_time.c
lib/libgss/g_delete_sec_context.c
lib/libgss/g_dsp_name.c
lib/libgss/g_dsp_status.c
lib/libgss/g_dup_name.c
lib/libgss/g_exp_sec_context.c
lib/libgss/g_export_name.c
lib/libgss/g_glue.c
lib/libgss/g_imp_name.c
lib/libgss/g_imp_sec_context.c
```

lib/libgss/g\_init\_sec\_context.c  
lib/libgss/g\_initialize.c  
lib/libgss/g\_inquire\_context.c  
lib/libgss/g\_inquire\_cred.c  
lib/libgss/g\_inquire\_names.c  
lib/libgss/g\_process\_context.c  
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lib/libgss/g\_utils.c  
lib/libgss/g\_verify.c  
lib/libgss/gssd\_pname\_to\_uid.c  
uts/common/gssapi/include/gssapi\_err\_generic.h  
uts/common/gssapi/include/mechglueP.h

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lib/gssapi/mechglue/g\_acquire\_cred.c  
lib/gssapi/mechglue/g\_canon\_name.c  
lib/gssapi/mechglue/g\_compare\_name.c  
lib/gssapi/mechglue/g\_context\_time.c  
lib/gssapi/mechglue/g\_delete\_sec\_context.c  
lib/gssapi/mechglue/g\_dsp\_name.c  
lib/gssapi/mechglue/g\_dsp\_status.c  
lib/gssapi/mechglue/g\_dup\_name.c  
lib/gssapi/mechglue/g\_exp\_sec\_context.c  
lib/gssapi/mechglue/g\_export\_name.c  
lib/gssapi/mechglue/g\_glue.c  
lib/gssapi/mechglue/g\_imp\_name.c  
lib/gssapi/mechglue/g\_imp\_sec\_context.c

lib/gssapi/mechglue/g\_init\_sec\_context.c  
lib/gssapi/mechglue/g\_initialize.c  
lib/gssapi/mechglue/g\_inquire\_context.c  
lib/gssapi/mechglue/g\_inquire\_cred.c  
lib/gssapi/mechglue/g\_inquire\_names.c  
lib/gssapi/mechglue/g\_process\_context.c  
lib/gssapi/mechglue/g\_rel\_buffer.c  
lib/gssapi/mechglue/g\_rel\_cred.c  
lib/gssapi/mechglue/g\_rel\_name.c  
lib/gssapi/mechglue/g\_rel\_oid\_set.c  
lib/gssapi/mechglue/g\_seal.c  
lib/gssapi/mechglue/g\_sign.c  
lib/gssapi/mechglue/g\_store\_cred.c  
lib/gssapi/mechglue/g\_unseal.c  
lib/gssapi/mechglue/g\_userok.c  
lib/gssapi/mechglue/g\_utils.c  
lib/gssapi/mechglue/g\_verify.c  
lib/gssapi/mechglue/gssd\_pname\_to\_uid.c  
lib/gssapi/mechglue/mglueP.h  
lib/gssapi/mechglue/oid\_ops.c  
lib/gssapi/spnego/gssapiP\_spnego.h  
lib/gssapi/spnego/spnego\_mech.c

and the initial implementation of incremental propagation, including the following new or changed files:

include/iprop\_hdr.h  
kadmin/server/ipropd\_svc.c  
lib/kdb/iprop.x  
lib/kdb/kdb\_convert.c  
lib/kdb/kdb\_log.c  
lib/kdb/kdb\_log.h  
lib/krb5/error\_tables/kdb5\_err.et  
kprop/kpropd\_rpc.c  
kprop/kproplog.c

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That's all there is to it!  
\*uganda.txt\* For Vim version 8.2. Last change: 2020 Jan 08

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## SUMMARY

\*iccf\* \*ICCF\*

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---

Kibaale Children's Centre \*kcc\* \*Kibaale\* \*charity\*

Kibaale Children's Centre (KCC) is located in Kibaale, a small town in the south of Uganda, near Tanzania, in East Africa. The area is known as Rakai District. The population is mostly farmers. Although people are poor, there is enough food. But this district is suffering from AIDS more than any other part of the world. Some say that it started there. Estimations are that 10 to 30% of the Ugandans are infected with HIV. Because parents die, there are many orphans. In this district about 60,000 children have lost one or both parents, out of a population of 350,000. And this is still continuing.

The children need a lot of help. The KCC is working hard to provide the needy with food, medical care and education. Food and medical care to keep them healthy now, and education so that they can take care of themselves in the future. KCC works on a Christian base, but help is given to children of any religion.

The key to solving the problems in this area is education. This has been neglected in the past years with president Idi Amin and the following civil wars. Now that the government is stable again, the children and parents have to learn how to take care of themselves and how to avoid infections. There is also help for people who are ill and hungry, but the primary goal is to prevent people from getting ill and to teach them how to grow healthy food.

Most of the orphans are living in an extended family. An uncle or older sister is taking care of them. Because these families are big and the income (if any) is low, a child is lucky if it gets healthy food. Clothes, medical care and schooling is beyond its reach. To help these needy children, a sponsorship program was put into place. A child can be financially adopted. For a few dollars a month KCC sees to it that the child gets indispensable items, is healthy, goes to school and KCC takes care of anything else that needs to be done for the child and the family that supports it.

Besides helping the child directly, the environment where the child grows up needs to be improved. KCC helps schools to improve their teaching methods. There is a demonstration school at the centre and teacher trainings are given. Health workers are being trained, hygiene education is carried out and households are stimulated to build a proper latrine. I helped setting up a production site for cement slabs. These are used to build a good latrine. They are sold below cost price.

There is a small clinic at the project, which provides children and their family with medical help. When needed, transport to a hospital is offered. Immunization programs are carried out and help is provided when an epidemic is breaking out (measles and cholera have been a problem).

\*donate\*

Summer 1994 to summer 1995 I spent a whole year at the centre, working as a volunteer. I have helped to expand the centre and worked in the area of water and sanitation. I learned that the help that the KCC provides really helps. When I came back to Holland, I wanted to continue supporting KCC. To do this I'm raising funds and organizing the sponsorship program. Please consider one of these possibilities:

1. Sponsor a child in primary school: 17 euro a month (or more).
2. Sponsor a child in secondary school: 25 euro a month (or more).
3. Sponsor the clinic: Any amount a month or quarter
4. A one-time donation

Compared with other organizations that do child sponsorship the amounts are

very low. This is because the money goes directly to the centre. Less than 5% is used for administration. This is possible because this is a small organization that works with volunteers. If you would like to sponsor a child, you should have the intention to do this for at least one year.

How do you know that the money will be spent right? First of all you have my personal guarantee as the author of Vim. I trust the people that are working at the centre, I know them personally. Furthermore, the centre has been co-sponsored and inspected by World Vision, Save the Children Fund and is now under the supervision of Pacific Academy Outreach Society. The centre is visited about once a year to check the progress (at our own cost). I have visited the centre myself many times, starting in 1993. The visit reports are on the ICCF web site.

If you have any further questions, send me e-mail: <Bram@vim.org>.

The address of the centre is:  
Kibaale Children's Centre  
p.o.

box 1658  
Masaka, Uganda, East Africa

Sending money: \*iccf-donations\*

Check the ICCF web site for the latest information! See [iccf] for the URL.

USA: The methods mentioned below can be used.

Sending a check to the Nehemiah Group Outreach Society (NGOS) is no longer possible, unfortunately. We are looking for another way to get you an IRS tax receipt.

For sponsoring a child contact KCF in Canada (see below). US checks can be sent to them to lower banking costs.

Canada: Contact Kibaale Children's Fund (KCF) in Surrey, Canada. They take care of the Canadian sponsors for the children in Kibaale. KCF forwards 100% of the money to the project in Uganda. You can send them a one time donation directly. Please send me a note so that I know what has been donated because of Vim. Ask KCF for information about sponsorship.

Kibaale Children's Fund c/o Pacific Academy

10238-168 Street

Surrey, B.C. V4N 1Z4

Canada

Phone: 604-581-5353

If

you make a donation to Kibaale Children's Fund (KCF) you will receive a tax receipt which can be submitted with your tax return.

Holland: Transfer to the account of "Stichting ICCF Holland" in Lisse.

This will allow for tax deduction if you live in Holland.

Postbank, nr. 4548774

IBAN: NL95 INGB 0004 5487 74

Germany: It is possible to make donations that allow for a tax return.

Check the ICCF web site for the latest information:

<http://iccf-holland.org/germany.html>

World: Use a postal money order. That should be possible from any country, mostly from the post office. Use this name (which is in my passport): "Abraham Moolenaar". Use Euro for the currency if possible.

Europe: Use a bank transfer if possible. Your bank should have a form that you can use for this. See "Others" below for the swift code and IBAN number.



Any other method should work. Ask for information about sponsorship.

Credit Card: You can use PayPal to send money with a Credit card. This is

the most widely used Internet based payment system. It's really simple to use. Use this link to find more info:

[https://www.paypal.com/en\\_US/mrb/pal=XAC62PML3GF8Q](https://www.paypal.com/en_US/mrb/pal=XAC62PML3GF8Q)

The e-mail address for sending the money to is:

Bram@iccf-holland.org

For amounts above 400 Euro (\$500) sending a check is preferred.

Others: Transfer to one of these accounts if possible:

Postbank, account 4548774

Swift code: INGB NL 2A

IBAN: NL95 INGB 0004 5487 74

under the name "stichting ICCF Holland", Lisse

If that doesn't work:

Rabobank Lisse, account 3765.05.117

Swift code: RABO NL 2U

under the name "Bram Moolenaar", Lisse

Otherwise, send a check in euro or US dollars to the address below. Minimal amount: \$70 (my bank does not accept smaller amounts for foreign check, sorry)

Address to send checks to:

Bram Moolenaar

Finsterruetihof 1

8134 Adliswil

Switzerland

This address is expected to be valid for a long time.

vim:tw=78:ts=8:noet:ft=help:norl:

/\*

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## 1.339 x-crypto v0.29.0

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## 1.340 makedumpfile child component of elfutils

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Version 2, June 1991

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```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
'Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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